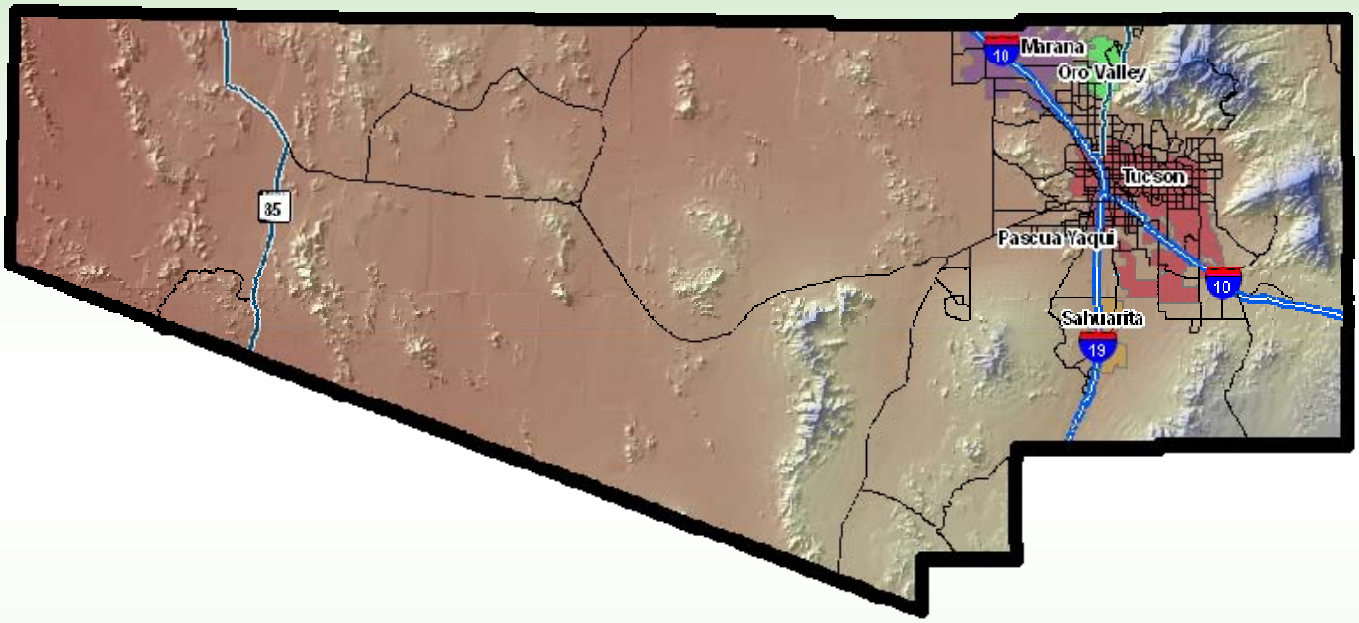
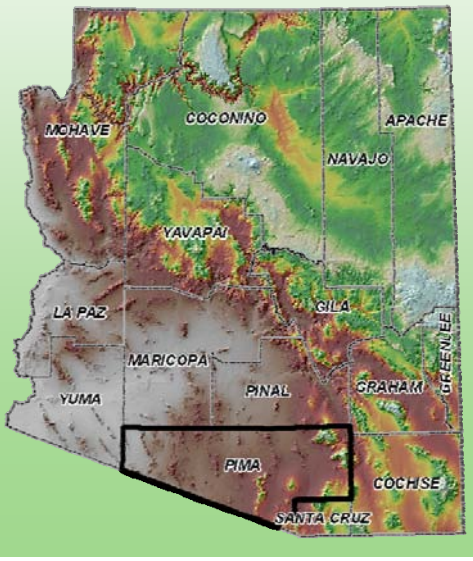
Pima County Multi-Jurisdictional Hazard Mitigation Plan 2012





EXECUTIVE SUMMARY

Across the United States, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense and damaged businesses cannot contribute to the economy. The time, money and effort to respond to and recover from these emergencies or disasters divert public resources and attention from other important programs and problems. With 43 federal or state declarations, 333 other significant events, and a combined total of 376 disaster events recorded, the four jurisdictions and one tribe within Pima County, Arizona participating in this planning effort, recognize the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards. The county and jurisdictions also know that with careful selection, mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the impact of natural and human-caused hazards.

The elected and appointed officials of Pima County, Marana, Oro Valley, Pascua Yaqui Tribe, Sahuarita, South Tucson, and Tucson, demonstrated their commitment to hazard mitigation in 2005-2006 by preparing the first Multi-Jurisdictional Hazard Mitigation Plan (2007 Plan). The 2007 Plan was developed through a planning effort that resulted in a multi-jurisdictional plan. The 2007 Plans was approved by FEMA on January 26, 2007, and requires a full FEMA approved update prior to the subsequent five year expiration. The Pascua Yaqui Tribe also participated in the 2005-2006 planning effort and received what was then known as a modified state plan approval that will require updating to a tribal plan.

In response, the Arizona Division of Emergency Management (ADEM) secured a federal planning grant and hired JE Fuller/ Hydrology & Geomorphology, Inc. to assist the county, tribe and participating jurisdictions with the update process. Pima County reconvened a multi-jurisdictional planning team comprised of veteran and first-time representatives from each participating jurisdiction, various county departments and organizations, ADEM, local fire and flood control districts, and the Pascua Yaqui Tribe and Tohono O'odham Nation. The Planning Team met four times during the period of February to May 2011 in a collaborative effort to review, evaluate, and update the 2007 Plan. In addition, the Pascua Yaqui Tribe also met twice within the same time period to develop the tribe-specific planning elements required for a Tribal Plan approval. The resulting Pima County Multi-Jurisdictional Hazard Mitigation Plan (Plan) will continue to guide the county, tribe and participating jurisdictions toward greater disaster resistance in full harmony with the character and needs of the community and region.

The Plan and accompanying Tribal Plan elements have been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S. C. 5165, enacted under Sec. 104 the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October, 2007. The Plan identifies hazard mitigation measures intended to eliminate or reduce the effects of future disasters throughout the county, and was developed in a joint and cooperative venture by members of the Pima County Planning Team.

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SECTION 1: JURISDICTIONAL ADOPTION AND FEMA APPROVAL

Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include…] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted*.

Requirement §201.6(d)(3): *A local jurisdiction must review and revise its plan to reflect changes in development ,progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.*

1.1 DMA 2000 Requirements

1.1.1 General Requirements

The Pima County Multi-Jurisdictional Hazard Mitigation Plan (the Plan) has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), 42 U.S.C. 5165, as amended by Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) Public Law 106-390 enacted October 30, 2000. The regulations governing the mitigation planning requirements for local mitigation plans are published under the Code of Federal Regulations (CFR) Title 44, Section 201.6 (44 CFR §201.6). Minimum requirements for tribal mitigation plans are published under CFR Title 44, Section 201.7 (44 CFR §201.7). Additionally, a DMA 2000 compliant plan that addresses flooding will also meet the minimum planning requirements for the Flood Mitigation Assistance program as provided for under 44 CFR §78.

DMA 2000 provides requirements for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning[1]. The local mitigation plan is the representation of the jurisdictions' commitment to reduce risks from hazards, serving as a guide for decision makers as they commit resources to reducing the effects of hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

Under 44 CFR §201.6 and §201.7, local and tribal governments must have a Federal Emergency Management Agency (FEMA)-approved local / tribal mitigation plan in order to apply for and/or receive funding under the following hazard mitigation assistance programs:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Repetitive Flood Claims (RFC), at FEMA's discretion
- Severe Repetitive Loss (SRL)
- Public Assistance Categories C – G, applies to Tribes

1.1.2 Tribal Assurance

The Pascua Yaqui Tribe will comply with all applicable Federal Statutes and regulations during the periods for which it receives grant funding, in compliance with 44CFR 13.11(c) and the DMA 2000 requirement §201.7(c)(6), and will amend its plan whenever necessary to reflect changes in tribal or Federal laws and statutes as required in 44CFR 13.11(d).

[1] FEMA, 2008, *Local Multi-Hazard Mitigation Planning Guidance*

1.1.3 Update Requirements

DMA 2000 requires that existing plans be updated every five years, with each plan cycle requiring a complete review, revision, and re-approval of the plan at both the state and FEMA level. Pima County, the Pascua Yaqui Tribe, and the incorporated communities of Marana, Oro Valley, Sahuarita, South Tucson, and Tucson are covered by a FEMA approved multi-jurisdictional hazard mitigation plan. The Tohono O'odham Nation (TON) also participated in the 2006-2007 planning work, but chose to develop a stand-alone tribal plan using a separate planning process. The TON Tribal Plan was approved by FEMA in late 2009. The Plan is the result of a planning process performed by the Pima County jurisdictions to update the current multi-jurisdictional plan developed in the 2006-2007. It is duly noted that TON participated in the current planning effort, but will not be an adopting jurisdiction as the nation already has their own plan.

1.2 Official Record of Adoption

Adoption of the Plan is accomplished by the governing body for each participating jurisdiction in accordance with the authority and powers granted to those jurisdictions by either the State of Arizona or the federal government. The officially participating jurisdictions in the Plan include:

County	Tribes	Cities	Towns
• Pima	• Pascua Yaqui Tribe	• City of Tucson	• Town of Marana • Town of Oro Valley • Town of Sahuarita

The City of South Tucson was a partial participant in the plan update process, but chose not to complete the process and therefore is not included in this Plan. All other jurisdictions may keep copies of official adoption documents in Appendix A of their copy of the Plan.

1.3 FEMA Approval Letter

The Plan was submitted to the Arizona Division of Emergency Management (ADEM), the authorized state agency, and FEMA for review and approval. FEMA's approval letter may be provided on the following page.

[Insert FEMA Approval Letter Here]

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SECTION 2: INTRODUCTION

2.1 Plan History

In 2004 through 2006, Pima County, the Pascua Yaqui Tribe, the Tohono O'odham Nation, and the incorporated communities of Marana, Oro Valley, Sahuarita, South Tucson and Tucson participated in a mitigation planning process that resulted in the development of the Pima County Multi-Jurisdictional Hazard Mitigation Plan (URS, 2007), herein referred to as the 2007 Plan. As previously mentioned, all jurisdictions except the Tohono O'odham Nation formally adopted the 2007 Plan. The 2007 Plan received official FEMA approval on January 26, 2007 and is nearing the end of the 5-year planning cycle.

2.2 Plan Purpose and Authority

The purpose of the Plan is to identify hazards that impact the various jurisdictions located within Pima County, assess the vulnerability and risk posed by those hazards to community-wide human and structural assets, develop strategies for mitigation of those identified hazards, present future maintenance procedures for the plan, and document the planning process. The Plan is prepared in compliance with DMA 2000 requirements and represents a multi-jurisdictional update of the 2007 Plan.

Pima County and all of the Cities and Towns are political subdivisions of the State of Arizona and are organized under Title 9 (cities/towns) and Title 11 (counties) of the Arizona Revised Statutes (ARS).

The Pascua Yaqui Tribe is a federally recognized tribe, organized and established as a sovereign nation pursuant to the provisions of the Indian Reorganization Act of June 18, 1934. The Pascua Yaqui Tribe achieved federal recognition as an established tribe on September 18, 1978 and became recognized as a historic tribe in 1994. In 1988, the tribe's first constitution was approved. The Pascua Yaqui Tribe is governed by a tribal council that is made up of eleven elected officials who are dedicated to the well being and advancement of the tribe as a whole.

Accordingly, each of the participating jurisdictions is empowered to formally plan and adopt the Plan on behalf of their respective jurisdictions.

Funding for the development of the Plan was provided through a PDM planning grant obtained by the State of Arizona from FEMA. JE Fuller/ Hydrology & Geomorphology (JE Fuller) was retained by Arizona Division of Emergency Management (ADEM) to provide consulting services in guiding the planning process and Plan development.

2.3 General Plan Description

The Plan is generally arranged and formatted to be consistent with the 2010 State of Arizona Multi-Hazard Mitigation Plan (State Plan) and is comprised of the following major sections:

Planning Process – this section summarizes the planning process used to update the Plan, describes the assembly of the planning team and meetings conducted, and summarizes the public involvement efforts.

Community Description – this section provides an overall description of the participating jurisdictions and the County as a whole.

Risk Assessment – this section summarizes the identification and profiling of natural and human-caused hazards that impact the County and the vulnerability assessment for each hazard that considers exposure/loss estimations and development trend analyses.

Mitigation Strategy – this section presents a capability assessment for each participating jurisdiction and summarizes the Plan mitigation goals, objectives, actions/projects, and strategy for implementation of those actions/projects.

Plan Maintenance Strategy – this section outlines the proposed strategy for evaluating and monitoring the Plan, updating the Plan in the next 5 years, incorporating plan elements into existing planning mechanisms, and continued public involvement.

Plan Tools – this section includes a list Plan acronyms and a glossary of definitions.

2.4 Overall Plan Update Process

The Plan is the result of a thorough update process that included a section by section review and evaluation of the 2007 Plan by the planning participants. The Plan is similar in arrangement to the 2007 Plan, with some slight modifications to fit the State Plan template.

At the onset of the planning process, ADEM printed copies of the 2007 Plan and provided them to each respective jurisdiction as a working document for their review and use during the planning process. This way the jurisdictions could keep their original 2007 Plan intact and unmarked. Digital versions of the 2007 Plan were also made available to planning team members for further distribution as needed. The Planning Team reviewed each section of the 2007 Plan during the first meeting, wherein the plan's purpose was explained, sections were discussed, and the plans' relation to the DMA 2000 requirements were summarized. Use of the 2007 Plan provided the seed material for subsequent discussions on how to update and improve the Plan. Planning participants were requested bring their working copy to every meeting as the team stepped through each stage of the update process and reviewed each 2007 Plan section in greater detail. Table 2.1 summarizes the review and analysis of each section of the 2006 Plans and generally describes what changes were or were not made and why. Additional details of that process are also discussed in the following sections of this Plan as appropriate.

Table 2-1: Summary of 2007 Plan review and 2012 Plan correlation

2007 Plan Section	2012 Plan Section	Review and Changes Description (2007 Plan to the 2012 Plan)
1	Executive Summary	• Executive Summary was moved to be located prior to the Table of Contents.
2	1	• Plan format changes were made to make the Plan more compatible with the 2007 State Plan format. • Moved 2007 Plan Section 2 discussions to 2012 Plan Section 1. • Expanded section to include the Tribal Assurance and a description of the update requirements.
3.1	1.1.1	• Removed discussion on Growing Smarter as it is not directly tied to DMA 2000
3.2	2.2	• Text edited to reflect the update process and tribal requirements
3.3	2.3	• Changed text to be more concise.
3.4	3.4	• Reorganized planning team participation and organization sections • Added a new section to address agency/organization participation and changes between the 2007 Plan and 2012 Plan.
3.5	Various (See Description)	• Redistributed the various sub elements of Section 3.5 to the 2012 Plan sections. o 3.5.1 through 3.5.4 are now summarized in Section 3.4 o 3.5.5 is now 3.5 o 3.5.6 is now 3.6 o 3.5.7 is now addressed in Section 6 o 3.5.8 is now eliminated
4	4	• Generally have kept the same information, just rearranged somewhat

Table 2-1: Summary of 2007 Plan review and 2012 Plan correlation

2007 Plan Section	2012 Plan Section	Review and Changes Description (2007 Plan to the 2012 Plan)
5	5	• The whole structure of the risk assessment was revised to provide a hazard based approach to the subsections. The planning team felt this would make the plan easier to understand and follow. • Each hazard profile and vulnerability analysis was carefully reviewed and updated to reflect either more current or totally new data. • Several hazards have either been dropped or combined into a new classification to generally follow the hazard list produced with the State Plan. • Asset inventories were updated and refined to make them more complete and current. • New sections pertaining to environmental risk and a consequence/impacts evaluation have been added to address EMAP requirements.
6	6	• A review of the goals and objectives subsection resulted in a significant change to much simpler goals and objectives. Reasoning for the changes are summarized in Section 6.1 • The first table of the capability assessment was reformatted to provide an "at-a-glance" summary of the elements and the departments responsible for their maintenance. • Tables summarizing previous mitigation activities for each jurisdiction were provided to document past mitigation activities • Section addressing the NFIP program was added in compliance to requirement changes from the 2007 Plan to the 2012 Plan • Each mitigation action/project in the 2007 Plan were reviewed and assessed by the respective jurisdiction. Tables summarizing the results are provided • Planning team chose to combine the data in Section 6.4 into one table to have all the details of the new mitigation actions/projects in one table.
7	7	• Reorganized the subsections as follows: o 7.1.1 and 7.1.2 are now 7.1 o 7.1.3 is now 7.2 o 7.1.4 is now 7.3 o 7.1.5 is now 7.4 • In general, the review of this section highlighted the lack of plan maintenance actually performed and forced a better definition of future efforts. It is anticipated that a multi-jurisdictional plan will provide the platform for a more regular review. • Added text to discuss review past plan maintenance activities and reasons for successes/failures. • Identified the need to expand Section 7.3 to provide a better explanation of plan incorporation by each of the jurisdictions. • Identified a need to provide more definition and specificity to the approach in Section 7.4. Revised to be more specific in the types and schedules of future public involvement opportunities.

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SECTION 3: PLANNING PROCESS

§201.6 (b): *Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

§201.6(c)(1)*: [The plan shall include…] (1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

This section includes the delineation of various DMA 2000 regulatory requirements, as well as the identification of key stakeholders and planning team members within Pima County. In addition, the necessary public involvement meetings and actions that were applied to this process are also detailed.

3.1 Planning Process Description

ADEM applied for and received a PDM planning grant to fund a multi-jurisdictional effort to review and update the 2007 Plan. Once the grant was received, ADEM then selected JE Fuller to work with the participating jurisdictions and guide the planning process. An initial project kick-off meeting between ADEM and JE Fuller was convened in September 2010 to begin the planning process, outline the plan objectives, outline the anticipating meeting agendas for the planning efforts, and to discuss the new plan format and other administrative tasks. A total of four multi-jurisdictional planning team meetings were conducted over the period of February through May 2011, beginning with the first meeting on February 3, 2011. Two separate tribal planning meeting were also conducted with the Pascua Yaqui Tribe officials on April 12 and May 18, 2011. Throughout that period of time and for several months afterward, all work required to collect, process, and document updated data and make changes to the plan was performed, culminating in a draft of the Plan. Details regarding key contact information and promulgation authorities, the planning team selection, participation, and activities, and public involvement are discussed in the following sections.

3.2 Previous Planning Process Assessment

The first task of preparation for this Plan, was to evaluate the process used to develop the 2007 Plan. The previous planning process involved selecting a representative from each jurisdiction in Pima County to serve as a lead contact for a steering committee. Each lead identified a jurisdiction-level local planning group that included decision-makers from police, fire, emergency services, community development/planning, transportation, economic development, public works and emergency response/services personnel within their jurisdiction. The local planning group assisted the leads in execution of the various planning elements and the leads brought this information to the steering committee meetings. Homework assignments were given at each of the steering committee meetings, and the homework was completed by the local planning group and returned to the study contractor for compilation into the 2007 Plan.

A conclusion of the assessment was that the prior planning process was sufficiently effective and would basically be replicated for the updating of the Plan. The proposed planning process was presented and discussed at the first multi-jurisdictional planning team meeting to verify the planning team agreement. Less than half of the planning team members were returning members from the 2007 Plan steering committee and were familiar with the prior planning process. No objections or alterations were raised or suggested.

3.3 Primary Point of Contact

Table 3-1 summarizes the primary points of contact identified for each participating jurisdiction.

Table 3-1: List of jurisdictional primary points of contact

Jurisdiction	Name	Department / Position	Address	Phone	Email
Pima County	Jeff Guthrie	Office of Emergency Management and Homeland Security / Operations Manager	33 N. Stone Suite 1490 Tucson, AZ 85701	520-798-0600	jeff.guthrie@pima.gov
Town of Marana	Steve Johnson	Police Department, Homeland Security and Internal Affairs / Sergeant	11555 W. Civic Center Dr., Bldg B. Marana, AZ 85653	520-382-2034	sjohnson@marana.com
Town of Oro Valley	Charlotte Ackerman	Police Department / Regional Emergency Response Planner	11000 N. La Cañada Dr. Oro Valley, AZ 85737	520-229-4950	cackerman@orovalleyaz.gov
Pascua Yaqui Tribe	Andre Matus	Pascua Pueblo Fire Department / Fire Chief	4631 W. Calle Torim Tucson, AZ 85757	520-879-5723	andre.matus2@pascuayaqui-nsn.gov
Town of Sahuarita	Edward Pope	Police Department / Regional Emergency Response Planner	315 W. Sahuarita Center Way Sahuarita, AZ 85629	520-344-7003	epope@ci.sahuarita.az.us
City of South Tucson	*none provided*	*none provided*	*none provided*	*none provided*	*none provided*
City of Tucson	Jan McLay	Office of Emergency Management and Homeland Security / Emergency Management Director	300 S. Fire Central Place Tucson, Arizona 85701	520-837-7380	jan.mclay@tucsonaz.gov

3.4 Planning Teams

Two levels of planning teams were organized for the development of this Plan. The first was a Multi-Jurisdictional Planning Team (Planning Team) that was comprised of one or more representatives from each participating jurisdiction. The second was an optional Local Planning Team.

The role of the Planning Team was to work on the coordination, research, and planning element activities required to update the 2007 Plan. Attendance by each participating jurisdiction was required for every Planning Team meeting, as the meetings were structured to progress step-by-step through the planning process. Steps and procedures for updating the 2007 Plan were presented and discussed at each Planning Team meeting, and assignments were given as necessary. Each meeting built on information discussed and assignments given at the previous meeting. The Planning Team also had the responsibility of liaison to Local Planning Team(s), and was tasked with:

- Conveying information and assignments to the Local Planning Team
- Ensuring all requested assignments were completed fully and returned on a timely basis.
- Arranging for review and official adoption of the Plan.

The function and role of the Local Planning Team was to:

- Provide support and data
- Assist the Planning Team representative with assignments
- Make planning decisions regarding Plan components
- Review the Plan draft documents

3.4.1 Planning Team Assembly

At the beginning of this planning process, the Pima County Office of Emergency Management and Homeland Security (PCOEM) organized and identified members for the Planning Team by initiating contact with, and extending invitations to, all incorporated communities and Indian tribes within the county limits. Other entities that were subsequently invited to participate are discussed in Section

3.4.3. The participating members of the Planning Team are summarized in Table 3-2. Returning planning team members are highlighted.

Table 3-2: Multi-jurisdictional planning team participants

Name	Jurisdiction / Organization	Department / Position	Planning Team Role
Char Ackerman	Town of Oro Valley / Police Department	Emergency Planner	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Charles Barclay	Arizona Department of Transportation / Tucson District	Superintendent	Planning Team participant
Robert Bereiter	Town of Marana / Police Department	Emergency Planner	Planning Team participant Local Planning Team resource
Keith Brann	Town of Marana / Development - Engineering	Town Engineer	Planning Team participant Local Planning Team resource
Lindy Brigham	Southern Arizona Buffelgrass Coordination Center /	Executive Director	Planning Team participant Local Planning Team resource
Bret Canale	Town of Marana / GIS	GIS DB Analyst	Planning Team participant Local Planning Team resource
Anna Casadei	Town of Sahuarita / Planning & Zoning Department	Senior Planner	Planning Team participant Local Planning Team resource
Paul Casertano	Pima Association of Governments / Planning	Operations & Safety Lead	Planning Team participant Local Planning Team resource
Dan Contorno	Marana Unified School District / CFO	CFO	Planning Team participant
Dane Crouse	Drexel Heights Fire District / Operations	Battalion Chief	Planning Team participant Local Planning Team resource
Brian Delfs	Avra Valley Fire District / Fire Department	Fire Chief	Planning Team participant Local Planning Team resource
Andy D'Entremont	Pima County / Office of Emergency Management	Planner	Planning Team participant Local Planning Team resource
Sandra Espinoza	Tohonon O'odham Nation / Office of Emergency Management	Hazard Mitigation Specialist	Jurisdictional Point of Contact Planning Team participant
Jane Fairall	Town of Marana / Legal	Deputy Town Attorney	Planning Team participant Local Planning Team resource
Jordan Feld	Tucson Airport Authority / Planning Department	Director	Planning Team participant Local Planning Team resource
Griselda Moya Flores	Pima County / Office of Emergency Management and Homeland Security	Administrative Support	Planning Team participant Local Planning Team resource
Jeff Guthrie	Pima County / Office of Emergency Management and Homeland Security	Operations Manager	Planning Team Primary Point of Contact Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Barb Harris	City of Tucson / Police Department - Office of Emergency Management	Emergency Planner	Jurisdictional Point of Contact Joint coordinator for LPT Planning Team participant
Thomas Helfrich	Pima County / Flood Control District	Manager	Planning Team participant Local Planning Team resource
Steven Johnson	Town of Marana / Police Department	Sergeant / Emergency Coordinator	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Paul Keesler	Town of Oro Valley / Development Services	Permitting Manager	Planning Team participant Local Planning Team resource
Jim Kress	City of Tucson / Fire Department - EM / HS	Captain	Planning Team participant Local Planning Team resource
Brian Lauber	Arizona State Land Department / State Forestry Division - Tuscon District	District Forester	Planning Team participant Local Planning Team resource
Rafael Leon	Tucson Airport Authority / Sound Insulation	Program Representative	Planning Team participant Local Planning Team resource

Table 3-2: Multi-jurisdictional planning team participants

Name	Jurisdiction / Organization	Department / Position	Planning Team Role
Michael Losada	Tucson Airport Authority / Police Department	Corporal	Planning Team participant Local Planning Team resource
Andre Matus	Pascua Yaqui Tribe / Pascua Pueblo Fire Department	Fire Chief	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Janet McLay	City of Tucson / Office of Emergency Management	Emergency Management Coordinator	Jurisdictional Point of Contact Joint coordinator for LPT Planning Team participant
Mark Moore	Town of Oro Valley / Water Utility - Engineering	Design Reviewer	Planning Team participant Local Planning Team resource
Lee Muscarella	Golder Ranch Fire District / Suppression	Battalion Chief	Planning Team participant Local Planning Team resource
Scott Ogden	JE Fuller/ Hydrology & Geomorphology, Inc /	Project Manager / Senior Engineer	Consultant
Jennifer Pegnato	City of Tucson / Office of Emergency Management and Homeland Security / Police Department	Sergeant	Planning Team participant Local Planning Team resource
Ed Pope	Town of Sahuarita / Emergency Response	Planner	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Jose Rodriguez	Town of Oro Valley / DIS - Engineering	Engineering Division Manager	Planning Team participant Local Planning Team resource
Lisa Romero	Pima County / Office of Emergency Management and Homeland Security	Administrative Support	Planning Team participant Local Planning Team resource
Jim Rosovich	Pascua Yaqui Tribe / Contracting Procurement	Contracting Officer	Planning Team participant Local Planning Team resource
Jim Schneden	City of Tucson / Police Department - Homeland Security	Sergeant	Planning Team participant Local Planning Team resource
Lisa Shafer	Town of Marana / Planning	Planning Director	Planning Team participant Local Planning Team resource
Nicolas Siemsen	Pima County / Office of Emergency Management and Homeland Security	Program Coordinator	Planning Team participant Former Jurisdictional Point of Contact
James Stoltenberg	Rural/Metro Fire District / Fire Department	Deputy Chief	Planning Team participant Local Planning Team resource
Liz Temple	Pima County / Office of Emergency Management and Homeland Security	Compliance Officer	Management level support for planning effort, Mitigation strategy development
T. Vanhook	Town of Marana / Community Development	Director	Planning Team participant Local Planning Team resource
Henry Vega	City of South Tucson / Public Works	Director	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Jim Vogelsberg	City of Tucson / Planning & Development	Administrator	Planning Team participant Local Planning Team resource
John Wisner	Pima County / Office of Emergency Management and Homeland Security	Program Coordinator	Planning Team participant Local Planning Team resource
Susan Wood	Arizona Division of Emergency Management / Mitigation Division	Planning Manager	Management level support for planning effort, Mitigation strategy development

Lists of Local Planning Team members and their respective roles, for each jurisdiction, are provided in Appendix B.

3.4.2 Planning Team Activities

The Planning Team met for the first time on February 3, 2011 to begin the planning process. Three more meetings were convened on about a monthly basis to step through the plan review and update process. Planning Team members used copies of the 2007 Plan for review and reference. Following each Planning Team meeting, the Point of Contact for each jurisdiction would convene meetings with the Local Planning Team as needed to work through the assignments. Two tribal planning meeting meetings were convened with officials from the Pascua Yaqui Tribe to review and update the tribal plan elements required per 44 CFR §201.7. Table 3-3 summarizes the Planning Team meetings along with a brief list of the agenda items discussed. Detailed meeting notes for all of the Planning Team meetings are provided in Appendix B. There are no details of the Local Planning Team meetings.

Table 3-3: Planning meetings convened as part of the plan update process

Meeting Type, Date, and Location	Meeting Agenda
Planning Team Meeting No. 1 February 3, 2011 Pima County Abrams Building Tucson, AZ	• INTRODUCTIONS / GREETING • MITIGATION PLANNING OVERVIEW • CURRENT MITIGATION PLAN REVIEW • PLANNING PROCESS a. MJ Planning Team Roles b. Public Involvement Strategy • RISK ASSESSMENT a. Hazard Identification / Profiling b. Asset Inventory • NEXT MEETING DATES • ACTION ITEM SUMMARY
Planning Team Meeting No. 2 March 8, 2011 Pima County Abrams Building Tucson, AZ	• EMAP ELEMENTS • ACTION ITEM REVIEW/STATUS • HAZARD PROFILING a. Finalize Hazard List b. CPRI • CAPABILITY ASSESSMENT a. Jurisdictional Capabilities b. Prior Mitigation Activities c. NFIP Participation and Status d. Repetitive Loss Properties • EXISTING MITIGATION ACTION/PROJECT EVALUATION • PLAN MAINTENANCE PROCEDURES • MEETING ENDING a. Review of action items b. Next meeting reminder/verification
Planning Team Meeting No. 3 March 8, 2011 Pima County Abrams Building Tucson, AZ	• ACTION ITEM REVIEW/STATUS • PLAN MAINTENANCE PROCEDURES a. Monitoring and Evaluation b. Plan Update c. Plan Incorporation d. Continued Public Involvement • GOALS AND OBJECTIVES REVIEW/UPDATE • MEETING ENDING a. Review of action items

Table 3-3: Planning meetings convened as part of the plan update process

Meeting Type, Date, and Location	Meeting Agenda
Planning Team Meeting No. 4 May 26, 2011 Pima County Abrams Building Tucson, AZ	• ACTION ITEM STATUS REVIEW • VULNERABILITY ANALYSIS REVIEW • MITIGATION ACTION/PROJECTS AND IMPLEMENTATION STRATEGY • MEETING ENDING a. Next Steps b. Action Item Summary
Tribal Planning Team Meeting Nos. 1 and 2 April 12, 2011 May 18, 2011 Pascua Pueblo Fire Department Tucson, AZ	• INTRODUCTION • MITIGATION PLANNING OVERVIEW • TRIBAL ASSURANCES • AGENCY COORDINATION • PLAN INTEGRATION • PUBLIC INVOLVEMENT • CULTURAL/SACRED SITE VULNERABILITY ASSESSMENT • CAPABILITY ASSESSMENT a. Summary of technical staff and personnel capabilities b. Summary of fiscal capabilities c. Summary of departments/entities with pre- and/or post-disaster hazard management responsibilities • MITIGATION STRATEGY PROGRESS ASSESSMENT

3.4.3 Agency/Organizational Participation

In addition to the adopting jurisdictions listed in Section 1.2, several agencies and organizations that operate within or have jurisdiction over small and large areas of Pima County were invited to participate in the planning process. Following the first Planning Team meeting, invitations were extended to several entities via both email and letter, to provide an opportunity for participation in the planning process. Copies of the various email and letter invitations are provided in Appendix B. The following is a partial list of the various agencies/organizations invited:

- Arizona Department of Transportation
- Arizona Division of Emergency Management
- Arizona State Land Department
- Avra Valley Fire District
- Drexel Heights Fire District
- Golder Ranch Fired District
- Marana School District
- Pima Association of Governments
- Pima County Department of Environmental Quality
- Pima County Department of Transportation
- Pima County Sheriff's Office
- Pima County Wastewater Management
- Pima Regional Flood Control District
- Tucson Electric Power Company
- Tucson Unified School District
- University of Arizona
- Raytheon Corporation
- Rural/Metro Fire District
- Southern Arizona Buffelgrass Committee
- Southwest Gas
- Tucson Airport Authority

Table 3-4 summarizes the organizations and agencies that participated in the 2007 Plan and their comparative participation in the 2011 plan update process. An explanation of the differences between the two lists is also provided where appropriate.

Table 3-4: Comparative summary of agency/organization participation in the plan update process

Agency / Organization	Participation		Explanation
	2007 Plan	2012 Plan	
City of South Tucson	yes	yes	Never finished the planning process for the 2012 Plan.
City of Tucson	yes	yes	
Davis Monthan Air Force Base	yes	no	No direct invitation was extended
Pascua Yaqui Tribe	yes	yes	
Pima Association of Governments	yes	yes	
Pima County	yes	yes	
Tohono O'odham Nation	yes	yes	
Town of Marana	yes	yes	
Town of Oro Valley	yes	yes	
Town of Sahuarita	yes	yes	
Tucson Unified School District	yes	no	Invited, but did not attend or participate.
Raytheon Corporation	yes	no	Invited, but did not attend or participate.
Veterans Medical Center	yes	no	No direct invitation extended

An integral part of the planning process included coordination with agencies and organizations outside of the participating jurisdiction's governance to obtain information and data for inclusion into the Plan or to provide more public exposure to the planning process. Much of the information and data that is used in the risk assessment is developed by agencies or organizations other than the participating jurisdictions. In some cases, the jurisdictions may be members of a larger organization that has jointly conducted a study or planning effort like the development of a community wildfire protection plan or participation in an area association of governments. Examples of those data sets include FEMA floodplain mapping, the community wildfire protection plans, severe weather statistics and incidents, and the Pima Association of Governments. A summary of the resources obtained, reviewed and compiled into the risk assessment are summarized at the end of each subsection of Section 5.3 and in Section 3.6. Jurisdictions needing these data sets obtained them by requesting them directly from the host agency or organization, downloading information posted to website locations, or engaging consultants.

3.5 Public Involvement

3.5.1 Previous Plan Assessment

The pre-draft public involvement strategy for the 2007 Plan included a press release that was sent to two local newspapers, the Arizona Daily Star and Tucson Citizen, as well as all area radio and television stations. Both newspapers published the press release. The County provided an e-mail address, telephone number, and a physical mailing address requesting interested citizens to participate in the planning and adoption processes.

No post-draft strategy was discussed in the 2007 Plan. However, the only way to promulgate the 2007 Plan was to go through a public meeting process wherein the resolutions of adoption would have been presented before the various council and board of supervisors meetings. The details of those meetings are not summarized in the 2007 Plan, but typically would some form of advertisement of the meeting agenda two to four weeks in advance of the council/board meeting.

There were no records of any public comment on the 2007 Plan adoption process. The Planning Team discussed the prior public involvement actions and concluded that the strategy used was sufficient, but should probably be augmented with more web-based technology for the update. Also, since any formal council/board action has a built-in public notification and comment opportunity, the Planning Team chose to continue using this process as one of the post-draft mechanisms for getting the Plan before the public.

3.5.2 Plan Update

Pre-draft public involvement and input to the planning process was encouraged cooperatively among all of the participating jurisdictions using the following strategies:

- Pima County will:
  - Post a notice to the county website.
  - Issue a press release similar to what was done for the 2007 Plan.
  - Coordinate the provision of links to the county's website with each jurisdiction once the website is up and running.
- Town of Marana will:
  - Post a notice to town's website with a link to the county's.
  - Publish an article/public notice in their local newspaper.
- Town of Oro Valley will:
  - Post a notice to town's website with a link to the county's.
- Pascua Yaqui Tribe will:
  - Post a notice to town's website with a link to the county's.
  - Publish an article/public notice in their local newspaper.
  - Provide an announcement on the local radio station
- Town of Sahuarita will:
  - Post a notice to town's website with a link to the county's.
  - Publish an article/public notice in their local newspaper.
  - Presentation/announcement at the Chamber of Commerce "For Our Cities" event.
- City of Tucson will:
  - Post a notice to city's website with a link to the county's.

Contact information provided on the websites and notices will at a minimum include a name, email, and phone information for the primary jurisdictional contact plus a link to the Pima County Office of Emergency Management and Homeland Security. Any comments will be addressed as appropriate and routed to the Planning Team Primary Point of Contact.

To date, there have been no questions, concerns, or responses received from the first round of notices from the general public.

The post-draft public involvement will include a second round of newspaper announcements and updating of the websites, to include specific instructions for obtaining or viewing a draft of the plan.

All of the notices, postings, and articles encouraged review and comment of the draft Plan by the public. Interested citizens were also encouraged to participate in the local community adoption process which, depending upon the jurisdiction, may have included a public meeting and a formal public hearing. Copies of the pre- and post-draft public notices, web pages, and newspaper notices are provided in Appendix C.

3.5.3 Tribal Definition of "Public"

The Pascua Yaqui Tribe has formulated the following statement to define "public" for the purposes of this planning effort to satisfy the Tribal Planning requirements:

"All residents of the Pascua Yaqui Reservation, as its boundaries may be revised from time to time."

3.6 Reference Documents and Technical Resources

Over the course of the update planning process, numerous other plans, studies, reports, and technical information were obtained and reviewed for incorporation or reference purposes. The majority of sources referenced and researched pertain to the risk assessment and the capabilities assessment. To a lesser extent, the community descriptions and mitigation strategy also included some document or technical information research. Table 3-5 provides a reference listing of the primary documents and technical resources reviewed and used in the Plan. Detailed bibliographic references for the risk assessment are provided at the end of each hazard risk profile in Section 5.3. Other bibliographic references are provided as footnotes.

Table 3-5: List of resource documents and references reviewed and incorporated in the plan update process

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
AZ Department of Commerce	Website Data and Community Profiles	Reference for demographic and economic data for the county. Used for community descriptions
AZ Division of Emergency Management	Data and Planning Resource	Resource for state and federal disaster declaration information for Arizona. Also a resource for hazard mitigation planning guidance and documents.
AZ Department of Water Resources	Technical Resource	Resource for data on drought conditions and statewide drought management (AzGDTF), and dam safety data. Used in risk assessment.
AZ Geological Survey	Technical Resource	Resource for earthquake, fissure, landslide/mudslide, subsidence, and other geological hazards. Used in the risk assessment.
AZ Model Local Hazard Mitigation Plan	Hazard Mitigation Plan	Guidance document for preparing and formatting hazard mitigation plans for Arizona.
AZ State Land Department	Data Source	Source for statewide GIS coverages (ALRIS) and statewide wildfire hazard profile information (Division of Forestry). Used in the risk assessment.
AZ Wildland Urban Interface Assessment (2004)	Report	Source of wildfire hazard profile data and urban interface at risk communities. Used in the risk assessment.
AZ Workforce Informer	Website	Source for employment statistics in Arizona.
Bureau Net (2010)	Website Database	Source for NFIP statistics for Arizona.
Census Bureau	Website Database	Source for 2010 Census demographics
Federal Emergency Management Agency	Technical and Planning Resource	Resource for HMP guidance (How-To series), floodplain and flooding related NFIP data (mapping, repetitive loss, NFIP statistics), and historic hazard incidents. Used in the risk assessment and mitigation strategy.
HAZUS-MH	Technical Resource	Based data sets within the program were used in the vulnerability analysis.
National Climatic Data Center	Technical Resource	Online resource for weather related data and historic hazard event data. Used in the risk assessment.
National Weather Service	Technical Resource	Source for hazard information, data sets, and historic event records. Used in the risk assessment.
National Wildfire Coordination Group (2010)	Technical Resource	Source for historic wildfire hazard information. Used in the risk assessment.
Pima Association of Governments	GIS Data	Source for demographic and 2010 Census block level data.
Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007)	Hazard Mitigation Plan	FEMA approved hazard mitigation plan that is the subject of the plan update process. See Section 2.4 for further discussion
Office of the State Climatologist for AZ	Website Reference	Reference for weather characteristics for the county. Used for community description.
Standard on Disaster/Emergency Management and Business Continuity Programs (2000)	Standards Document	Used to establish the classification and definitions for the asset inventory. Used in the risk assessment.
State of Arizona Hazard Mitigation Plan (2010)	Hazard Mitigation Plan	The state plan was used a source of hazard information and the state identified hazards were used as a starting point in the development of the risk assessment.
USACE Flood Damage Report (1978)	Technical Data	Source of historic flood damages for 1978 flood. Used in the risk assessment.

Table 3-5: List of resource documents and references reviewed and incorporated in the plan update process

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
USACE Flood Damage Report (1994)	Technical Data	Source of historic flood damages for 1993 flood. Used in the risk assessment.
US Forest Service	Technical Data	Source for local wildfire data. Used in the risk assessment.
US Geological Survey	Technical Data	Source for geological hazard data and incident data. Used in the risk assessment.
Western Regional Climate Center	Website Data	Online resource for climate data used in climate discussion of Section 4
World Wildlife Fund (2010)	GIS Data	Terrestrial ecoregions database used in the general county description.
Zillow	Technical Data	Source for assigning general residential structure replacement costs by region with the county.

SECTION 4: COMMUNITY DESCRIPTIONS

4.1 General

The purpose of this section is to provide updated basic background information on Pima County as a whole and includes information on geography, climate, population and economy. Abbreviated details and descriptions are also provided for each participating jurisdiction.

4.2 County Overview

4.2.1 History

Pima County is located in southern Arizona and encompasses 9,184 square miles. The second largest of the four original counties, Pima County was created by the first territorial legislature for Arizona on November 8, 1864. As originally constituted, Pima County included almost the entire portion of the United States originally acquired from Mexico in the Gadsen Purchase. Over time, portions of Pima County were carved off to create Maricopa, Pinal, Cochise, and Graham Counties.

Originally named for the Native American tribe inhabiting the area, evidence of the human settlement of Pima County dates back over 9,000 years. The Hohokam inhabited the area until the 1500s when they mysteriously disappeared. The Tohono O'odham were the next to settle the region and concentrated along the Santa Cruz and Gila Rivers. The arrival of the Spanish in the 1690s marked the first European peoples to establish settlements in the area. Missionary and explorer Father Eusebio Francisco Kino established the San Xavier del Bac mission, which still stands today as one of the preeminent examples of 18th century missionary architecture in the world. Throughout the 1700s the Spanish continued to settle throughout southern Arizona. In 1775, the Tucson presidio was built to protect settlers from raiding tribes of Apaches. Residents of the fort began to refer to it as the "Old Pueblo", which still remains today as a nickname for Tucson.

Rapid growth in the region occurred in the mid-1800s with the discovery of silver and gold and the arrival of prospectors from Mexico. With the expansion of mining and ranching in the late 1800s, Pima County continued to witness increasing populations as new residents migrated to the Tucson region settling in proximity to major transportation corridors. Slowly, development moved eastward from Tucson until abutting with federally owned land resulting in a trend reversal with new growth occurring to the northwest.

4.2.2 Geography

Pima County is located in the south-central portion of the State of Arizona, as depicted in Figure 4-1. The county limits generally extend from longitude 111.430 to 114.944 degrees west and latitude 31.846 to 32.192 degrees north.

Pima County lies within the Basin and Range Physiographic Province, characterized by northwest-trending mountain ranges separated by alluvial basins. Separated by the Tucson and Sierrita Mountains, a large portion of Pima County lies in two alluvial basins: Avra Valley to the west and the Tucson basin in the east. The regional drainage network, primarily formed by the Santa Cruz River and its tributaries, is dry for a majority of the year except during the spring runoff or from heavy storms.

Varying in elevation from desert valleys at roughly 1,200 feet to the 9,185-foot peak of Mount Lemmon, the county is home to diverse plant and animal communities. Numerous mountain ranges ring the Tucson basin, including the Santa Catalina, Rincon, Empire, Santa Rita, Sierrita, and Tucson mountains. Two cactus forests traverse the county – Saguaro National Park to the northeast and Organ Pipe Cactus National Monument in the southwestern portion. In addition, the County is home to the Cabeza Prieta National Wildlife Refuge nestled along the western boundary of the county and the Coronado National Forest in the eastern portion of the county within the Santa Catalina Mountains.

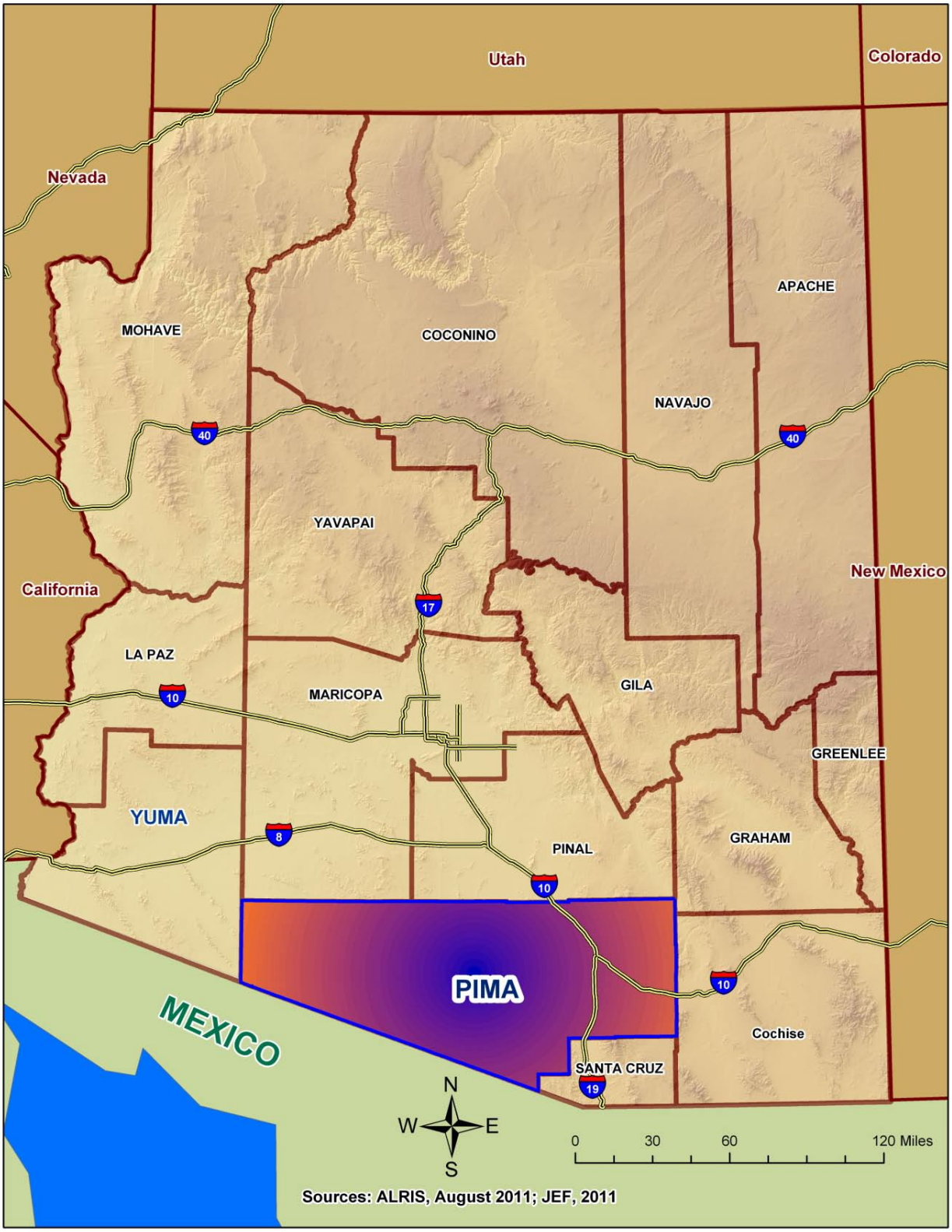


Figure 4-1: Vicinity Map

Other major natural features include Tortolita Mountain Park, Tucson Mountain Park, Colossal Cave Mountain Park, Cienega Creek Natural Preserve, and Agua Caliente Park.

The geographical characteristics of Pima County have been mapped into three terrestrial ecoregions , which are depicted in Figure 4-2 and described by the following:

- **Chihuahuan Desert** – this ecoregion is typical of the high altitude deserts and foothills and is found in much of the southeastern portion of Arizona. Elevations in this zone varies between 3,000 to 4,500 feet. The average temperatures for the Chihuahuan Desert tends to be cooler than the Sonoran Desert (see below) due to the elevation differences. However, like its lower elevation cousin, the summers are hot and dry with mild to cool winters.
- **Sierra Madre Occidental Pine-Oak Forest** – this ecoregion is predominant to mountainous regions in southeast Arizona with elevations generally above 5,000 feet. The average temperatures tend to be cool during the summer and cold in winter.
- **Sonoran Desert** – this ecoregion is an arid environment that covers much of southwestern Arizona. The elevation varies in this zone from approximately sea level to 3,000 feet. Vegetation in this zone is comprised mainly of Sonoran Desert Scrub and is one of the few locations in the world where saguaro cactus can be found. The climate is typically hot and dry during the summer and mild during the winter.

Land ownership within Pima County is divided between Indian Reservation (42%), Private (14%), U.S. Forest and Bureau of Land Management (12%), State Trust Land (15%), and other public lands (17%). Figure 4-3 represents the land ownership in Pima County.

4.2.3 Government

The governmental and administrative affairs of the unincorporated areas of Pima County are directed by a five-member Board of Supervisors with each member elected from a designated district to serve a four-year term. The chairperson is selected by the Board from among its members. Other elected officials, often referred to as constitutional officers, are the Assessor, Clerk of the Superior Court, the Constables, County Attorney, Recorder, School Superintendent, Sheriff, and Treasurer. Presiding judges are appointed from elected members of the judicial bench.

Because of Arizona's constitutional provisions and the requirements promulgated by Arizona Revised Statutes, the government of Pima County is organized to have a direct and indirect relationship with the Board of Supervisors. The Board of Supervisors has direct control over the County's general government functions; community services; indigent defense; medical, health, and welfare services; and public works functions. These broad functions include the County's internal governmental administrative/ management activities; maintenance and construction of the County's sewerage and sanitation infrastructures; County streets, roads, and bridges which comprise the County's transportation infrastructure; natural resources, parks, community centers, recreational facilities and libraries (in cooperation with the city of Tucson); and numerous clinics. Indirect relationships are maintained with the elected officials. The Board of Supervisors appoints a County Administrator to be responsible for the general direction, supervision, administration, and coordination of all affairs of the county.

Each of the five municipalities in the county (Marana, Oro Valley, Sahuarita, South Tucson, and Tucson) are governed by council-manager form of government, with an elected Council consisting of seven members, including a mayor and vice mayor and an appointed town or city manager. The Pascua-Yaqui Tribe is governed by an elected tribal council. Each of the municipalities and the tribal community are described in more detail in Section 4.3 below.

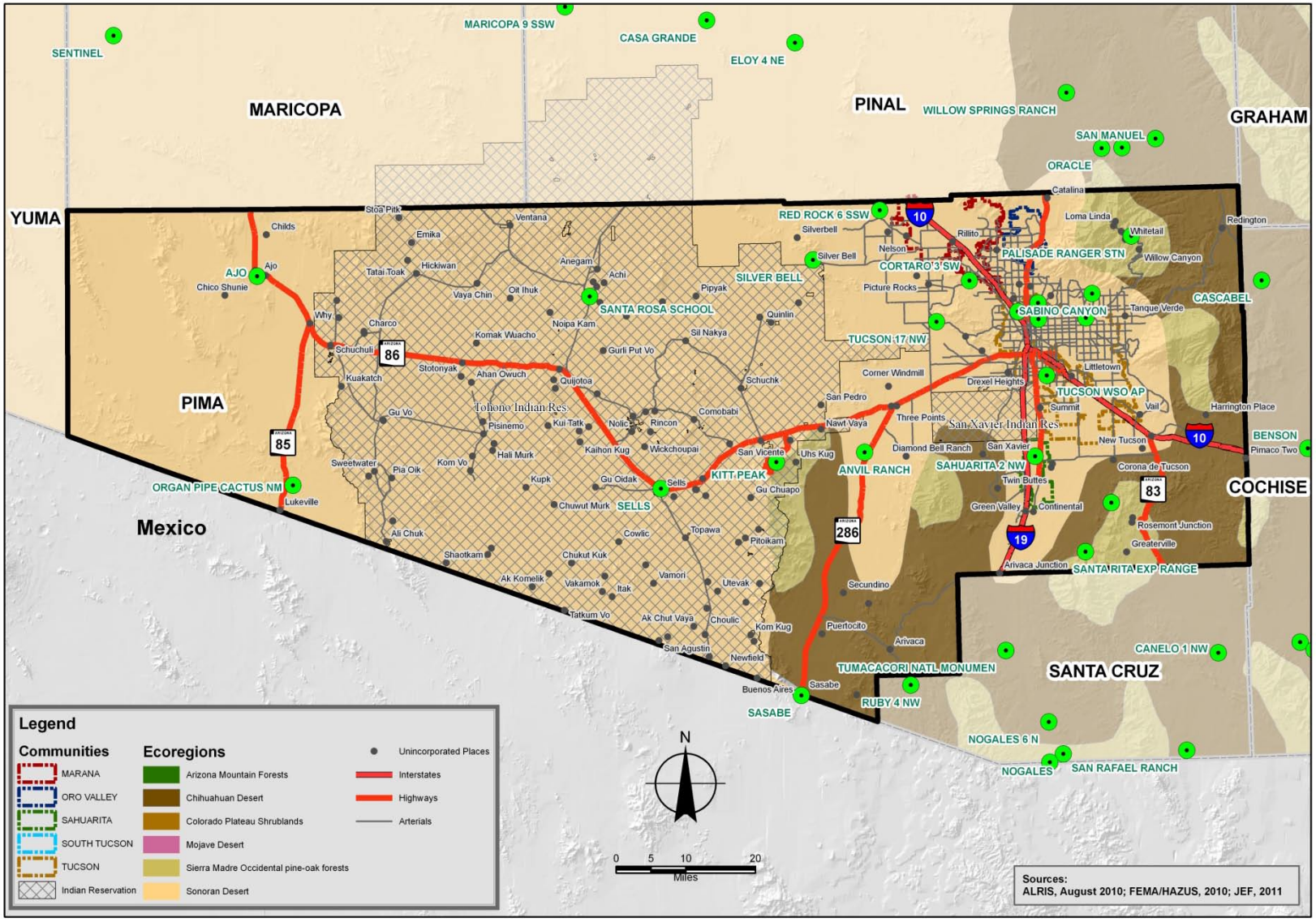


Figure 4-2: Ecoregions Map

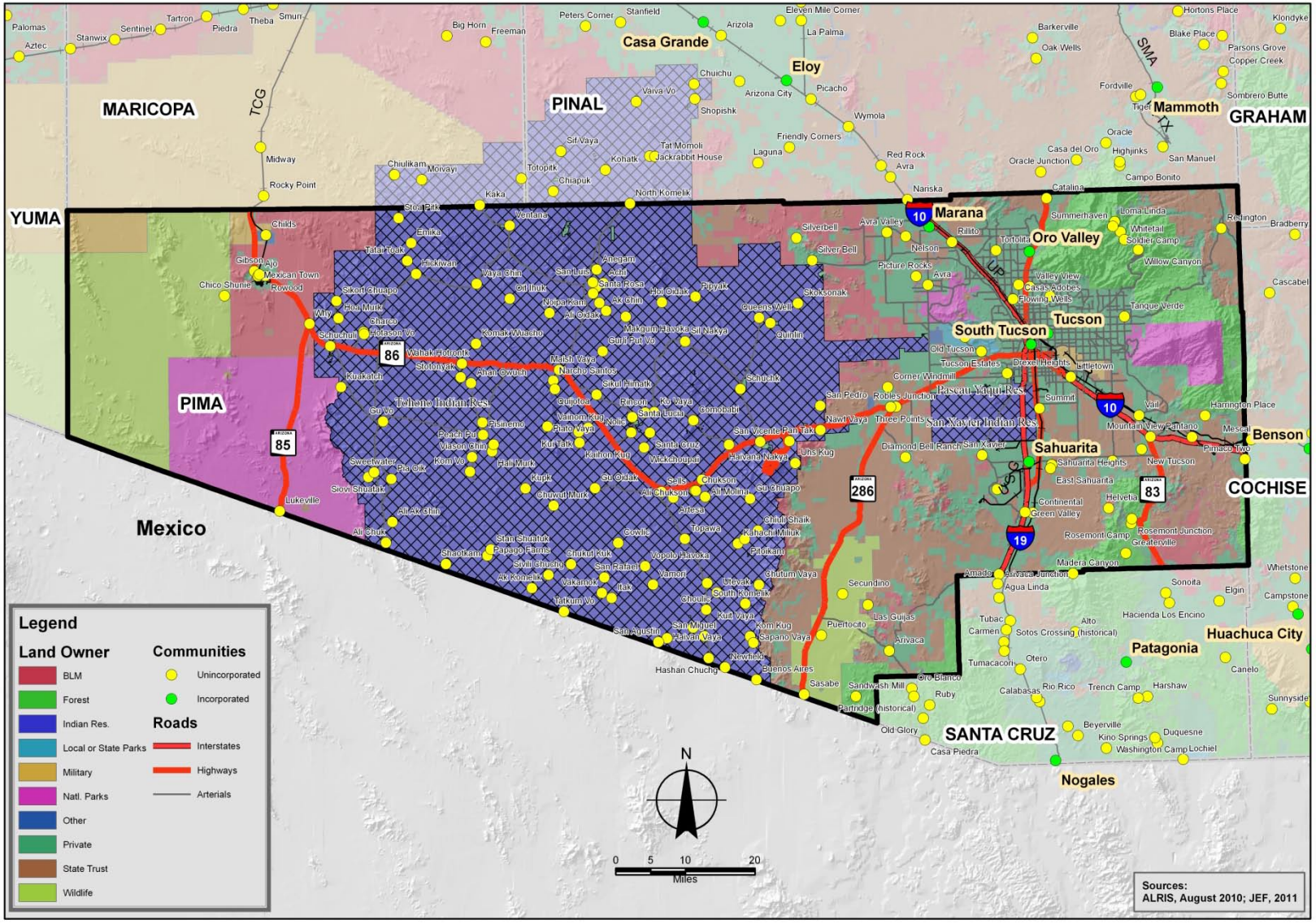


Figure 4-3: Community Location and Land Ownership Map

4.2.4 Geology

Pima County is comprised of a complex geology reflective of a history of faulting and folding of the earth's crust. The mountains include sedimentary, metamorphic volcanic, or intrusive igneous rock, or a combination of the three. The alluvial basins consist of well-consolidated sediments eroded from the surrounding mountain ranges with caliche, or hardpan, underneath. Caliche is formed as calcium carbonate and deposited within the soil through water seepage.

4.2.5 Transportation

As shown in Figure 4-4, several major roadways support both local and transportation needs. Interstate 10 provides connectivity with the Phoenix metropolitan area to the north and Interstate 19 with Mexico to the south. Several other State and US highways, most notably Arizona State Highways 85 and 86, coupled with key Indian Routes provide local and regional access throughout southern Arizona. Pima County is host to four municipal airports providing commercial and general aviation service to the region. In addition, the county is home to the Davis-Monthan Air Force Base in Tucson. Davis-Monthan Air Force Base currently has approximately 6,000 military personnel stationed on base and employs 1,700 civilian persons.

4.2.6 Climate

For the majority of Pima County, the climate is typical to the Sonoran Desert areas of the state and is characterized by abundant sunshine, a long summer, mild winter, low average annual precipitation, relatively low humidity, and generally light winds. In the relatively small areas of the county above 4,000 feet mean sea level, the climate tends to be more moderate. Climatic statistics for weather stations within Pima County are produced by the Western Region Climate Center[2] and span records dating back to the early 1900's. Locations of reporting stations within or near Pima County are shown on Figure 4-2.

Table 4-1 lists some partial climate statistics for several of the weather stations located within the county. Average temperatures within Pima County range from near freezing during the winter months to over 100 degrees Fahrenheit during the hot summer months. The severity of temperatures in either extreme is highly dependent upon the location, and more importantly the altitude, within the county. For instance, temperature extremes in the foothill communities will generally be about ten (10) degrees less than those in the valley communities.

Table 4-1: Climate statistics for select WRCC station locations in Pima County

	Average Temperature (F)				Precipitation (inches)		
	January		July				Total Annual
Location	Min	Max	Min	Max	Wettest Month	Driest Month	Average
Ajo	41.5	64	77.7	103	1.91 (August)	0.10 (May)	8.35
Cascabel	30.3	64.9	65.4	99.3	2.65 (August)	0.33 (May)	13.53
Kitt Peak	33.1	49.6	61.0	80.5	4.65 (August)	0.44 (May)	23.39
Sabino Canyon	37.1	66.4	72.4	101.9	2.41 (August)	0.19 (May)	12.73
Sahuarita 2 NW	31.0	67.0	68.4	101.3	2.57 (July)	0.06 (May)	10.62
Sells	36.9	66.0	72.1	101.1	2.58 (July)	0.15 (May)	11.77
Tucson Magnetic Observatory	34.2	64.8	71.3	100.5	2.25 (August)	0.24 (May)	12.62
Tucson, University of Arizona	37.6	65.5	73.9	100.1	2.15 (August)	0.18 (May)	11.14

Note: Period of record varies by station but generally spans from the early 1900's to 2010
Source: Western Regional Climate Center, 2011.

[2] Most of the data provided and summarized in this plan are taken from the WRCC website beginning at the following URL: http://www.wrcc.dri.edu/CLIMATEDATA.html

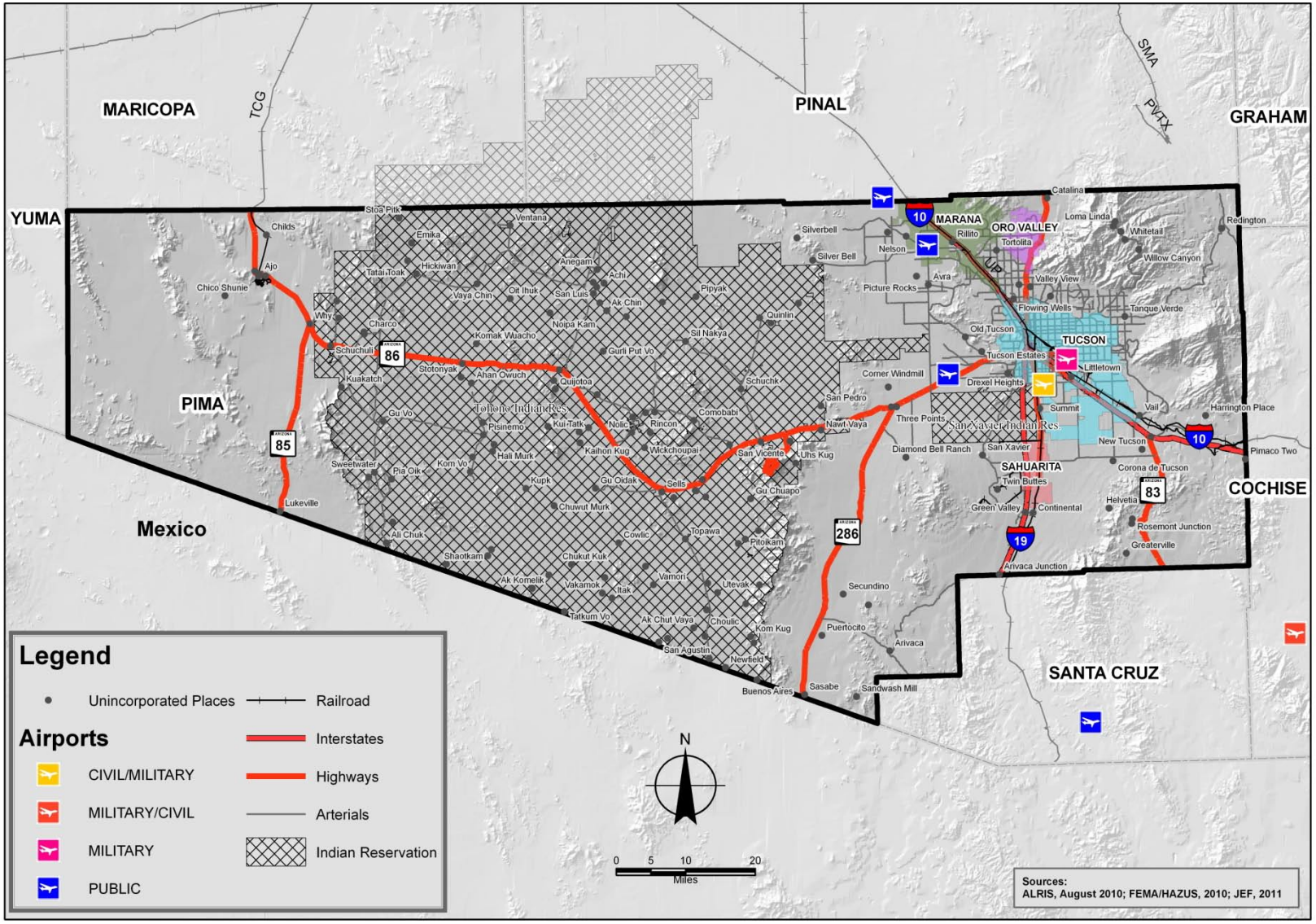


Figure 4-4: General Location and Transportation Map

Precipitation throughout Pima County is governed to a great extent by elevation and season of the year. From November through March, storm systems from the Pacific Ocean cross the state as broad winter storms producing mild precipitation events and snowstorms at the higher elevations. Summer rainfall begins early in July and usually lasts until mid-September. Moisture-bearing winds move into Arizona at the surface from the southwest (Gulf of California) and aloft from the southeast (Gulf of Mexico). The shift in wind direction, termed the North American Monsoon, produces summer rains in the form of thunderstorms that result largely from excessive heating of the land surface and the subsequent lifting moisture-laden air, especially along the primary mountain ranges. Thus, the strongest thunderstorms are usually found in the mountainous regions of the central southeastern portions of Arizona. These thunderstorms are often accompanied by strong winds, blowing dust, and infrequent hail storms.[3]

Average wind speeds are similar across Arizona, averaging approximately 6 to 9 miles per hour annually. Pima County generally experiences average wind speeds at approximately 8 miles per hour. However, significant variations can exist throughout the year, as evidenced by Tucson's statewide record of 71 miles per hour maximum-recorded wind gust. The surrounding mountains and topography of the region influence wind velocities and directions in the Tucson basin.

4.2.3 Population

In 1775, Pima County's population was slightly more than 3,000. By 1920, the population had grown to over 20,000. According to the 2010 Census, 980,263 residents now call Pima County home, which reflects a growth of 16% since the 2000 Census. The majority of the citizens still live in the incorporated communities or reservation portion of Pima County. The largest community is Tucson. The two incorporated cities and three towns are geographically located in eastern portion of Pima County. The other unincorporated communities and places located throughout the county are usually situated along a major highway and are mostly comprised of only one structure or landmark. Table 4-2 summarizes jurisdictional population statistics for the participating jurisdictions and un-incorporated Pima County.

Table 4-2: Population estimates for Pima County jurisdictions

Jurisdiction	1990	2000	2010	2015	2020
Pima County	666,880	843,746	980,263	1,175,967	1,271,912
Tribes, Cities and Towns					
Marana	2,187	13,566	34,961	60,809	72,915
Oro Valley	6,670	29,700	41,011	50,222	54,134
Pascua Yaqui Tribe (Pascua Pueblo Reservation)	2,412	3,315	3,745	-	-
Sahuarita	1,629	3,242	25,259	57,367	71,479
South Tucson	5,093	5,490	5,652	5,761	5,743
Tohono O'odham Nation	2,750	2,799	9,051	-	-
Tucson	405,390	486,699	520,116	597,568	624,671
Unincorporated County	247,540	305,049	340,468	404,240	442,969

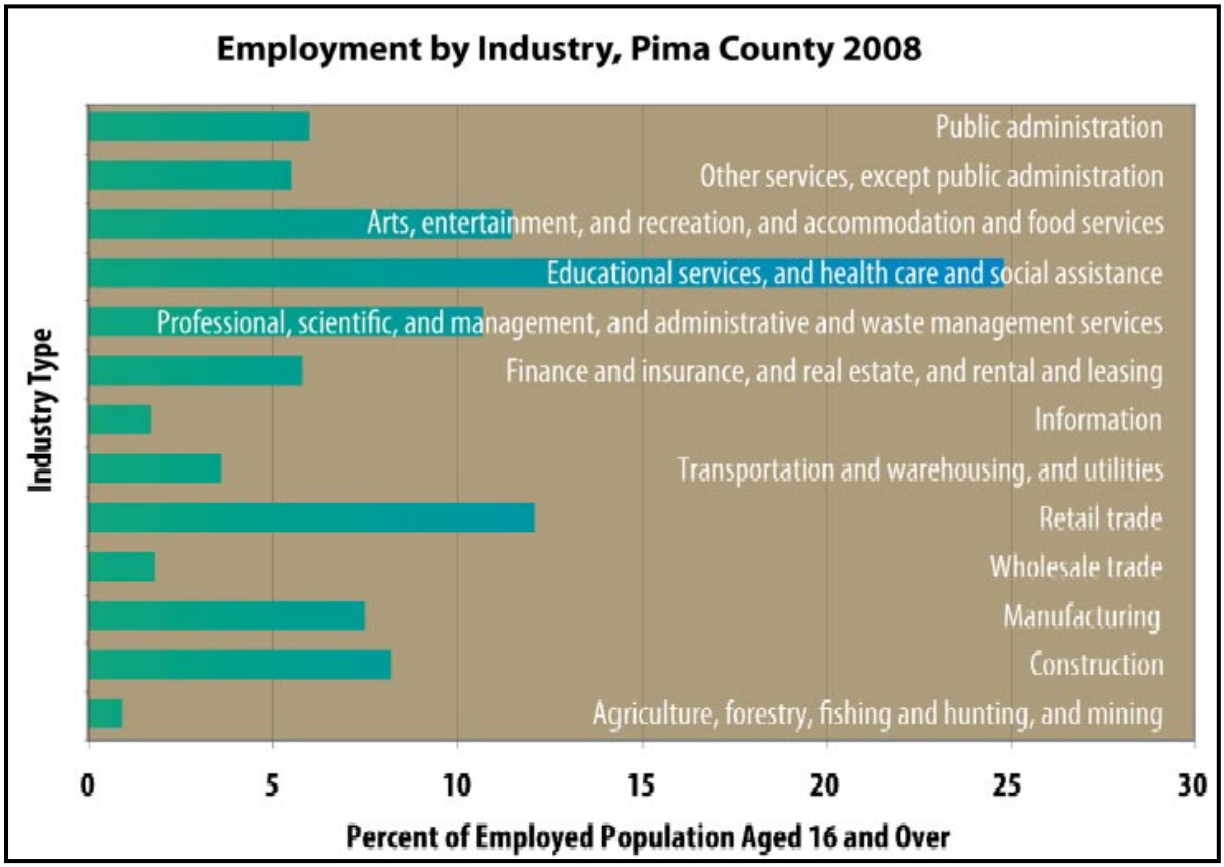
- *Figures for 1990 and 2000 (1980 – 2008 Historical Estimates: http://www.azcommerce.com/econinfo/demographics/Population+Estimates.html*
- *Figures for 2010 from AZ Dept of Commerce's Arizona Workforce Informer, as accessed at: http://www.workforce.az.gov/?PAGEID=67&SUBID=255*
- *Figures for 2015 and 2020 AZ Dept of Commerce's Arizona Workforce Informer, as accessed at: http://www.workforce.az.gov/?PAGEID=67&SUBID=257*
- *2010 Pascua Yaqui Tribe and Tohono O'odham Nation estimates from 2010 Census Block data*

[3] Office of the State Climatologist for Arizona, 2004. Partially taken from the following weblink: http://geography.asu.edu/azclimate/narrative.htm

4.2.4 Economy

The metropolitan Tucson area, located in the eastern portion of Pima County, is the center of economic activity for the County. As of August 2011, the county-wide labor force was estimated at 484,311 with an unemployment rate of 8.4%.[4] A majority of workers in Pima County are employed in the educational services, health care, and social assistance sector of the economy, followed by arts and entertainment, and then professional, scientific and management as illustrated in Figure 4-5. The labor force is reflective of the influence of tourism, academia, and the retirement population in the Tucson metropolitan area.

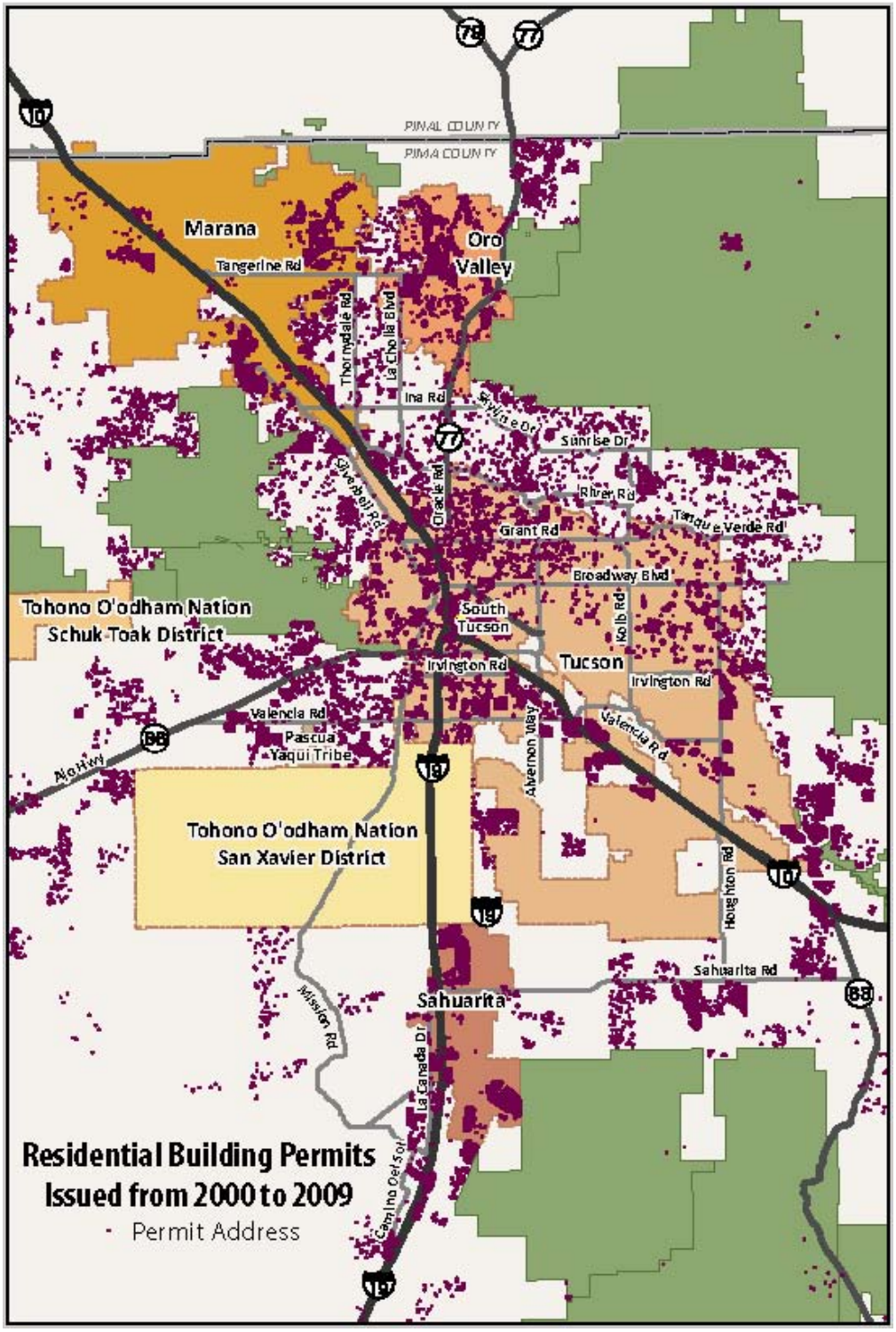
Figure 4-6 is a graphic prepared by the Pima Association of Governments (PAG) depicting the residential building permits issued by member jurisdictions for the ten year period of 2000 to 2009.



Source: PAG, 2011

Figure 4-5: Employment by Industry in 2008

[4] Source: Arizona Dept of Commerce Office of Employment & Population Statistics website at: http://www.azstats.gov/pubs/labor/specrates2011.pdf



Source: PAG, 2011

Figure 4-6: Residential Building Permits for PAG Member Jurisdictions for the period of 2000 to 2009

4.3 Jurisdictional Overviews

The following are brief overviews for each of the participating jurisdictions in the Plan.

4.3.1 Marana

Nestled along Interstate 10 approximately 1 mile northwest of Tucson (see Figure 4-7), the Town of Marana experienced dramatic growth in the past decade as a result of aggressive annexation policies and the development of master-planned communities.

Founded in 1881, in conjunction with the development of rail transportation, Marana solidified itself as a destination with its appearance on Southern Pacific Railroad maps in 1890. Although ranching and the railroad dominated the community prior to World War I, the post-way war years brought significant change to the region with the implementation of extensive agricultural irrigation systems and the development of cotton farming. Other substantial factors in Marana's development were the location of Marana Army Air Field (now Pinal Airpark and Evergreen Air Center) and the removal of the downtown business district due to the widening of Interstate 10 in the early 1960's. In March of 1977, the Town of Marana incorporated with an area roughly 10 square miles. Governed by a seven member Town Council consisting of a Mayor and six council members elected for four-year terms, the Town utilizes a Council-Manager form of government. The Town Council appoints a Town Manager responsible for the daily operation of town services and the orderly administration of affairs.

Although a majority of Marana's topography is flat, much of the area is designated as floodplain. In addition, the existing Town boundaries include portions of the Tortolita and Tucson Mountain foothills that are dominated by slopes exceeding 15%. The development constraints posed by these environmentally sensitive lands provide the potential for natural open space and habitat conservation areas to balance with the urban development occurring. Several riparian features, including major wash crossing in the Tortolita Fan and the Santa Cruz River provide natural wildlife habitat for diverse species native to the Sonoran desert.

Although witnessing substantial urban growth during the past decade, Marana continues to hold onto its agricultural and ranching roots and serves as the main trade and transportation center for the surrounding rural periphery for the eastern portion of Pima County. As illustrated in Table 4-2, the 2010 Census population of Marana is 34,961. With residential development continuing to rise, this population is forecasted to grow to nearly 72,915 by 2020.

Marana's General Plan, adopted on December 7, 2010, reflects a community preparing for unprecedented future growth. Marana's Land Use Map defines a pattern of growth sensitive to the natural environment and reflective of the Town's goal to preserve and protect natural habitats. The Marana General Plan designates a majority of northeast Marana as environmentally sensitive, best suited for less intense uses such as low density residential development or open space. Low and medium density residential in proximity to environmentally sensitive areas provides a transition to more intensive commercial and industrial uses located in proximity to major transportation corridors including Interstate 10 and the Marana Northwest Regional Airport.[5]

As of August 2011, the civilian labor force was 16,894 with an unemployment rate of 7.7 percent. In 2008, there were approximately $1.4 billion of taxable sales in the town. New building permits issued in 2008 were 259.[6]

[5] Pima County Multi-Jurisdictional Hazard Mitigation Plan, 2005

[6] http://www.azcommerce.com/doclib/commune/marana.pdf

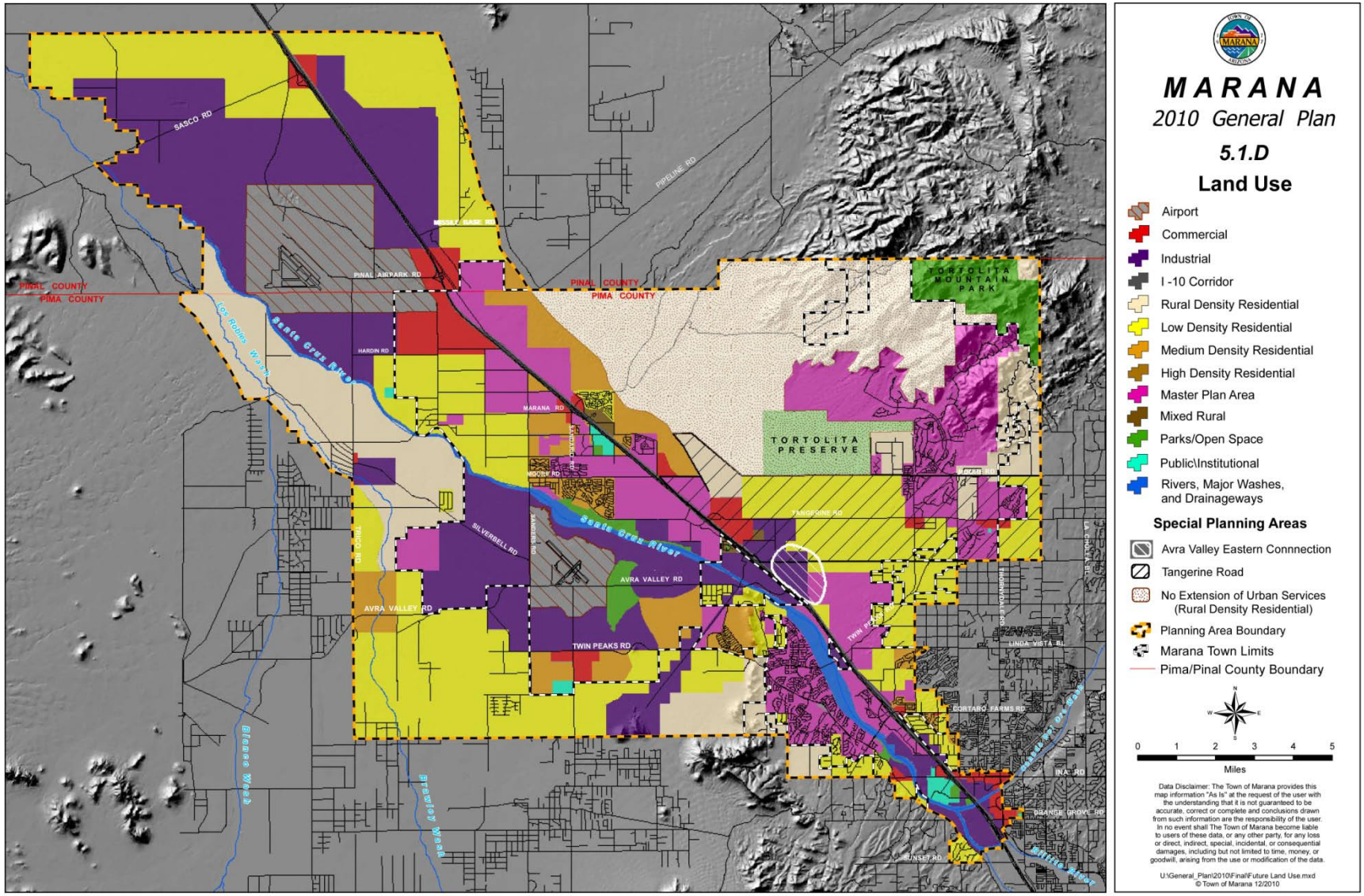


Figure 4-7: Town of Marana Land Use Map 2010

The Town's reputation for a business-friendly environment with no city property taxes has lead to substantial recent investment in economic development activities. Although agriculture remains a major force in Marana's economy, a recent influx of residential and commercial development has occurred due to its location between Phoenix and Tucson along I-10 and the Union Pacific Railroad, a business-friendly government and no town property taxes. To the south, adjacent to Tucson, is a new commercial business district. Continental Ranch/Peppertree Ranch Industrial Park has several new tenants and new industrial properties will soon be available at Marana Northwest Regional Airport. Marana's major private employers include Arizona Portland Cement, Costco, Home Depot, Wal-Mart, Lowes, Sargent Controls & Aerospace, and Tucson Ready Mix. Major public employers include the Marana Unified School District and the Town of Marana.

Marana's planning area encompasses approximately 228 square miles in Pima and Pinal Counties. Existing land uses include natural undisturbed desert, improved drainage areas, agriculture, recreational lands, residential, commercial, and industrial development. A majority of the Planning Area beyond the Town boundaries is undeveloped.

Marana's Town limits reflect the many changes and transitions that have occurred since its incorporation. Marana's rural heritage is reflected in traditional family farms and agricultural activities that continue on many acres of land historically used for agriculture. Older, low-density residential and commercial development was located west of Interstate 10 (I-10), in and near the traditional Town area where many Marana pioneer families settled. This northwest part of Marana began a transition to a more densely populated area in early 2000. At that time, the Cactus Ferruginous Pygmy-owl was listed as an endangered species, which limited development in much of the area east of I-10. This shifted the development focus to the farm fields in northwest Marana. The extension of bank protection along the Santa Cruz River to Sanders Road took many of the farm fields out of the floodplain and opened them up to development opportunities. The extension of close to six miles of sewer lines in 2003 brought urban services to the northwest area. By 2010, there were more than 4,000 new lots platted in this developing part of the Town and close to half of those lots had constructed homes. The new growth brought approximately 5,000 new residents to this once rural area. The northwest area is the number one growth area for Marana, with more than 17,000 additional lots entitled in this area.

Marana's planning area includes natural areas, such as the Tortolita Mountain Alluvial Fan in the northeast, which provide physical constraints that limit development. Characterized by steep slopes, natural drainage ways, native vegetation and floodplains, this area provides natural undisturbed open space and habitat for a multitude of plant and animal species. The Town has proactively moved to direct new growth and development away from the fan to other more appropriate areas.

The Town of Marana 2010 General Plan indicates that residential development is the predominant land use, occupying more than 50% of the total land area. The residential categories provide a range of densities within each designation. However, the maximum density cannot always be achieved because of land use policies or physical constraints. Commercial and industrial uses may potentially accommodate a wide range of uses.

The new Twin Peaks Road extension and Twin Peaks/I-10 freeway interchange has created access and provided infrastructure to new areas previously unavailable for development. Related to this, Tangerine Road, from La Canada Drive to I-10, is currently in design for the expansion of up to six lanes which will facilitate the expected growth in three activity centers in the region:

1. The Tangerine Road/I-10 Activity Center;
2. The Tangerine Corridor Activity Center;

3. The Dove Mountain Activity Center.

The new Tangerine Road will eventually connect to a fully planned, new Tangerine/I-10 freeway interchange. These roadway projects will allow for the capacity necessary for future growth in the area as well as provide better circulation and connectivity in the community including access to the Town of Oro Valley.

At the Marana Regional Airport, a future focal point of the town's local economy, continual upgrading and expansion of the facility has added value to the airport and to the Town's ability to attract commerce. The recent addition of road and utility infrastructure in the 1-10 area directly east of the airport will attract new businesses to the Town while others will be attracted to the airport because of its business-class jet capabilities, convenient location and access for business or pleasure.

4.3.2 Oro Valley

Located between the Santa Catalina Mountains to the east and the Tortolita Mountains to the northwest, Oro Valley is located six miles northwest of the Tucson city limits. Other nearby communities include the Town of Marana to the west and the unincorporated community of Catalina to the north. Oro Valley serves as a gateway to regional parks, sharing its eastern border with Catalina State Park and the Coronado National Forest. These areas provide vast recreational and natural open space opportunities for the community and are integral to the Town's identity as a community known for its integration of residential uses within the natural Sonoran Desert and as a resort area as illustrated in Figure 4-8. Major access to Oro Valley is provided via Interstate 10, located approximately 12 miles to the west, and State Route 77, or Oracle Road, which runs north-south through the Town, and is the original transportation corridor linking Tucson with the Phoenix metropolitan area to the north. The Town was incorporated in April of 1974 and operates under a Council-Manager form of government, which includes a mayor and six council members elected at large. The Mayor is directly elected while the Vice Mayor is selected by the Council from among the six Council members.

As illustrated in Table 4-2, the 2010 population of Oro Valley is projected at 41,011. With residential development continuing to rise, this population is forecasted to grow to nearly 54,134 by 2020. Presently, the community relies on residential growth and development to stimulate economic opportunities, which results in vulnerability to fluctuations in the real estate market. Oro Valley's larger employers include: Ventana Medical Systems, a member of the Roche Group, the Hilton El Conquistador Golf & Tennis Resort, Oro Valley Hospital, Town of Oro Valley, Amphitheater School District, Fry's Food and Drug Store, Wal-Mart, Target and Kohl's. Oro Valley is emerging as a regional center for the biotech industry, with Innovation Park, featuring medical and biotech campuses.

The Town of Oro Valley General Plan, adopted by the Town Council on June 15, 2005, and ratified by the Oro Valley voters on November 8, 2005, supports the themes of maintaining low-density residential character while permitting a compatible mix of land uses and preservation of the natural Sonoran desert through the implementation of a well connected system of natural open space. Rural and low-density residential and open space uses predominate throughout the community, comprising 36.5% and 26.9% of the planning area, respectively, and tend to follow natural features and provide buffers to environmentally sensitive areas from high intensity uses. Commercial uses concentrate along Oracle Road, providing easy access to residential neighborhoods and resulting in a linear pattern of higher intensity uses.

As of August 2011, the civilian labor force was 19,637 with an unemployment rate of 5.9 percent. In 2008, there were approximately $830.2 million of taxable sales in the town. New building permits issued in 2008 were 227.[7]

[7] http://www.azcommerce.com/doclib/COMMUNE/oro%20valley.pdf

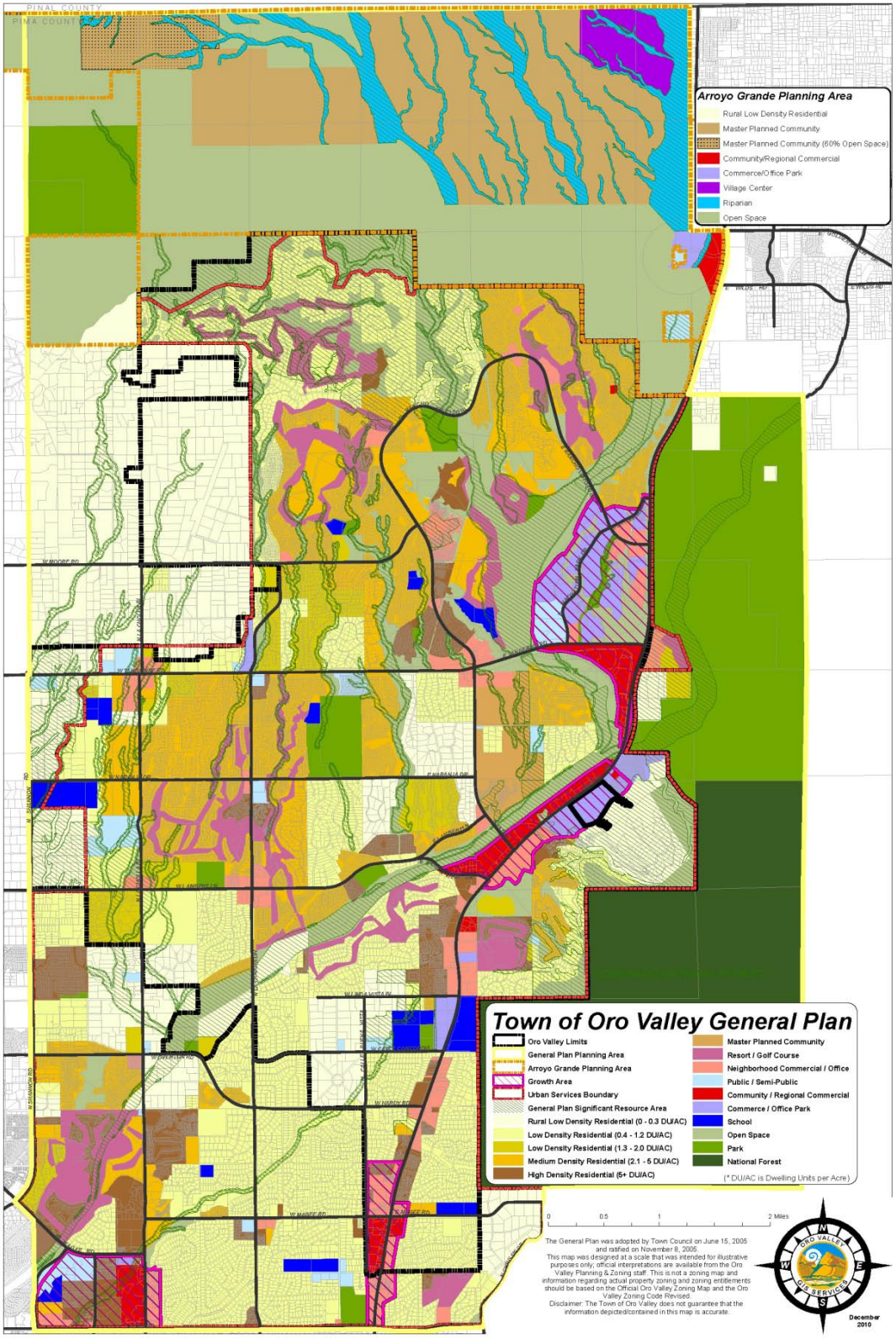


Figure 4-8: Town of Oro Valley Land Use Map 2010

4.3.3 Pascua Yaqui Tribe

The lands of the Pascua Yaqui became part of the United States in the 1870s. Calling themselves the Yaquis, the first modern settlements of these descendents from the ancient Uto-Azteca people, were near Nogales and South Tucson. Over time, the Yaquis spread out, settling north of Tucson in an area they named Pascua Village and in Guadalupe near Tempe. Retaining their religious and cultural ways of life, the Yaquis began calling themselves the Pascua Yaqui Tribe and accepted political integration into American society during the 1950s. In 1952, the Pascua Yaqui Tribe was annexed by the City of Tucson. In 1964, Congress transferred 202 acres of desert land southwest of Tucson to the Pascua Yaquis who were looking for an area to preserve their tribal identity. Members of the Pascua Yaqui Tribe relocating to the reservation, struggled to secure federal recognition for the tribe until finally being recognized in 1978. The Tribe acquired an additional 690 acres in 1988. In 1994, the tribe's status was changed from a created tribe to an historic tribe.

Today, the Pascua Yaqui Tribe is scattered throughout eastern Pima County and includes several small communities. These communities include Yoem Pueblo in Marana, Old Pascua in Tucson, Barrio Libre in South Tucson, and the Pascua Pueblo, a 1.87-square mile reservation located southwest of the City of Tucson as represented in Figure 4-9.

According to Tribal sources, the population as of November 2011 for the Pascua Yaqui Tribe within Pima County communities was 4,592. Table 4-3 summarizes enrolled Tribal membership by the various Pascua Yaqui communities located both within Pima County and outside.

Table 4-3: Pascua Yaqui Tribal enrollment statistics as of March 2011

Pascua Yaqui Communities	No. of Enrolled Members
• Pascua Pueblo (Reservation)	• 3951
• Old Pascua (Tucson)	• 418
• Barrio Libre (South Tucson)	• 174
• Yoem Pueblo (Marana)	• 49
• Guadalupe (Maricopa County)	• 3,313
• High Town (Chandler)	• 74
• Penjamo Pueblo (Scottsdale)	• 171
• Eloy/Coolidge (Pinal County)	• 256
Total (within Yaqui communities)	**8,406**
• Outside of Yaqui Communities	• 9,446
• In Arizona (Outside of Yaqui Communities)	• 9,737
• Outside the State of AZ	• 1,681
Total Active Membership	**17,852**

The Pascua Yaqui Tribe operates two casinos within Pima County, the 40,000 square foot Casino of the Sun and the 75,000 square foot Casino del Sol. Other tribal enterprises include the brand new Sol Casino Hotel and Convention Center, which includes 215 rooms and a 20,000 square foot ballroom, the Anselmo Valencia Amphitheater 4,470 seat open-air concert venue, and the Del Sol Marketplace.

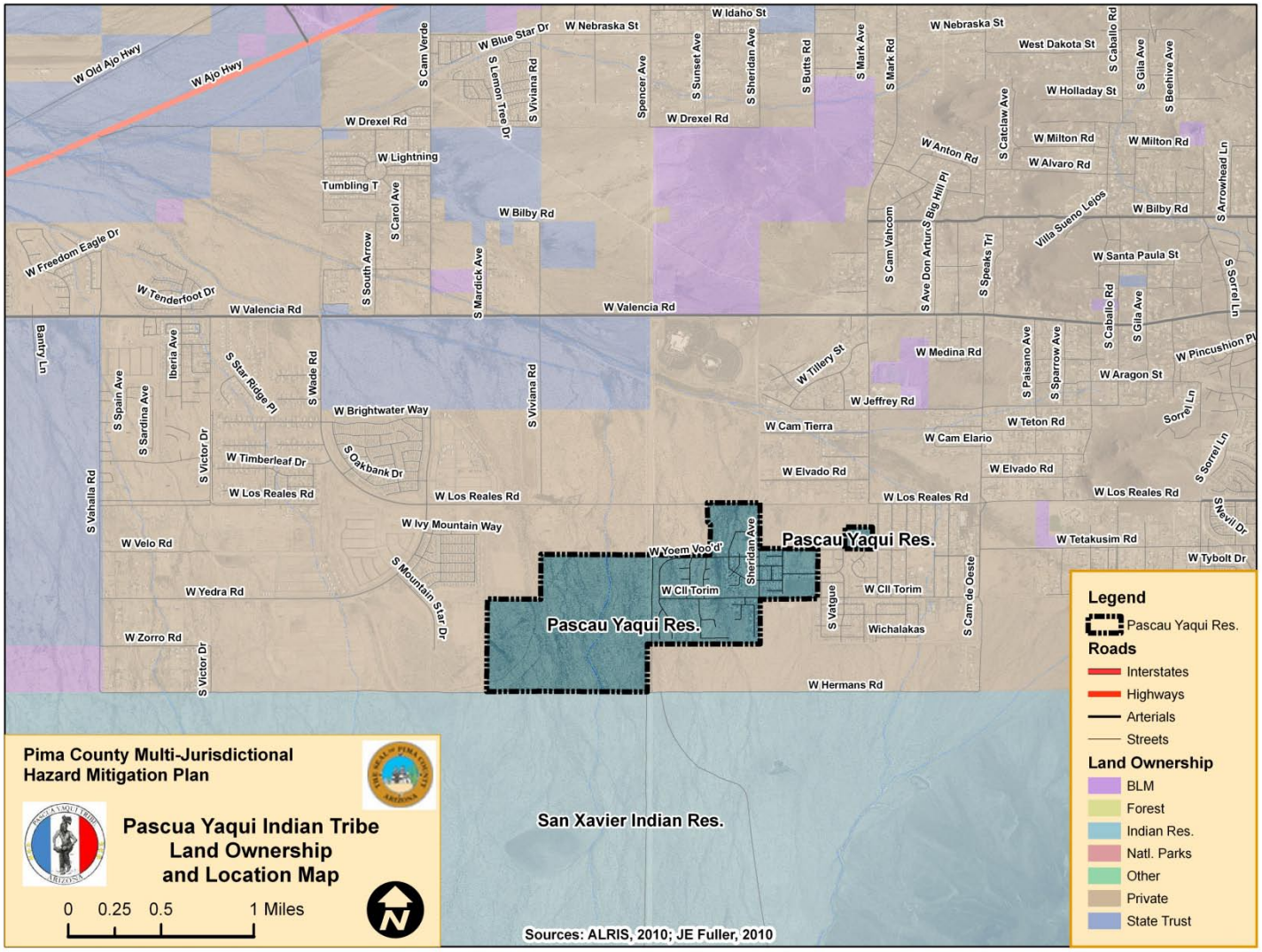


Figure 4-9: Pascua Location Map

4.3.4 Sahuarita

The Town of Sahuarita is the southern-most incorporated and newest jurisdiction within Pima County. Sahuarita was incorporated in 1994 and the Town population has increased 669 percent during the period between the 2000 and 2010 Census estimates. Situated along Interstate 19 approximately 15 miles from the City of Tucson, Sahuarita share portions of its southern border with the retirement community of Green Valley and its northern border with the Tohono O'odham Nation. Unincorporated Pima County surrounds the remainder of the Tow to the west and east. The Town of Sahuarita is known for its semi-rural setting with a mixture of master planned communities in contrast to the historical agricultural production sill largely occupying he east portion of the community. Bounded by mountain ranges within the Santa Cruz Valley, Sahuarita's resident are governed under a Council-Manager form of government, which includes a seven-member Town Council consisting of a Mayor and six Council Members elected at-large for overlapping terms of four years.

Sahuarita encompasses 30.5 square miles of area. The primary transportation corridors through the Town are Interstate 19 and the Tucson Nogales Highway (SR 19B) providing connections with the metropolitan environs of Tucson to the north and the Mexican board to the south. Paralleling the Tucson Nogales Highway, natural development constraints abound in Sahuarita as the Santa Cruz River and its associated floodplain effectively bisect the Town into eastern and western segments.

As illustrated in Table 4-2, in 2000 the population of Sahuarita was 3,242. With expanses of available land and residential growth, the population increased to 25,259 per the 2010 Census. These new population figures represent a significant growth not only to the community, but in the Sahuarita's population percentage within Pima County. By 2020, it is the Town of Sahuarita is expected to represent almost 5.6 percent of Pima County's population as compared with only 0.38% in 2000.

In addition to population, Sahuarita has also experienced economic growth yet a majority of full-time employees travel to the great Tucson area or are employed in service related facilities in Sahuarita and Green Valley. Agricultural production, in particular the pecan orchards owned by the Farmers Investment Company, and with a growth in area mining operations of Freeport McMoRan and ASARCO, still provided the basic Town employment. Other Town major private and public employers include Frye's, Safeway, Wal-mart, Ross Stores, American Home Furnishings, the Desert Diamond Casino – an operation of the Tohono O'odham Nation, and the Sahuarita School District and Town of Sahuarita. There is a small light industrial park on Duval Mine Road and business parks are in the evaluation/planning states. Carondelet has purchased land and will be announcing the specific types of ambulatory health care serviced that will become available in Sahuarita.

Ratified by Town residents on May 20, 2003, the Sahuarita General Plan reflects a community striving to preserve its rural character while realizing continual growth pressures. Over 50 percent of the land within the planning area is listed as Future Development Area. Although legally developable, demand is achieving the point to be high enough to warrant additional investment in these properties within the planning cycle of the General Plan. Growth area will be encouraged in the eastern portion of the Town and consist of a land use pattern emphasizing a mixture of uses. The future development plan stresses the importance of encouraging employments opportunities by designating 12.8 percent of the planning area's acreage to development of opportunities focusing on light industrial, office, research, and warehousing activities. These areas are expected to develop in the northern portion of the Interstate 19 corridor. Transitional to these usages are areas allocated for medical density resident and missed-use development providing flexibility in the design of concentrated areas allowing residents to live close to employment centers. The Land Use Plan from the General Plan is provided as Figure 4-10.

As of August 2011, the civilian labor force was 1,884 with an unemployment rate of 7.8 percent. In 2008, there were approximately $705.2 million of taxable sales in the town.[8] New building permits issued in 2007 were 847, as compared to the 164 permits granted in 2000.

[8] http://www.azcommerce.com/doclib/COMMUNE/sahuarita.pdf

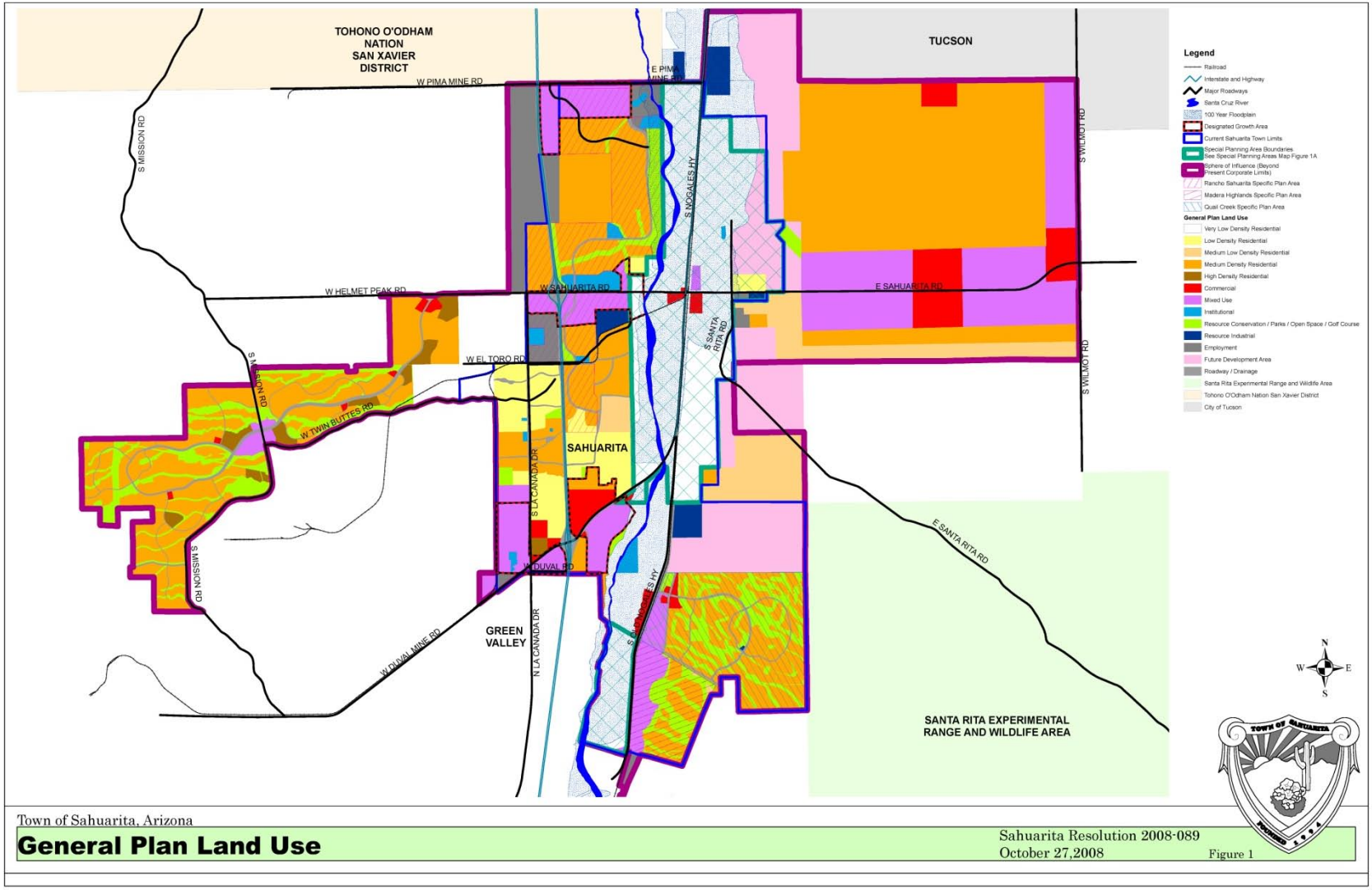


Figure 4-10: Town of Sahuarita General Plan Land Use Map 2008

4.3.5 South Tucson

Surrounded by the City of Tucson, the City of South Tucson is a one square mile community just south of historical downtown Tucson nestled between the junction of Interstates 10 and 19 as represented in Figure 4-11. Rich in ethnic heritage, this small community services a population of which 83 percent are Mexican-American and 10 percent are Native American. Developed as a suburban community to Tucson, South Tucson enjoyed a colorful history after being incorporated in 1936, unincorporated in 1938, and reincorporated in 1940.

In 2000, the population of South Tucson was 5,490 as illustrated in Table 4-2. Although relatively small growth (0.42% through 2020) is projected for the future, South Tucson will continue to provide an increasingly diminished percent of Pima County's overall resident population. This pattern is reflective of the strong growth throughout eastern Pima County and the City's inability to gain in available land mass. Similarly, South Tucson's small labor force is forecasted to parallel the Town's population growth by comprising a smaller share of the region's employment opportunities. The City of South Tucson updated their General Plan in 2002. Although not mandated to contain Growing Smarter elements due to their small size, this information was incorporated into the 2002 revision to provide consistency with other municipalities in the region.

As of August 2011, the civilian labor force was 2,616 with an unemployment rate of 22.6 percent. In 2008, there were approximately $86 million of taxable sales in the City.[9] New building permits issued in 2008 were 14, as compared to the 24 permits granted in 2000.

[9] http://www.azcommerce.com/doclib/COMMUNE/sahuarita.pdf

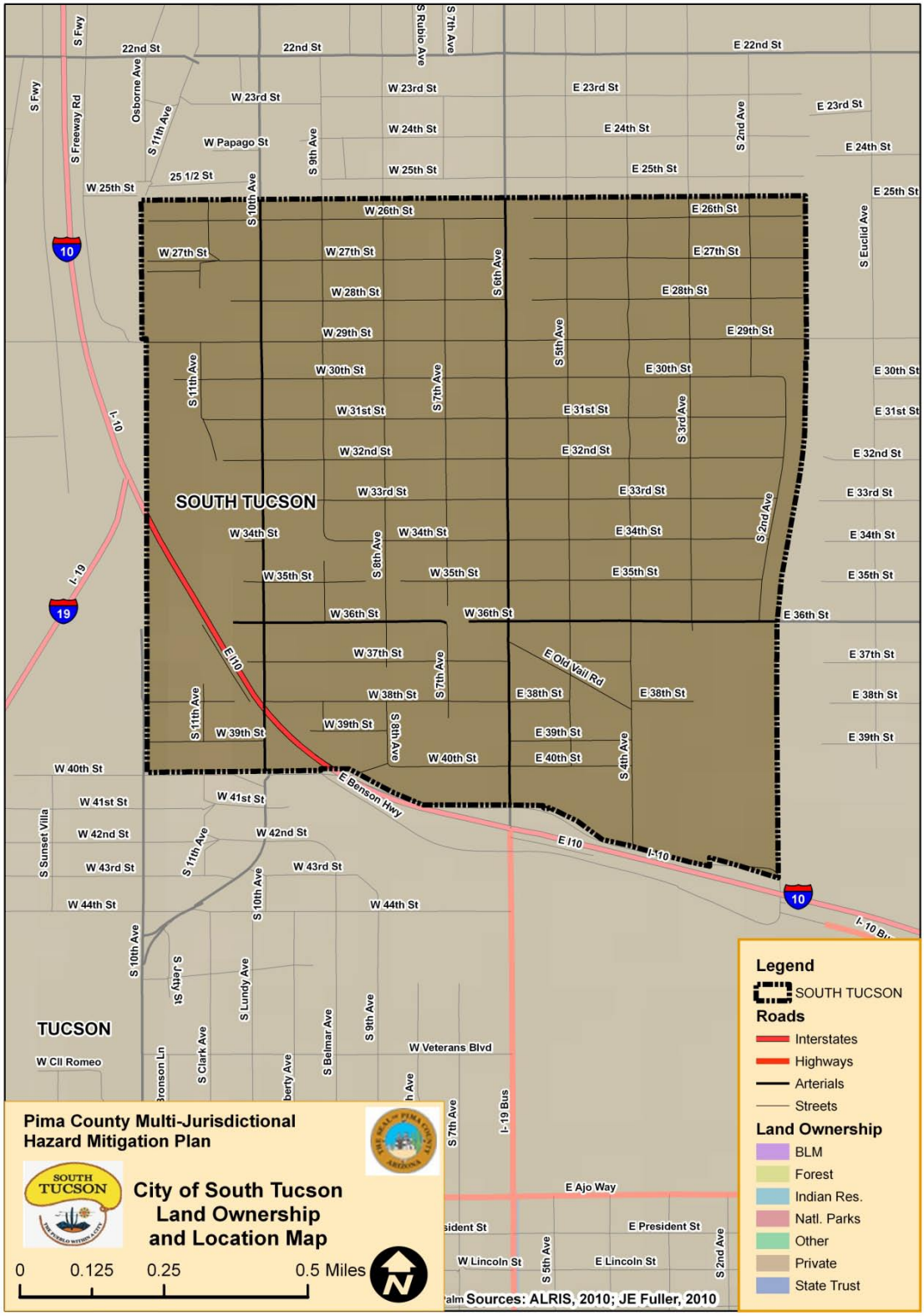


Figure 4-11: City of South Tucson Land Ownership and Location Map

4.3.6 Tohono O'odham

The Tohono O'odham Nation has prepared the FEMA approved *Tohono O'odham Nation Multi-Hazard Mitigation Plan.* A complete description of the Tohono O'odham Nation characteristics is summarized in that plan and will not be reproduced here.

4.3.7 Tucson

The City of Tucson, Arizona's second largest and oldest city, serves as the focal point for political, economic, and cultural activity for Pima County. Prior to the establishment of the first Spanish mission in 1700, San Xavier del Bac, and the arrival of the Spanish Conquistadors, various Native American tribes including the Pima, Hohokam and the Tohono O'odham inhabited the area presently occupied by the City of Tucson. Founded in 1775, Tucson began as a Spanish military garrison to protect settlers from Indian raids from nearby tribes. Receiving independence from Spanish colonial rule in 1821, governance of the area passed to the Republic of Mexico and remained part of the State of Sonora until 1854 when it became part of the United States with the Gadsden Purchase. Formally incorporated in 1877 with an area of 2 square miles, the City of Tucson presently includes 226 square miles and is the nation's thirtieth most populous City.

Fueled by the availability of cheap and abundant land, Tucson experienced rapid growth in the 1950s following World War II. Much of this new growth, however, occurred outside the city limits leading to a widespread lineal development pattern. Surrounded by unincorporated portions of Pima County, Tucson completely surrounds the City of South Tucson and is in close proximity to the smaller communities of Marana to the northwest, Oro Valley to the north, and Sahuarita to the south. A mayor and six City Council members representing various wards within the City govern Tucson. Operating under a charter form of government, the Mayor and City Council set policy to be carried out by an appointed City Manager and other city officials.

Known for its natural beauty, Tucson's natural environment is characteristic of the Sonoran Desert with diverse habitats and conditions ranging from low land deserts to the highlands of the Santa Catalina and Rincon Mountains. In addition to the rich biodiversity of the region, the close proximity of the Mexican border and the presence of the University of Arizona and the Davis-Monthan Air Force Base, which draw residents from throughout the United States as well as from other countries, influence the City's cultural diversity and tradition for cultural heritage preservation.

As depicted in Figure 4-12, Tucson's primary transportation corridors are Interstates 10 and 19, which provide accessibility to distant urban locations and a well-developed arterial network providing connectivity within the metropolitan area. Tucson International Airport, providing commercial air service, and Ryan Airfield, serving business and general aviation traffic, provide additional transportation service to Tucson.

The City of Tucson has experienced tremendous growth since its incorporation over 125 years ago. Illustrated in Table 4-2, this growth has lead to a current population of just over 520,000 people, which represents 53% of the county according to the 2010 Census. Regardless of its role as the regional focal point, Tucson's relative position as the population center will slow in the future as other incorporated jurisdictions and unincorporated communities in the urban periphery absorb a larger share of the regional growth. As the regional economic engine, Tucson comprises 73.1% of the county's employment. However, by 2030 this figure is expected to drop to 60.9%. As of August 2011, the civilian labor force was 261,699 with an unemployment rate of 9.3 percent. In 2008, there were approximately $10.8 billion of taxable sales in the City. New building permits issued in 2008 were 795, as compared to the 6,086 permits that were granted in 2000.[10]

[10] http://www.azcommerce.com/doclib/commune/tucson.pdf

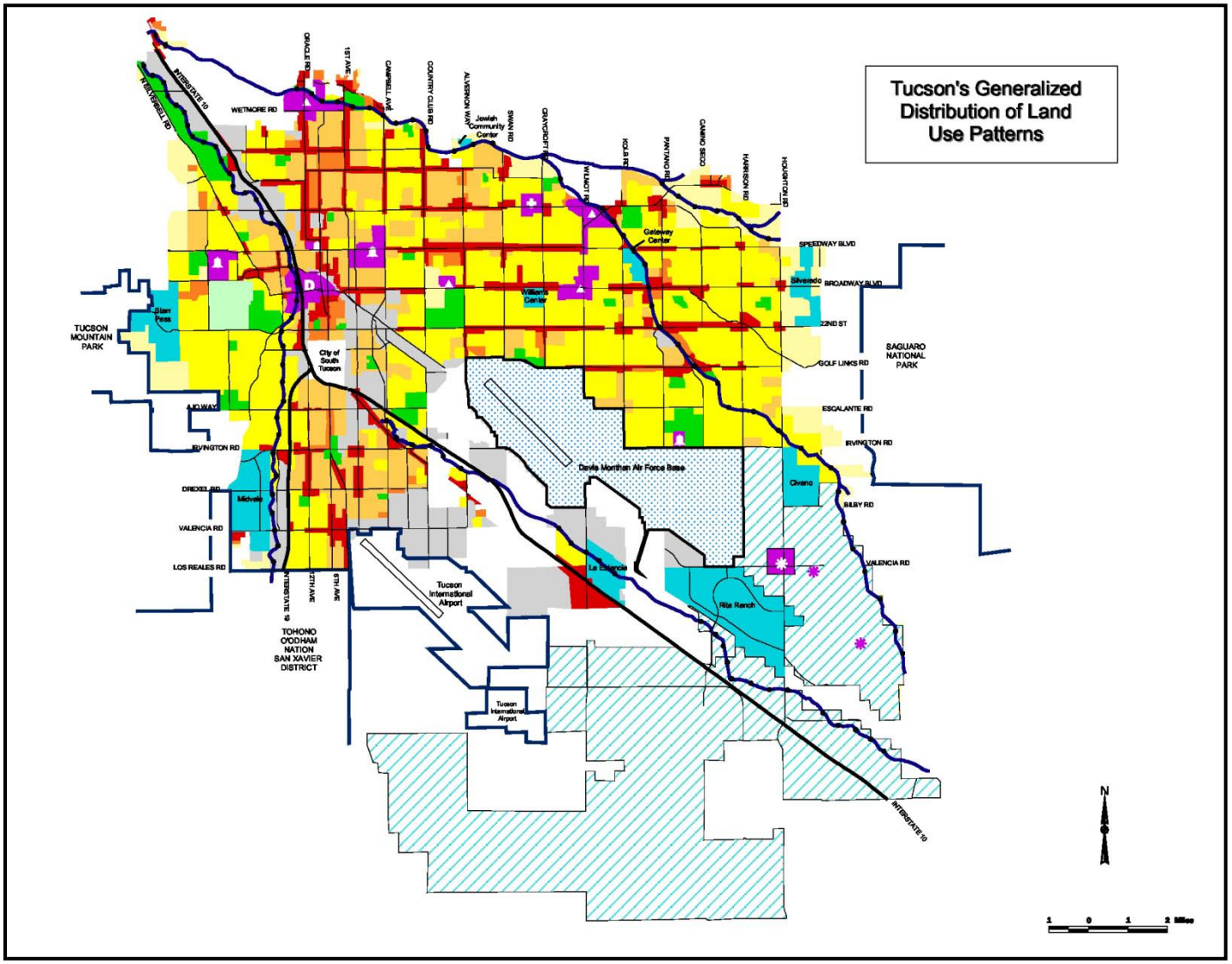
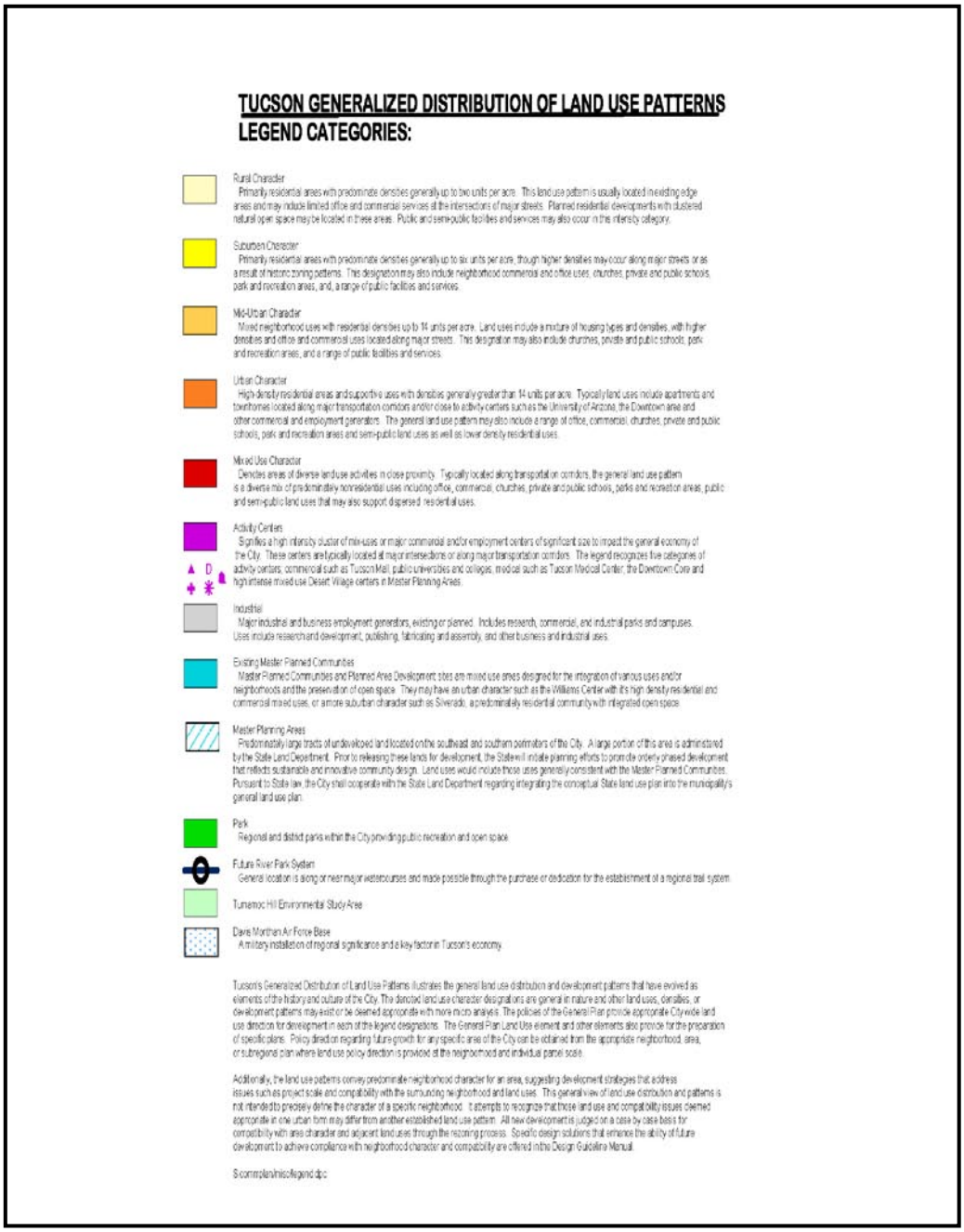


Figure 4-12: City of Tucson Generalized Distribution of Land Use Patterns 2001

Approved in December of 2001, Tucson's General Plan reflects a community that is responding to the diverse nature of its residents and natural character of the region as represented in Figure 4-12 and 4-13. The plan anticipates that new growth will be accommodated primarily through infill development; higher density, mixed-use activity centers; and corridor planning to reduce the peripheral sprawl. Tucson is positioning itself to take advantage of its distinct natural setting by clearly separating urban uses from rural and natural resource-based areas. Economic development activity will be encouraged to locate transportation hubs along existing transportation corridors including Interstate 10, Interstate 19, the Southern Pacific Railroad, and airports. As an alternative to the lineal pattern of commercial development, small-scale neighborhood commercial centers will be focused at major street intersections with regional centers positioned in mixed-use activity centers.



TUCSON GENERALIZED DISTRIBUTION OF LAND USE PATTERNS
LEGEND CATEGORIES:

Rural Character
Primarily residential areas with predominate densities generally up to two units per acre. This land use pattern is usually located in existing edge areas and may include limited office and commercial services at the intersections of major streets. Planned residential developments with clustered natural open space may be located in these areas. Public and semi-public facilities and services may also occur in this intensity category.

Suburban Character
Primarily residential areas with predominate densities generally up to six units per acre, though higher densities may occur along major streets or as a result of historic zoning patterns. This designation may also include neighborhood commercial and office uses, churches, private and public schools, park and recreation areas, and, a range of public facilities and services.

Mid-Urban Character
Mixed neighborhood uses with residential densities up to 14 units per acre. Land uses include a mixture of housing types and densities, with higher densities and office and commercial uses located along major streets. This designation may also include churches, private and public schools, park and recreation areas, and a range of public facilities and services.

Urban Character
High density residential areas and supportive uses with densities generally greater than 14 units per acre. Typically land uses include apartments and townhomes located along major transportation corridors and/or close to activity centers such as the University of Arizona, the Downtown area and other commercial and employment generators. The general land use pattern may also include a range of office, commercial, churches, private and public schools, park and recreation areas and semi-public land uses as well as lower density residential uses.

Mixed Use Character
Denotes areas of diverse land use activities in close proximity. Typically located along transportation corridors, the general land use pattern is a diverse mix of predominately nonresidential uses including office, commercial, churches, private and public schools, parks and recreation areas, public and semi-public land uses that may also support dispersed residential uses.

Activity Centers
Signifies a high intensity cluster of mix-uses or major commercial and/or employment centers of significant size to impact the general economy of the City. These centers are typically located at major intersections or along major transportation corridors. The legend recognizes five categories of activity centers, commercial such as Tucson Mall, public universities and colleges, medical such as Tucson Medical Center, the Downtown Core and high intensive mixed use Desert Village centers in Master Planning Areas.

Industrial
Major industrial and business employment generators, existing or planned. Includes research, commercial, and industrial parks and campuses. Uses include research and development, publishing, fabricating and assembly, and other business and industrial uses.

Existing Master Planned Communities
Master Planned Communities and Planned Area Development sites are mixed use areas designed for the integration of various uses and/or neighborhoods and the preservation of open space. They may have an urban character such as the Williams Center with its high density residential and commercial mixed uses, or a more suburban character such as Silverado, a predominately residential community with integrated open space.

Master Planning Areas
Predominately large tracts of undeveloped land located on the southeast and southern perimeters of the City. A large portion of this area is administered by the State Land Department. Prior to releasing these lands for development, the State will initiate planning efforts to promote orderly phased development that reflects sustainable and innovative community design. Land uses would include those uses generally consistent with the Master Planned Communities. Pursuant to State law, the City shall cooperate with the State Land Department regarding integrating the conceptual State land use plan into the municipality's general land use plan.

Park
Regional and district parks within the City providing public recreation and open space.

Future River Park System
General location is along or near major watercourses and made possible through the purchase or dedication for the establishment of a regional trail system.

Tumamoc Hill Environmental Study Area

Davis Monthan Air Force Base
A military installation of regional significance and a key factor in Tucson's economy.

Tucson's Generalized Distribution of Land Use Patterns illustrates the general land use distribution and development patterns that have evolved as elements of the history and culture of the City. The denoted land use character designations are general in nature and other land uses, densities, or development patterns may exist or be deemed appropriate with more micro analysis. The policies of the General Plan provide appropriate City-wide land use direction for development in each of the legend designations. The General Plan Land Use element and other elements also provide for the preparation of specific plans. Policy direction regarding future growth for any specific area of the City can be obtained from the appropriate neighborhood, area, or subregional plan where land use policy direction is provided at the neighborhood and individual parcel scale.

Additionally, the land use patterns convey predominate neighborhood character for an area, suggesting development strategies that address issues such as project scale and compatibility with the surrounding neighborhood and land uses. This general view of land use distribution and patterns is not intended to precisely define the character of a specific neighborhood. It attempts to recognize that those land use and compatibility issues deemed appropriate in one urban form may differ from another established land use pattern. All new development is judged on a case by case basis for compatibility with area character and adjacent land uses through the rezoning process. Specific design solutions that enhance the ability of future development to achieve compliance with neighborhood character and compatibility are offered in the Design Guideline Manual.

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Figure 4-13: City of Tucson Generalized Distribution of Land Use Patterns-Legend

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SECTION 5: RISK ASSESSMENT

> ***§201.6(c)(2):*** *[The plan shall include…] (2) A* ***risk assessment*** *that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:*
> *(i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*
> *(ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:*
> *(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;*
> *(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate;*
> *(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*
> *(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*

One of the key elements to the hazard mitigation planning process is the risk assessment. In performing a risk assessment, a community determines "what" can occur, "when" (how often) it is likely to occur, and "how bad" the effects could be[11]. According to DMA 2000, the primary components of a risk assessment that answer these questions are generally categorized into the following measures:

Hazard Identification and Screening

Hazard Profiling

Assessing Vulnerability to Hazards

The risk assessment for Pima County and participating jurisdictions was performed using a county-wide, multi-jurisdictional perspective, with much of the information gathering and development being accomplished by the Planning Team. This integrated approach was employed because many hazard events are likely to affect numerous jurisdictions within the County, and are not often relegated to a single jurisdictional boundary. The vulnerability analysis was performed in a way such that the results reflect vulnerability at an individual jurisdictional level, and at a countywide level.

The entire Risk Assessment section of the Plan has been reformatted and revised to comport with the State Plan template.

5.1 Hazard Identification and Screening

Hazard identification is the process of answering the question; *"What hazards can and do occur in my community or jurisdiction?"* For this Plan, the list of hazards identified in the 2006 Plan were reviewed by the Planning Team with the goal of refining the list to reflect the hazards that pose the greatest risk to the jurisdictions represented by this Plan. The Planning Team also compared and contrasted the 2006 Plan list to the comprehensive hazard list summarized in the 2010 State Plan[12] to ensure compatibility with the State Plan. Table 5-1 summarizes the 2006 Plan and 2010 State Plan hazard lists.

[11] National Fire Protection Association, 2000, *Standard on Disaster/Emergency Management and Business Continuity Programs*, NFPA 1600.

[12] ADEM, 2007, *State of Arizona Multi-Hazard Mitigation Plan*

Table 5-1: Summary of initial hazard identification lists	
2007 Pima County Plan Hazard List	**2010 State Plan Hazard List**
• Dam Failure • Disease • Drought • Extreme Heat • Flooding • Hail • HAZMAT • Lightning • Subsidence • Thunderstorm • Tornado • Tropical Cyclone • Wildfire • Winter Storm	• Dam Failure • Drought • Earthquake • Extreme Heat • Fissure • Flooding/Flash Flooding • Landslide / Mudslide • Levee Failure • Severe Wind • Subsidence • Wildfire • Winter Storms

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

- Experiential knowledge on behalf of the Planning Team with regard to the relative risk associated with the hazard
- Documented historic context for damages and losses associated with past events (especially events that have occurred during the last plan cycle)
- The ability/desire of Planning Team to develop effective mitigation for the hazard under current DMA 2000 criteria
- Compatibility with the state hazard mitigation plan hazards
- Duplication of effects attributed to each hazard

One tool used in the initial screening process was a historic hazard database. With this update, the historic hazard database developed for the 2010 State Plan was obtained and records pertaining to Pima County were parsed out and compiled. The resulting database was reviewed and revised to separately summarize declared disaster events versus non-declared events. Declared event sources included Pima County Office of Emergency Management and Homeland Security (PCOEMHS), Arizona Division of Emergency Management (ADEM), Federal Emergency Management Agency (FEMA), and United States Department of Agriculture (USDA). Non-declared sources included Arizona State Land Department (ASLD), National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), United States Geological Survey (USGS), the United States Forest Service (USFS), the National Wildfire Council Group (NWCG) and others. Both data sets were updated with additional hazard events that have occurred since the State Plan data was compiled or were deemed by the Planning Team to be relevant to dataset. The declared events database represent the period of February 1966 to August 2010. The undeclared event database has records dating back to the early 1960's, with the majority of the records representing the past 25 years. For the undeclared events database, the following filtering criteria were applied to limit the records to relevant occurrences:

- 1 or more fatalities
- 1 or more injuries
- Any dollar amount in property or crop damages
- For wildfires, all the following must be met:
    - 100 acres or larger, and
    - Any reported amount for firefight costs, and
    - Any reported damages to structures
- A significant event to a community regardless of the above criteria

Three tables are used in this Plan to summarize the historic hazard events. Tables 5-2 and 5-3 summarize federal and state disaster declarations that included Pima County, with Table 5-2 showing only state and federal disaster expenditure data provided by the ADEM Recovery Section, and Table 5-3 summarizing fatality, injury, and property damage estimates obtained from many of the sources previously mentioned. Table 5-4 summarizes all non-declared hazard events specific to Pima County, that met the filtering criteria. When reviewing Tables 5-2, 5-3 and 5-4, the following should be noted:

1) Hazard categories in all tables follow the updated hazard categories discussed in the following paragraphs;
2) Events in Tables 5-2 and 5-3 are generally not duplicated as events in Table 5-4;
3) If a hazard is not listed, that means there were no events reported for that hazard that fit the criteria above.

Table 5-2: Total Disaster Expenditures for State and Federally Declared Natural Hazard Events That Included Pima County – February 1966 to August 2010

Hazard Categories	Arizona Declared Events That Included Pima County January 1966 to August 2010		
	No. of Events	Total Expenditures	
		State	Federal
Disease	7	$ 1,738,895	$ -
Drought	3	$ 226,440	$ -
Flooding / Flash Flooding	12	$ 42,334,412	$ 333,683,342
Flood / Severe Wind	1	$ 16,158	$ 10,879,002
Hazardous Materials Incident	3	$ 1,611,337	$ -
Severe Wind	1	$ 14,238	$ -
Wildfire	17	$ 6,369,936	$ 5,907,407

Notes:
- Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values.
- Only a portion of the reported expenditures were spent in the subject county.

Source: ADEM - Recovery Section, October 2010

Table 5-3: Human and Property Loss Estimates for State and Federally Declared Events That Included Pima County January 1966 to August 2010

Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Damage Costs ($)
Disease	2	0	0	$0
Drought	8	0	0	$300,000,000
Flooding / Flash Flooding	13	39	1087	$904,837,000
Hazardous Materials Incident	3	0	0	$0
Severe Wind	1	0	2	$230,000
Wildfire	17	0	0	$38,100,000

Notes:
- Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values. Sources: ADEM, FEMA, USDA, NCDC, AFMA

Table 5-4: Undeclared Historic Hazard Events for Pima County – July 1961 to August 2010

Hazard	No. of Records	Recorded Losses		
		Fatalities	Injuries	Damage Costs ($)
Flooding	68	13	9	$22,052,000
Hazardous Materials Incident	42	28	61	$262,200
Lightning	18	3	16	$511,000
Severe Wind	183	3	101	$28,926,200
Wildfire	20	0	30	$66,100,000
Winter Storm	2	3	0	$0

Notes:
Damage costs include property and crop/livestock losses and are reported as is with no attempt to adjust costs to current dollar values. Furthermore, wildfire damage cost do not include the cost of suppression which can be quite substantial. Sources: ADEM, NCDC, NWCG, NWS, USFS

Detailed historic hazard records are provided as digital files on CD and in printed form in Appendix D.

The culmination of the review and screening process by the Planning Team resulted in a revised list of hazards that will be carried forward with this Plan. Several of the hazards in the 2007 Plan list may be better described as storm events wherein the effects of the storm may pose exposure to multiple hazards. For instance, hazards associated with a ***Thunderstorm or Tropical Cyclone*** may include flooding and severe winds in a single event. With the direction of ADEM, the Planning Team chose to eliminate these "hazards" and account for their impacts in other categories. Similarly, the predominant perceived hazard associated with ***Tornado*** is the associated damaging high winds. Therefore, ADEM has decided to account for the wind related hazards associated with these events into a new category named ***Severe Wind***. Flooding caused by these atmospheric events are addressed in the ***Flooding/Flash Flooding*** category. The Planning Team also chose to follow the State's lead and split ***Dam/Levee Failure*** into separate categories since each is handled differently regarding regulation and mitigation.

The Planning Team has selected the following list of hazards for profiling and updating based on the above explanations and screening process. Revised and updated definitions for each hazard are provided in Section 5.3 and in Section 8.2:

- **Disease**
- **Drought**
- **Earthquake**
- **Extreme Temperature**
- **Flooding/Flash Flooding**
- **HAZMAT**
- **Levee Failure**
- **Severe Wind**
- **Subsidence**
- **Wildfire**
- **Winter Storms**

5.2 Vulnerability Analysis Methodology

5.2.1 General

The following sections summarize the methodologies used to perform the vulnerability analysis portion of the risk assessment. For this Plan, the entire vulnerability analysis was either revised or updated to reflect new hazard categories, the availability of new data, or differing loss estimation methodology. Specific changes are noted below and/or in Section 5.3.

For the purposes of this vulnerability analysis, hazard profile maps were developed for Earthquake, Flooding/Flash Flooding, Fissure, Levee Failure, Subsidence, Wildfire and Winter Storm to map the geographic variability of the probability and magnitude of exposure risk as estimated by the Planning Team. Hazard profile categories of HIGH, MEDIUM, and/or LOW were used (except for Earthquake and Winter Storm) and were subjectively assigned based on the factors discussed in the Probability and Magnitude sections below. Within the context of the county limits, the other hazards do not exhibit significant geographic variability and will not be categorized as such.

Unless otherwise specified in this Plan, the general cutoff date for new hazard profile data and jurisdictional corporate limits is the end of May 2011.

5.2.2 Calculated Priority Risk Index (CPRI) Evaluation

The first step in the vulnerability analysis (VA) is to assess the perceived overall risk for each of the plan hazards using a tool developed by the State of Arizona called the Calculated Priority Risk Index[13] (CPRI). The CPRI value is obtained by assigning varying degrees of risk to four (4) categories for each hazard, and then calculating an index value based on a weighting scheme. Table 5-5 summarizes the CPRI risk categories and provides guidance regarding the assignment of values and weighting factors for each category.

As an example, assume that the project team is assessing the hazard of flooding, and has decided that the following assignments best describe the flooding hazard for their community:

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

The CPRI for the flooding hazard would then be:

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

CPRI = 2.65

5.2.3 Asset Inventory

A detailed asset inventory was performed for the 2007 Plan to establish a fairly accurate baseline data-set for assessing the vulnerability of each jurisdiction's assets to the hazards previously identified. The asset inventory from the 2007 Plan was updated to reflect the current critical and non-critical facilities potentially exposed to hazards. Details of the update are discussed later in this section. The 2010 State Plan defines assets as:

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

The asset inventory is generally tabularized into ***critical*** and ***non-critical*** categories. ***Critical facilities and infrastructure*** are systems, structures and infrastructure within a community whose incapacity or destruction would:

- Have a debilitating impact on the defense or economic security of that community.
- Significantly hinder a community's ability to recover following a disaster.

Following the criteria set forth by the Critical Infrastructure Assurance Office (CIAO), the State of Arizona has adopted eight general categories[14] that define critical facilities and infrastructure:

1. **Communications Infrastructure:** Telephone, cell phone, data services, radio towers, and internet communications, which have become essential to continuity of business, industry, government, and military operations.

[13] ADEM, 2003, *Arizona Model Local Hazard Mitigation Plan*, prepared by JE Fuller/ Hydrology & Geomorphology, Inc.

[14] Instituted via Executive Order 13010, which was signed by President Clinton in 1996.

Table 5-5: Calculated Priority Risk Index (CPRI) categories and risk levels

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

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

Other assets such as public libraries, schools, businesses, museums, parks, recreational facilities, historic buildings or sites, churches, residential and/or commercial subdivisions, apartment complexes, and so forth, are typically not classified as critical facilities and infrastructure unless they serve a secondary function to the community during a disaster emergency (e.g. - emergency housing or evacuation centers). As a part of the update process, each community was tasked with determining which of the previously identified "non-critical" assets, if any, were deemed critical by the community. The remaining "non-critical" assets were deleted from the database. New facilities were also added as appropriate and available. Each community was also tasked with making any needed changes to the geographic position, revision of asset names, updating replacement costs, etc. to bring the dataset into a current condition. The updated asset inventory is attributed with a descriptive name, physical address, geospatial position, and an estimated building/structure and contents replacement cost for each entry to the greatest extent possible and entered into a GIS geodatabase.

The 2007 Plan used a combination of the Asset Inventory and HAZUS®-MH[15] data to represent the critical facilities for Pima County jurisdictions, however, those data sets were not available for use with this update. The Pima County Office of Emergency Management and Homeland Security (PCOEMHS) coordinated with regional emergency planners from each jurisdiction to prepare a database of critical facilities and infrastructure. Each jurisdiction was given the responsibility for making the decisions regarding which and how many assets would be reported. Updates included changes to the geographic position, revision of asset names, updating replacement costs, etc. Table 5-5 summarizes the facility counts by category provided by each of the participating jurisdictions in this plan.

It should be noted that the facility counts summarized in Table 5-6 do not represent a comprehensive inventory of all the category facilities that exist within the county. They do represent the facilities inventoried to-date by each jurisdiction and are considered to be a work-in-progress that is to be expanded and augmented with each Plan cycle.

[15] U.S. Department of Homeland Security, Federal Emergency Management Agency, HAZUS®-MH.

Table 5-6: Asset inventory structure counts by category and jurisdiction as of May 2011

	Communications Infrastructure	Electrical Power Systems	Gas/Oil Facilities	Banking/Finance Institutions	Transportation Networks	Water Supply Systems	Government Services	Emergency Services	Educational [a]	Cultural [a]	Business [a]	Flood Control [a]	Residential [a]	Recreational [a]
County-Wide Totals	**1603**	**29**	**105**	**0**	**572**	**115**	**171**	**129**	**750**	**0**	**12**	**0**	**0**	**0**
Marana	142	5	14	(22) [b]	34	23	13	7	25	0	9	0	0	0
Oro Valley	29	1	0	0	6	64	4	9	19	0	0	0	0	0
Pascua Yaqui Tribe	4	0	1	0	1	0	1	5	1	0	3	0	0	0
Sahuarita	16	1	0	0	19	15	3	4	18	0	0	0	0	0
South Tucson	1	0	0	0	6	0	5	2	5	0	0	0	0	0
Tohono O'odham	31	0	4	0	57	3	0	2	11	0	0	0	0	0
Tucson	686	12	20	0	220	26	93	41	527	0	0	0	0	0
Unincorporated Pima	694	10	66	0	229	48	52	59	144	0	0	0	0	0

a – Assets listed under these categories have been determined to be critical per the definition of this Plan by the corresponding jurisdiction.
b – These were not included in asset inventory database but are reported here to acknowledge their existence and need for inclusion to the database at the next Plan update.

5.2.4 Loss Estimations

In the original 2007 Plan, losses were estimated by either quantitative or qualitative methods. Where applicable, quantitative methods employed the loss estimating algorithms coded into the HAZUS MH® program, or statistically based estimations using historic data. Where quantitative information or standardized software was lacking, a more qualitative evaluation was made on the basis of each hazard's characteristics.

Loss estimates for this Plan will be similar in scope and detail to the 2007 Plan, but will reflect current hazard map layers, an updated asset database, and the use of Census 2010 block level data for estimating the human and residential structure impacts wherever possible. HAZUS MH® currently includes data sets that are based on 2000 Census information. Upon review by the Planning Team, a decision was made to use more current 2010 Census Block data instead. The procedures for developing loss estimates are discussed below.

Economic loss and human exposure estimates for each of the final hazards identified in Section 5.1 begins with an assessment of the potential exposure of critical infrastructure, human populations, and residential structures to those hazards. Estimates of critical assets identified by each jurisdiction (see Table 5-5) are accomplished by intersecting the asset inventory with the hazard profiles in Section 5.3. Human or population exposures are estimated by intersecting the same hazards with the 2010 Census Block data population statistics.

Additional exposure estimates for general residential buildings within the county is also made using the residential housing counts reported in the 2010 Census data. Replacement costs for the residential housing counts were estimated by geographical area within the county, using July 2011 mean home sales data published by Zillow® Real Estate.[16] The neighborhood data published by Zillow® was correlated to the 2010 Census block data using the Census Places boundaries. All areas outside of the Census Places boundaries was assigned a county-wide mean. Combining the exposure results from the critical asset inventory and the 2010 Census database provides a fairly comprehensive depiction of the overall exposure of critical facilities, human population, and residential building stock and the two datasets are considered complementary and not redundant.

[16] Zillow website at the following URL: http://www.zillow.com/local-info/AZ-Pima-County-home-value/r_281/

Economic losses to structures and facilities are estimated by multiplying the exposed facility replacement cost estimates by an assumed loss to exposure ratio for the hazard. The loss to exposure ratios used in this Plan update are summarized by hazard in Section 5.3. It is important to note the following when reviewing the loss estimate results:

- The loss to exposure ratios are subjective and the estimates are solely intended to provide an understanding of relative risk from the hazards and potential losses.
- Potential losses reported in this Plan represent an inherent assumption that the hazard occurs county-wide to magnitude shown on the hazard profile map. The results are intended to present a county-wide loss potential. Any single hazard event will likely only impact a portion of the county and the actual losses would be some fraction of those estimated herein.
- No attempt has been made at developing annualized loss estimates, unless otherwise noted in Section 5.3

It is also noted that uncertainties are inherent in any loss estimation methodology due to:

- Incomplete scientific knowledge concerning hazards and our ability to predict their effects on the built environment;
- Approximations and simplifications that are necessary for a comprehensive analysis; and,
- Lack of detailed data necessary to implement a viable statistical approach to loss estimations.

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

5.2.5 Development Trend Analysis

The 2007 Plan development trend analysis will require updating to reflect growth and changes in Pima County and jurisdiction boundaries over the last planning cycle. The updated analysis will focus on the potential risk associated with projected growth patterns and their intersection with the Plan identified hazards.

5.2.6 Environmental Risk and Vulnerability

The three environmental elements of air, water, and soil, are specifically evaluated with respect to the exposure and impact risk posed to those elements, by each of the Plan hazards. Similar to the CPRI discussed in Section 5.2.2, Table 5-7 is a summary of the impact categories, descriptions and index values that are used to address the environmental risk. Environmental Risk and Vulnerability Index (ERVI) is calculated similar to the CPRI with a minimum possible value of 1.00 and a maximum possible value of 3.40.

Table 5-7: Environmental Risk and Vulnerability Index (EVRI) categories and risk levels

Environmental Element	EVRI Category	Level ID	Description	Index Value	Weighting Factor
Applies to ALL THREE ELEMENTS	Probability of Impact	Unlikely	Extremely rare. No documented history of occurrences/events.	1	45%
		Possibly	Rare occurrences with at least one documented or anecdotal historic event.	2	
		Likely	Occasional occurrences with 2+ documented historic events.	3	
		Highly Likely	Frequent events with a well documented history of occurrence.	4	
AIR	Magnitude/ Severity	Negligible	Negligible impact.	1	30%
		Limited	Moderate impact. Special population groups may experience effects. Unlikely to impact general public.	2	
		Critical	Significant impact. General public likely to experience effects. Caution required.	3	
		Catastrophic	Severe impact. Unsafe for general public. Evacuation required.	4	
	Duration of Impact / Damage	< 1 month	Self explanatory.	1	10%
		1 – 3 month	Self explanatory.	2	
		3 – 6 months	Self explanatory.	3	
		> 6 months	Self explanatory.	4	
WATER	Magnitude/ Severity	Negligible	Negligible impact/disruption.	1	30%
		Limited	Minor impact/disruption. No threat to public, caution limited. Possible remediation required.	2	
		Critical	Moderate impact/disruption. Consumption may require special handling/preparation actions. Remediation likely.	3	
		Catastrophic	Severe impact/disruption. Not safe for consumption/agricultural uses. Remediation required.	4	
	Duration of Impact / Damage	< 1 month	Self explanatory.	1	10%
		1 – 3 month	Self explanatory.	2	
		3 – 6 months	Self explanatory.	3	
		> 6 months	Self explanatory.	4	
SOIL	Magnitude/ Severity	Negligible	Negligible impact/disruption.	1	30%
		Limited	Moderate impact/disruption. No remediation required.	2	
		Critical	Significant impact/disruption. Recovery likely with remediation.	3	
		Catastrophic	Severe impact/disruption, rendered non-productive/unusable for agriculture and/or development for extended period of time or indefinitely.	4	
	Duration of Impact / Damage	< 1 month	Self explanatory.	1	10%
		1 – 3 month	Self explanatory.	2	
		3 – 6 months	Self explanatory.	3	
		> 6 months	Self explanatory.	4	

5.2.7 Consequences/Impacts:

This section provides an assessment of the consequence and impacts posed by an occurrence of the hazard, to the following sectors:

Public – the public in general

Responders to the Incident – a discussion of the hazard impacts/consequence posed to officials and individuals responding to or during the hazard.

Continuity of Operations/Delivery of Services – an assessment of the hazard impact/consequence to state agencies and delivery of state level services.

Environment – a general discussion of the impacts/consequences of the hazard on the environment. This will compliment the previous "Environmental Risk & Vulnerability" section.

Economic / Financial Condition of Jurisdiction – a general discussion of the impacts/consequences to the Arizona economy and financial condition.

Public Confidence in Jurisdiction's Governance – a general discussion of the impacts/consequences to the public's confidence in the ability of the state to effectively govern and maintain governance during and after the hazard event.

5.2.8 Pascua Yaqui Tribe Cultural/Sacred Sites

Like the assets listed above, cultural and sacred sites are of high priority to the Pascua Yaqui Tribe and special attention is needed when considering hazard mitigation of these areas. Because of their cultural importance, these sites require special attention and protection. The Tribe's practice is to not share the location of these sites and areas. For this reason these sites and areas will not be included in this Plan. The Pascua Yaqui Tribe will ensure within its internal planning efforts that these sites and areas are included in their mitigation activities.

5.3 Hazard Risk Profiles

The following sections summarize the risk profiles for each of the Plan hazards identified in Section 5.1. For each hazard, the following elements are addressed to present the overall risk profile:

- **Description**
- **History**
- **Probability and Magnitude**
- **Vulnerability**
  - **CPRI Results**
  - **Loss Estimations**
  - **Development Trends**
  - **EVRI**
  - **Consequences/Impacts**
- **Sources**
- **Profile Maps (if applicable)**

Much of the 2007 Plan data has been updated, incorporated and/or revised to reflect current conditions and Planning Team changes, as well as an overall plan format change. Historic discussions for each hazard are limited to state and count impacts, unless broader discussions are warranted. County-wide and jurisdiction specific profile maps are provided at the end of the section (if applicable). Also, the maps are not included in the page count.

The reader is referred to the *Tohono O'odham Nation Multi-Hazard Mitigation Plan* (TON Plan) for all risk assessment information pertaining to the Tohono O'odham Nation.

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5.3.1 Disease

Description

A disease is a pathological (unhealthy or ill) condition of a living organism or part of the organism that is characterized by an identifiable group of symptoms or signs. Disease can affect any living organism, including people, animals, and plants. Disease can both directly (through infection) and indirectly (through secondary impacts) affect people, animals, and plants. Some diseases can directly affect both people and animals by infecting both. The most hazardous disease threat is the occurrence of an epidemic, which is a disease that affects numerous people, animals, or plants at one time.

Of great concern for human, animal and plant health are infectious diseases caused by the entry and growth of microorganisms in another living organism. Some, but not all, infectious diseases are contagious, meaning they are communicable through direct or even indirect contact with an organism infected with the disease, something it has touched, or another medium (e.g., water, air). According to the Centers for Disease Control and Prevention (CDC), during the first half of the twentieth century, optimism grew as steady progress was made against infectious diseases in humans resulting from improved water quality, sanitation, antibiotics, and inoculations (CDC, October 1998). The incidences and severity of infectious diseases such as tuberculosis, typhoid fever, smallpox, polio, whooping cough, and diphtheria were all significantly reduced during this period. This optimism proved premature, however, for a variety of reasons, including the following: antibiotics began to lose their effectiveness against infectious disease (e.g., Staphylococcus aureus); new strains of influenza emerged in China and spread rapidly around the globe; sexually transmitted diseases surged; new diseases were identified in the U.S. and elsewhere (e.g., Legionnaires's disease, Lyme disease, toxic shock syndrome, and Ebola hemorrhagic fever); acquired immunodeficiency syndrome (AIDS) appeared; and tuberculosis (including drug-resistant strains) reemerged (CDC, October 1998).

In a 1992 report entitled *Emerging Infections: Microbial Threats to Health in the United States*, the Institute of Medicine (IOM) identified the growing links between U.S. and international health, and concluded that emerging infections are a major and growing threat to the U.S. An emerging infectious disease is one whose incidence in humans has increased during the previous decades or threatens to increase in the near future. Emerging infectious diseases are a product of modern demographic and environmental conditions, such as global travel, globalization and centralized processing of the food supply, population growth and increased urbanization. In response to the threat of emerging infectious diseases, the CDC launched a national effort to protect the US public in a plan entitled Addressing Emerging Infectious Disease Threats. Based on the CDC's plan, major improvements to the US health system have been implemented, including improvements in surveillance, applied research, public health infrastructure, and prevention of emerging infectious diseases (CDC, October 1998).

Despite these improvements, infectious diseases are the leading cause of death in humans worldwide and the third leading cause of death in humans in the U.S. (American Society for Microbiology, June 21, 1999). A recent follow-up report from the Institute of Medicine, entitled *Microbial Threats to Health: Emergence, Detection, and Response*, notes that the impact of infectious diseases on the U.S. has only grown in the last ten years and that public health and medical communities remain inadequately prepared. Further improvements are necessary to prevent, detect, and control emerging, as well as resurging, microbial threats to health. The danger posed by infectious diseases are compounded by other important trends: the continuing increase in antimicrobial resistance; the US' diminished capacity to recognize and respond to microbial threats; and the intentional use of biological agents to do harm (Institute of Medicine, 2003).

The CDC maintains a list of over 50 nationally notifiable diseases. A notifiable disease is one that, when diagnosed, health providers are required, usually by law, to report to State or local public health officials. Notifiable diseases are those of public interest by reason of their contagiousness, severity, or frequency. The long list includes such diseases as the following: AIDS; anthrax; botulism; cholera; diphtheria; encephalitis; gonorrhea; Hantavirus pulmonary syndrome; hepatitis (A, B, C); HIV (pediatric); Legionellosis; Lyme disease; malaria; measles; mumps; plague; polio (paralytic); rabies (animal and human); Rocky Mountain spotted fever; rubella (also congenital); Salmonellosis; SARS; Streptococcal disease (Group A); Streptococcal toxic-shock syndrome; Streptococcus pneumoniae

(drug resistant); syphilis (also congenital); tetanus; Toxic-shock syndrome; Trichinosis, tuberculosis, Typhoid fever; and Yellow fever (Centers for Disease Control and Prevention, May 2, 2003). In addition to diseases found only in humans, there is also significant concern about diseases that affect both humans and animals, known as zoonotic diseases. There are approximately 40 zoonotic diseases, including the following: rabies; tuberculosis and brucellosis; trichinosis; ringworm; giardiasis; and Lyme disease (Will, April 2002). Pima County is also very active in fighting the spread of the West Nile Virus through the control of mosquitoes.

In Pima County, the Pima County Health Department seeks to prevent infectious diseases from entering the county and control those that are endemic or have already entered. Of particular concern to the County Health Department are new pandemic diseases, such as SARS, new strains of HIV, new influenza strains such as the most recent H1N1 threat, botulism, and bio-terrorism pathogens such as anthrax, smallpox, or chemical attacks of sarin or VX gas. As a component of the Pima County Health Department, the Disease Control division seeks to reduce the incidence of disease morbidity and mortality in Pima County through the identification of community health problems, compilation of health statistics, and development of appropriate intervention programs. Special attention is paid to epidemiology, HIV/AIDS, sexually transmitted diseases, in addition to preventive programs such as immunizations and well women services.

Diseases affecting animals and plants, particularly livestock and agricultural products, are also of major concern, as they can affect the supply and quality of human food supplies, potential economic consequences, and impact foreign trade. According to the National Animal Health Emergency Management System (NAHEMS), an animal health emergency is defined as the appearance of disease with the potential for sudden negative impacts through direct effects on productivity, real or perceived risks to public health, or real or perceived risks to foreign countries importing from the U.S. (Lautner, April 18, 2002).

A division of the United States Department of Agriculture (USDA), the Animal and Plant Health Inspection Service (APHIS) is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and carrying out wildlife damage management activities. Major programs within APHIS relating to disease are Veterinary Services (VS) and Plant Protection and Quarantine (PPQ). Veterinary Services protects and improves the health, quality, and marketability of animals, animal products and veterinary biologics by (i) preventing, controlling and/or eliminating animal diseases, and (ii) monitoring and promoting animal health and productivity. Among other activities, Veterinary Services conducts surveillance on national animal diseases, foreign animal diseases, emerging animal diseases, and invasive plant species. Most of Veterinary Services efforts are targeted at diseases on the Organization Internationale des Epizooties (OIE) “A” list or “B” list.

The OIE is the international standard setting body for animal health and international trade. OIE categorizes animal diseases in two classes: “A” list (most serious) and “B” list (less serious). The “A” list contains transmissible diseases that have the potential for very serious and rapid spread, irrespective of national borders, are of serious socio-economic or public health consequence, and are of major importance in the international trade of animals and animal products. Diseases on the “A” list include the following: Foot and mouth disease; lumpy skin disease; bluetongue; African horse sickness; classical swine fever; vesicular stomatitis; rinderpest; contagious bovine pleuropneumonia; Rift Valley fever; sheep pox and goat pox; African swine fever; and highly pathogenic avian influenza. The “B” list diseases are transmissible diseases considered to be of socio-economic and/or public health importance within countries and are significant in the international trade of animals and animal products. This list currently includes over 100 diseases (Organization Internationale des Epizooties, January 9, 2003).

The Plant Protection and Quarantine (PPQ) program safeguards agriculture and natural resources from the risks associated with the entry, establishment, or spread of animal and plant pests and noxious weeds. Several thousand foreign plant and animal species have been established in the United States over the past 200 years, with approximately one in seven becoming invasive. An invasive species is an alien (i.e., non-native) species whose introduction does, or is likely to, cause harm to the economy, environment, or human health. Invasive plants, animals, and pathogens have often reduced the economic productivity and ecological integrity of agriculture, forestry, and other natural resources.

The Arizona Department of Agriculture (ADA) and Arizona Game and Fish Department (AGFD) are primarily concerned with plant, livestock and wild animal diseases and infections. These agencies focus on diseases listed on the Office International des Epizooties (OIE) disease "A" list. The OIE develops standards and guidelines for use in protecting against incursions of diseases or pathogens during trade in animals and animal products. The ADA and the AGFD are concerned with animal-to-animal diseases, as well as diseases transmitted from animals or arthropod vectors to humans.

As a part of the Sonoran Desert Conservation Plan (Pima County, 2002), Pima County identified and characterized a list of invasive, non-native plant and animal species that require attention. In that report, Pima County's most serious invasive species problems were identified to be:

- Invasive African and Mediterranean grasses that present severe fire hazards to the Sonoran Desert ecosystem that did not evolve with fire and cannot survive with intense fires.
- Bullfrogs that eat native frogs, fish, snakes, and even bats and birds they catch flying over the water and crayfish that devour other aquatic plant and animal life, leaving streams with little life other than crayfish and algae.
- Saltcedar that invades riparian systems and displaces native plants while offering little benefit to most wildlife.
- Africanized bees that threaten humans and animal life.

Many other hazards, such as floods, earthquakes or droughts, may create conditions that significantly increase the frequency and severity of diseases. These hazards can affect basic services (e.g., water supply and quality, wastewater disposal, electricity), the supply and quality of food, and the public and agricultural health system capacities. As a result, concentrations of diseases may result and grow rapidly, potentially leading to large losses of life and economic value. In addition, since the anthrax attacks following the terrorist attacks on September 11, 2001, the threat of terrorism using disease to infest humans, animals, or plants, is of growing concern. This is particularly true of those capable of disrupting the human or animal food chain.

History

In Pima County, there have been seven disaster declarations (Presidential, USDA, or Gubernatorial disaster or emergency declaration) due to disease, as shown in Tables 5-2 and 5-3. There were no identified fatalities or injuries associated with these events as recorded. Major infectious disease outbreaks in Pima County that affected humans and animals include the following:

- In 1918 the Spanish influenza pandemic entered Arizona resulting in a great number of deaths, although the exact number is undocumented.
- In 1952, large numbers of influenza cases were reported throughout Arizona, including Pima County, although no death statistics are available.
- In 1975, a Rabies quarantine was issued for Pima County.
- On May 18, 2002 the Arizona Game and Fish Department placed an emergency ban on the importation of live hoofed animals (e.g., deer and elk) into Arizona due to a fear of Chronic Wasting Disease (CWD). CWD is a disease closely related to "mad cow disease" in cattle and scrapie in domestic sheep and goats, but also affects deer and elk (Arizona Game and Fish).
- On January 8, 2003, the Arizona Department of Agriculture issued an Administrative Order implementing procedures to prevent the introduction of Exotic Newcastle Disease (END) into Arizona. END is a contagious and fatal viral disease affecting domestic, wild, and caged poultry and birds, and is one of the most infectious diseases of poultry in the world. On February 5, 2003, Governor Napolitano declared a state of emergency to contain END threatening Arizona's poultry. The US Secretary of Agriculture, Ann M. Veneman, signed declarations of extraordinary emergency with respect to END in Arizona on February 7, 2003 (United States Department of Agriculture, February 12, 2003).

Pima County has been subject to a number of major infestations, the largest of which is still affecting the state and region (pine bark beetle). Further details on these infestations are given below:

- Exotic and imported ants are listed on the Arizona Department of Agriculture website as "Arizona's Most Unwanted Pest". Some people are allergic to the sting and in some cases may cause death. Fire ants are also known to out compete and drive away local native ants (Arizona Department of Agriculture).
- Arizona periodically experiences major grasshopper infestations. Four infestations have resulted in State declarations of emergency in the last quarter century (Arizona Division of Emergency Management, March 6, 2003).
- In 1996, a Karnal Bunt wheat plant disease disaster was declared. Other undeclared plant disease events include the citrus disease red scale in 1942 (Arizona Division of Emergency Management, March 6, 2003).
- On May 22, 2003, Governor Janet Napolitano declared a State disaster and a state of emergency due to the ravages of the pine bark beetle on the state's forests. An estimated 2.5 million ponderosa pines and 4 million pinon pines were killed by the pine bark beetle in Arizona in 2002-2003. The last significant bark beetle outbreak in Arizona occurred from 1951 to 1956. The bark beetles are killing so many trees for two reasons, first the forest has too many trees and second the trees are very dry. Overcrowded forest conditions coupled with drought lead to the high probability of beetle attack. The forests of Arizona have been able to survive in relatively dry conditions because in past centuries low intensity fires helped to maintain a low density of trees in the forest. In the past century, however, fires have been controlled allowing many forested areas to become overcrowded (DeGomez, April 23, 2003).

Probability and Magnitude

The probability and magnitude of disease, particularly an epidemic, is difficult to evaluate due to the wide variation in disease characteristics, such as rate of spread, morbidity and mortality, detection and response time, and the availability of vaccines and other forms of prevention. A review of the historical record (see above) indicates that disease related disasters do occur in humans, animals, and plants with some regularity and severity. There is growing concern, however, about emerging infectious diseases as well as the possibility of a bioterrorism attack.

Vulnerability – CPRI Results

Disease CPRI results for each jurisdiction are summarized in Table 5-8 below.

Table 5-8: CPRI results by jurisdiction for disease

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Limited	> 24 hours	> 1 week	2.05
Oro Valley	Possible	Limited	> 24 hours	> 1 week	2.05
Pascua Yaqui Tribe	Possible	Limited	> 24 hours	> 1 week	2.05
Sahuarita	Possible	Limited	12 to 24 hours	< 1 week	2.20
Tucson	Possible	Limited	> 24 hours	> 1 week	2.05
Unincorporated Pima County	Likely	Critical	> 24 hours	< 1 week	2.70
				County-wide average CPRI =	**2.18**

Vulnerability – Loss Estimations

The wide variation in disease characteristics makes evaluation of the vulnerability of people, animals, and plants difficult to analyze. Preventable diseases and injuries are studied and vulnerability assessments have been made. However, a highly contagious and severe disease, such as smallpox or a new strain of influenza, could swiftly kill large numbers of people and incapacitate critical facilities (e.g. hospitals). Although the vulnerability to people, animals and plants is valuable and desirable information for emergency planning purposes, a vulnerability assessment of the healthcare infrastructure would be invaluable in assessing the ability of hospitals, public health departments, clinics, urgent care centers and the like to ensure continued health care in all of Pima County should

any one healthcare support system become inoperable or overwhelmed. Systems that should be included in a future vulnerability assessment study would include, but would not be limited to, local and outside pharmaceutical suppliers and their alternate sources, means of delivery, and timeframe; local laboratories and their alternate sources, means of delivery, and timeframe; general and specialized medical suppliers and their alternate sources, means of delivery and timeframe; and local military medical and hazardous materials support and possible alternate resources from the private sector to include means of delivery and timeframe.

Likewise, an animal equivalent, such as foot-and-mouth disease, could result in the destruction of numerous animals and cause tremendous economic impacts. The Arizona Department of Agriculture has identified numerous systemic, administrative, or organizational vulnerabilities that currently affect disease prevention in Arizona. Some of the more compelling factors that influence these vulnerabilities in Pima County include the following:

- Inspection services at all ports. No port has an animal inspector; most ports are manned by the Motor Vehicle Division and plant health inspection personnel who assist the Animal Services Division by visualizing animal health papers, without examining the animals.
- Safeguarding the food supply by inspecting commercial trucks destined for areas both inside and outside Arizona's borders.
- Continued observation of border crossings for animals arriving from Mexico after their USDA inspection.
- Create and enforce animal identification plan for cattle and horses in the United States.
- Prevent the illegal smuggling of fighting birds, pet birds, and other poultry; as well as meat products.
- The importation of shell eggs to the United States without USDA approval.
- Biosecurity at Arizona dairies, feedlots, and poultry producers.

Vulnerability – Development Trends

Population growth in the county will increase the amount of people exposed to disease. Development within the county may also increase the risk of introducing or propagating invasive species if not monitored and regulated. Pima County citizens have taken an active role in mitigating disease and invasive species through numerous public and private programs, and will continue to do so.

Vulnerability – EVRI

Table 5-9 summarizes the EVRI assessment for disease.

Table 5-9: Environmental Risk and Vulnerability Index (EVRI) scores for disease

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Negligible	< 1 month	0.85
SOIL	Unlikely	Negligible	< 1 month	0.85
			Overall EVRI Score	**0.85**

Vulnerability – Consequences/Impacts

Public – Pandemic and infectious diseases create a serious threat to public health as they may affect a large percentage of the population, regardless of health condition, age or location. These potentially hazardous conditions affect humans, domestic animals, and livestock (food supply). People who work with infected persons/populations (health care workers) are especially vulnerable and should take

precautions, such as, vaccination/inoculation, personal protective equipment (PPE), etc. Sickness and death may occur if proper precautions are not taken.

Responders to the Incident – Emergency response personnel, workers and volunteers may be subject to potentially hazardous working conditions when working with people infected with pandemic and infectious disease. Emergency medical service, fire/rescue and law enforcement personnel must wear appropriate PPE. Such safety gear may make first responders susceptible to heat exhaustion or heat stroke when working in hot conditions and/or while performing strenuous activities.

Continuity of Operations / Delivery of Services – There is a serious threat to Pima County's ability to continue the functioning of government operations and services due to potential extensive absenteeism. Since pandemic and infectious disease may infect large numbers of the working, adult population, childcare for sick, school-aged children, who may not be permitted to attend school, may pose attendance issues for government employees. If employees stay home to care for their sick children, this also increases their exposure increasing vulnerability to infection. Emergency services may be affected due to absenteeism in the ranks of first responders.

Environment – There is little potential for direct environmental impact by pandemic and infectious disease, unless the event results in a large number of decedents and dead animal carcasses to be disposed of. Temporary internment of human remains (per Pima County Mass Fatalities Plans) may be necessary as would be the mass disposal of animal remains. Environmental impact could potentially affect air quality, soil and water if proper planning protocols for storage, burial and/or disposal of human and animal remains are not adhered to.

Economic / Financial Condition of Jurisdiction – Pima County government may be impacted financially by a pandemic and infectious disease event due to the expense of staffing emergency response and non-emergency, essential functions during high absenteeism and overtime costs associated with keeping well-personnel working to continue to provide necessary government services. Additionally, tourism, service industries, recreation/sports and agriculture will be affected. Impact is directly linked to magnitude and duration of the event.

Public Confidence in Jurisdiction's Governance – The confidence of Pima County residents in the governance offered in this matter of public health will remain high due to the various educational, prevention and treatment information and programs that have been offered to the public. Plans exist for the distribution and dispensing of medical supplies and services to respond to an outbreak of pandemic and infectious disease. Pima County is well supported by state and federal assets which are pre-positioned for deployment in time of need. Each year as the flu season approaches, public health messages will continue to be provided to the region through extensive coverage in the TV/radio/print news media, public health clinics and social networks. Pima County residents will be notified of available mass prophylaxis, i.e. influenza vaccinations, by both public and private sources. Treatment will be accomplished through the public/private partnership between Pima County, the local media and private healthcare providers. Government employees will continue to be offered annual preventive treatment for pandemic influenza to increase their resistance to perceived and seasonal health threats as a proactive measure. The Pima County Health Department maintains active disease surveillance in conjunction with the Arizona Department of Health Services (ADHS) and the Centers for Disease Control (CDC).

Sources:

Centers for Disease Control and Prevention, *Emerging Infectious Diseases: A Public Health Response.* URL at: http://www.cdc.gov/ncidod/emergplan/summary/summary.pdf

Centers for Disease Control and Prevention, 1994, *Addressing Emerging Infectious Disease Threats*. URL at: ftp://ftp.cdc.gov/pub/infectious_diseases/emergplan/pdf/emergplan.pdf

Centers for Disease Control and Prevention. May 2, 1997, *Facts About Disease Case Definitions.* URL at: http://www.cdc.gov/od/oc/media/fact/cases.htm

Centers for Disease Control and Prevention, October 1998, *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century.* URL at: http://www.cdc.gov/ncidod/emergplan/plan98.pdf

Centers for Disease Control and Prevention, January 7, 2003, *CDC Finds Annual Flu Deaths Higher Than Previously Estimated.* URL at: http://www.cdc.gov/od/oc/media/pressrel/r030107.htm

Centers for Disease Control and Prevention, May 2, 2003, *Summary of Notifiable Diseases, United States, 2001*. URL at: http://www.cdc.gov/mmwr/PDF/wk/mm5053.pdf

Centers for Disease Control and Prevention, July 8, 2003, *CDC Confirms Nation's First Human Case of West Nile in 2003*. URL at: http://www.cdc.gov/od/oc/media/pressrel/r030708.htm

Centers for Disease Control and Prevention, July 17, 2003, *Update to SARS Case Definition Reduces US Cases by Half.* URL at: http://www.cdc.gov/od/oc/media/pressrel/r030717a.htm

Lautner, Beth, April 18, 2002, *What is the National Health Emergency Management System (NEHMS)?* URL at: http://aphisweb.aphis.usda.gov/vs/training/lautner.pdf

Pima County, 2002, *An Invasive Species Management Program for Pima County, Sonoran Desert Conservation Plan*. URL at: http://www.pima.gov/cmo/sdcp/reports%5Cd26%5C136INVSP.PDF

Profile Maps

No profile maps provided.

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5.3.2 Drought

Description

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

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

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

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

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

The effects of drought increase with duration as more moisture-related activities are impacted. Non-irrigated croplands are most susceptible to precipitation shortages. Rangeland and irrigated agricultural crops many not respond to moisture shortage as rapidly, but yields during periods of drought can be substantially affected. During periods of severe drought, lower moisture in plant and forest fuels create an increased potential for devastating wildfires. In addition, lakes, reservoirs, and rivers can be subject to water shortages that impact recreational opportunities, irrigated crops, and availability of water supplies for activities such as fire suppression and human consumption, and natural habitats of animals. Socioeconomic effects include higher unemployment and lower land values. Insect infestation can also be particularly damaging impact from severe drought conditions.

History

Arizona has experienced 17 droughts declared as drought disasters/emergencies and 93 drought events (droughts affecting multiple years are recorded as a distinct event for each year affected). Figures 5-1 and 5-2 depict the most recent precipitation data from NCDC regarding average statewide precipitation variances from normal. Between 1849 and 1905, the most prolonged period of drought conditions in 300 years occurred in Arizona (Jacobs, 2003). Another prolonged drought occurred during the period of 1941 to 1965. The period from 1979-1983 appears to have been anomalously wet, while the rest of the historical records shows that dry conditions are most likely the normal condition for Arizona.

Between 1998 and 2008, there have been more months with below normal precipitation than months with above normal precipitation.

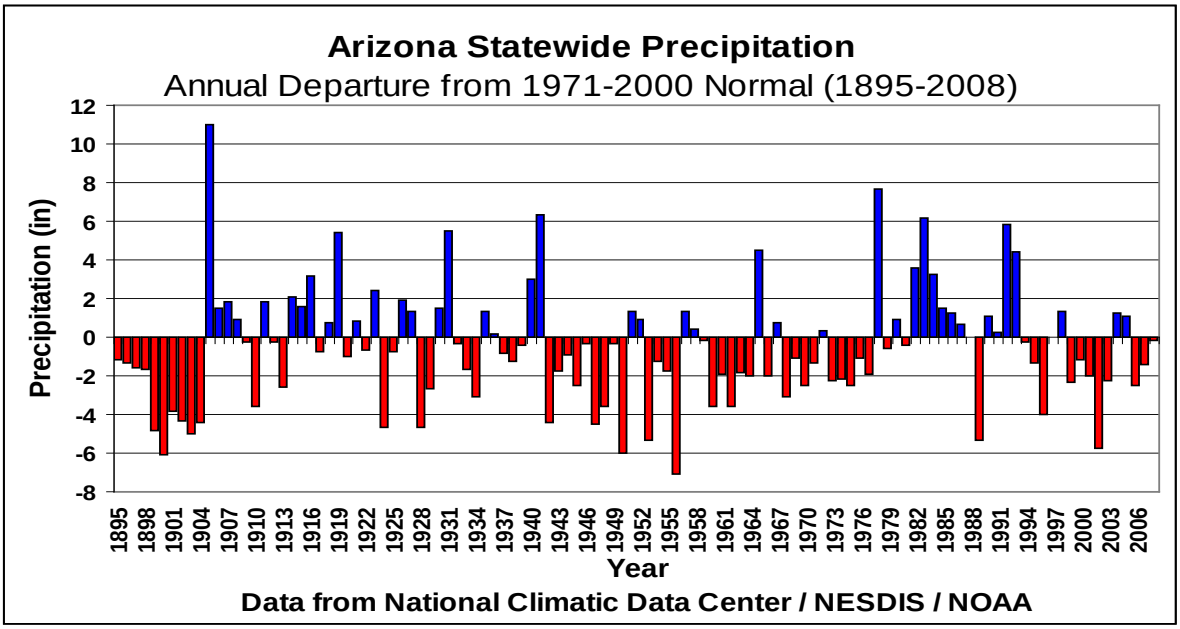


Figure 5-1: Average statewide precipitation variances from a normal based on 1971-2000 period.

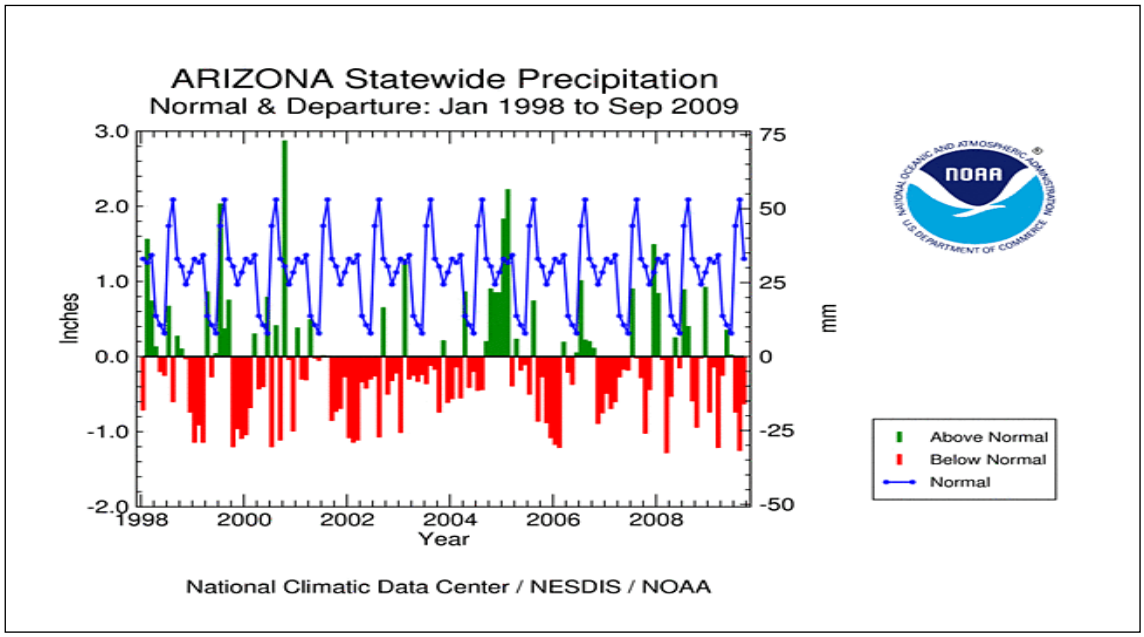
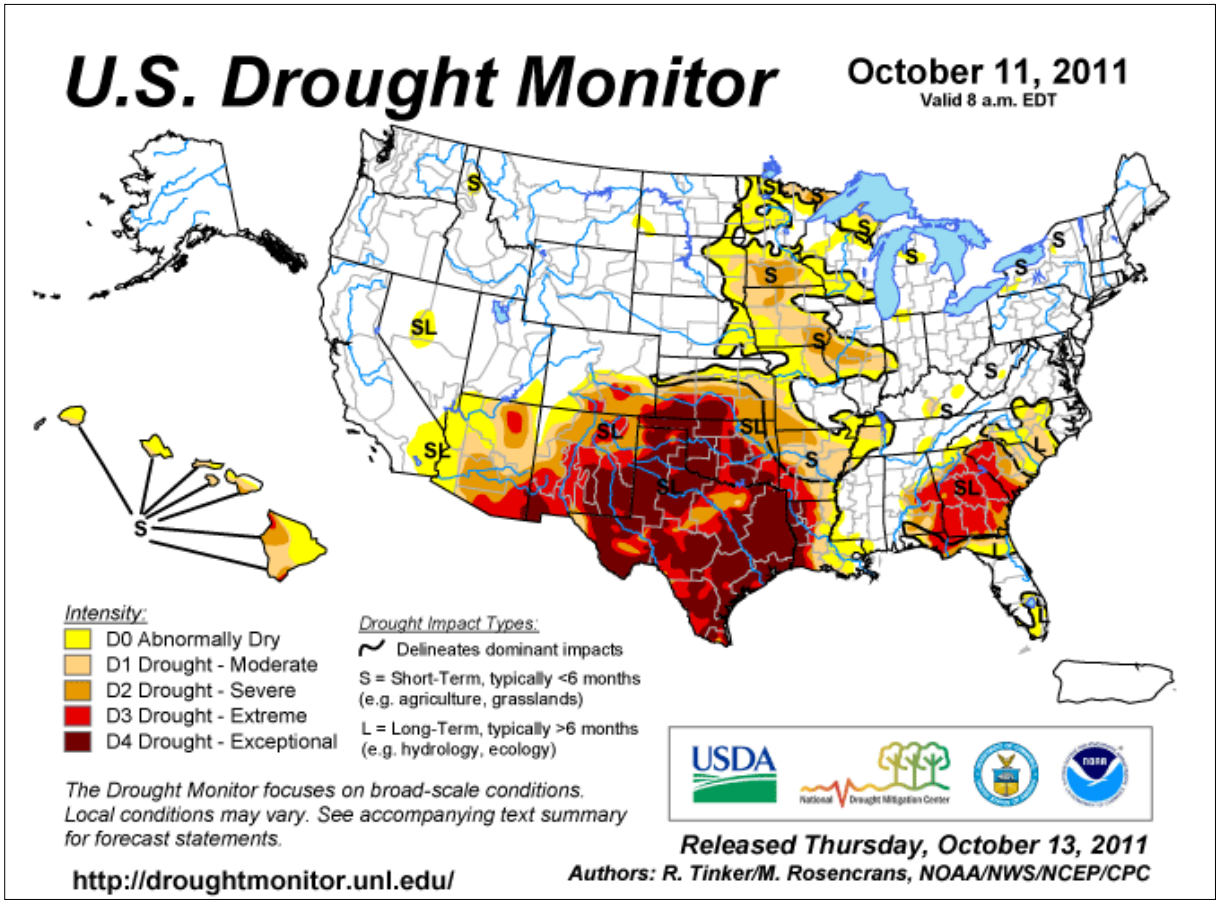


Figure 5-2: Average statewide precipitation variances from a normal based on 1998-2009 period

Probability and Magnitude

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

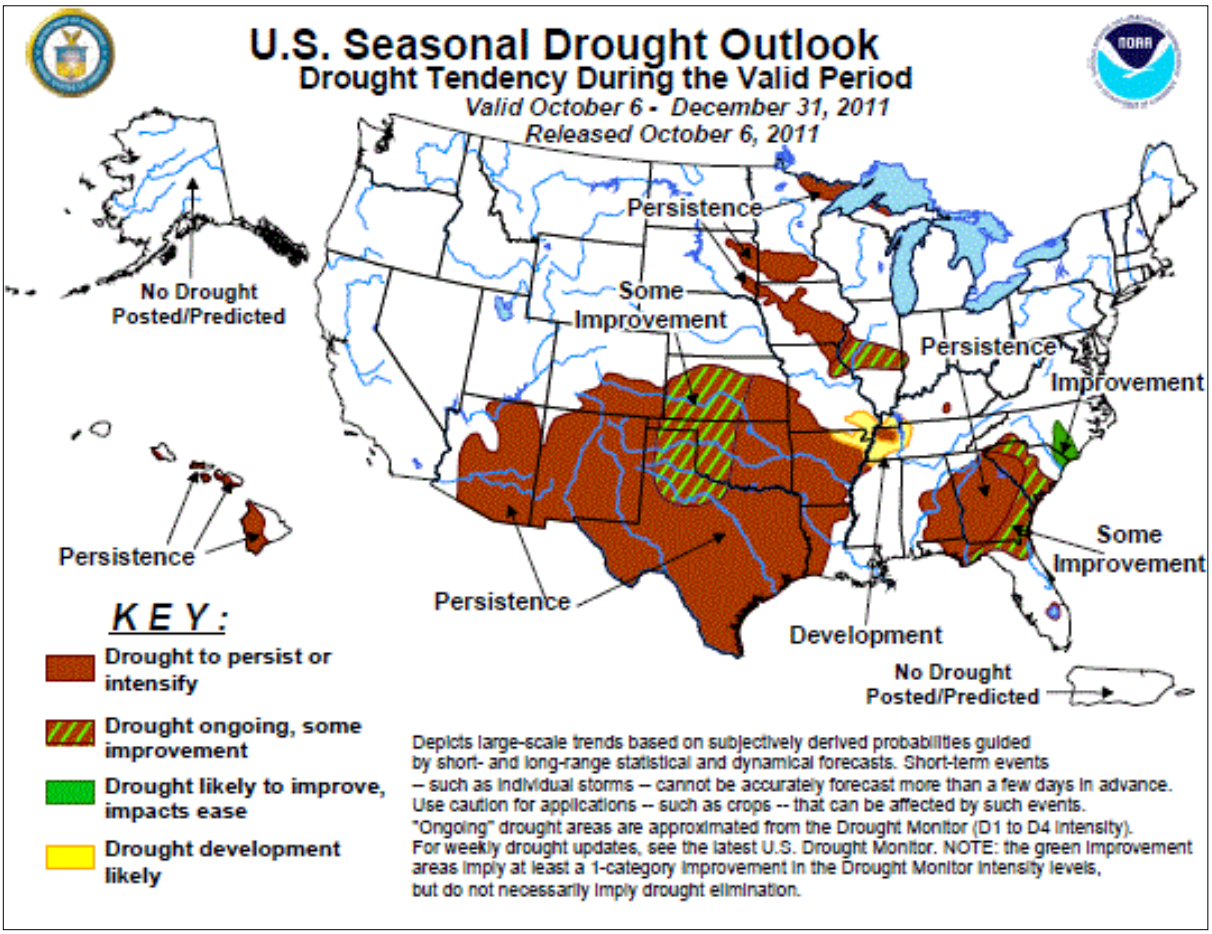
The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning (NIDIS, 2007). The NIDIS maintains the U.S. Drought Portal[17] which is a centralized, web-based access point to several drought related resources including the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO). The USDM, shown in Figure 5-3, is a weekly map depicting the current status of drought and is developed and maintained by the National Drought Mitigation Center. The USSDO, shown in Figure 5-4, is a six month projection of potential drought conditions developed by the National Weather Service's Climate Prediction Center. The primary indicators for these maps for the Western U.S. are the Palmer Hydrologic Drought Index and the 60-month Palmer Z-index. The Palmer Drought Severity Index (PSDI) is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the Palmer Index is not considered to be consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and neither of the Palmer indices are well suited to the dry, mountainous western United States.



Source: http://drought.unl.edu/dm/monitor.html

Figure 5-3: U.S. Drought Monitor Map for October 11, 2011

[17] NIDIS U.S. Drought Portal website is located at: http://www.drought.gov/portal/server.pt/community/drought.gov/202



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

Figure 5-4: U.S. Seasonal Drought Outlook, October to December, 2011

In 2003, Governor Janet Napolitano created the Arizona Drought Task Force (ADTF), led by ADWR, which developed a statewide drought plan. The plan includes criteria for determining both short and long-term drought status for each of the 15 major watersheds in the state using assessments that are based on precipitation and stream flow. The plan also provides the framework for an interagency group which reports to the governor on drought status, in addition to local drought impact groups in each county and the State Drought Monitoring Technical Committee. Twice a year this interagency group reports to the governor on the drought status and the potential need for drought declarations. The counties use the monthly drought status reports to implement drought actions within their drought plans. The State Drought Monitoring Technical Committee defers to the USDM for the short-term drought status and uses a combination of the Standardized Precipitation Index (SPI), evaporation and streamflow for the long-term drought status. Figures 5-5 and 5-6, present the most current short and long term maps available for Arizona as of the writing of this plan.

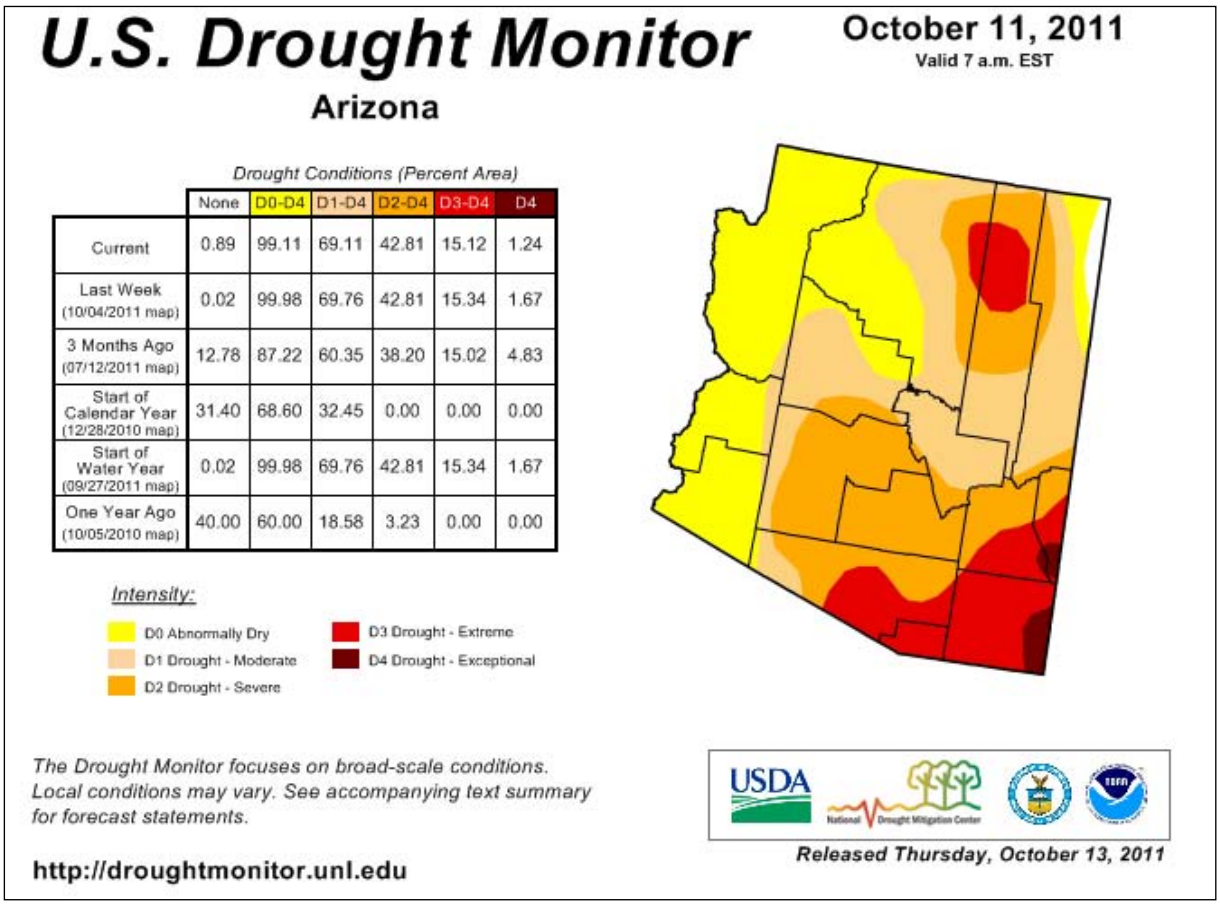
The current drought maps are in general agreement that Pima County is currently experiencing a abnormally dry to extreme drought condition for the short term and in a moderate drought condition for the long term. Figure 5-4 indicates that the drought conditions are projected to persist or intensify for Pima County over the next few months.

Vulnerability – CPRI Results

Drought CPRI results for each community are summarized in Table 5-10 below.

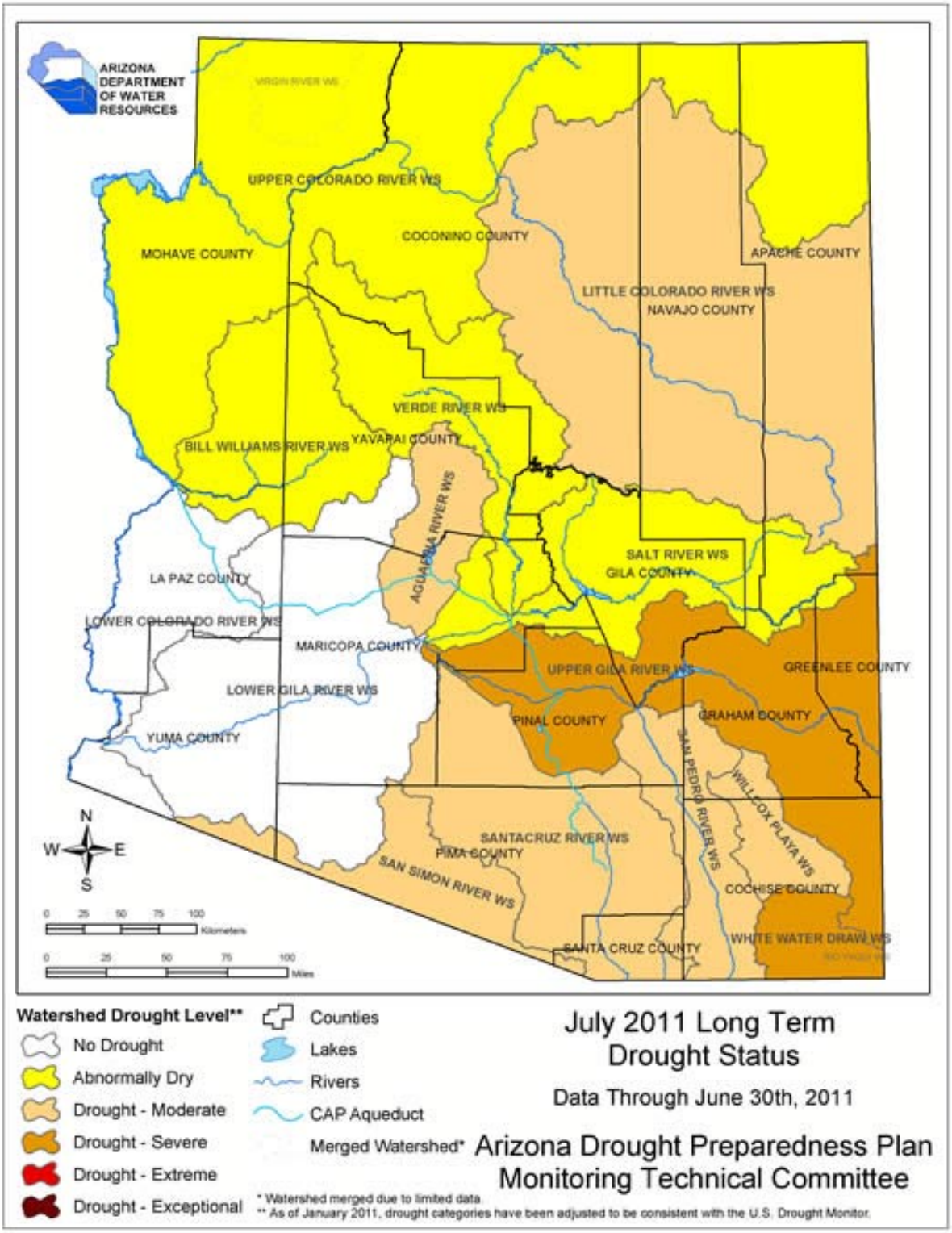
Table 5-10: CPRI results by jurisdiction for drought

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Limited	> 24 hours	> 1 week	2.05
Oro Valley	Likely	Critical	> 24 hours	> 1 week	2.80
Pascua Yaqui Tribe	Highly Likely	Limited	> 24 hours	> 1 week	2.95
Sahuarita	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Tucson	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Unincorporated Pima County	Highly Likely	Critical	> 24 hours	> 1 week	3.25
				County-wide average CPRI =	**2.93**



Source: http://www.adwr.state.az.us/AzDWR/StatewidePlanning/Drought/DroughtStatusMonitorPU.htm

Figure 5-5: Arizona short term drought status map for August 2009



Source: ADWR, 2010, *Arizona Drought Monitor Report - January 2010*

Figure 5-6: Arizona long term drought status map for July 2011

Vulnerability – Loss Estimations

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

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

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

According to the 2010 annual report of the Pima County Local Drought Impact Group, the following drought impacts were noted:

- At Cienega Creek, groundwater levels in three wells have dropped as much in the last year as they have in the last 15 years. Stream reaches are also shorter and the surface water volume is lower.
- Despite the warm, wetter summer weather patterns in eastern Pima County, water utilities continue to see a change in the peak high demand day. Usually occurring in mid- to late-June, the peak high water use day occurred in August and the peak was lower than in previous years.
- For ranchers, impacts to stock ponds and grasses continue to indicate drought conditions.

From 1995 to 2010, Pima County farmers and ranchers received $1.6 million in disaster related assistance funding from the U.S Department of Agriculture (USDA) for crop and livestock damages (EWG, 2011). Over $1.3 million of those funds were received during the time period of 2000 to 2005, which corresponds to the most severe period of the current drought cycle for Pima County.

Other direct costs such as increased pumping costs due to lowering of groundwater levels and costs to expand water infrastructure to compensate for reduced yields or to develop alternative water sources, are a significant factor but very difficult to estimate due to a lack of documentation. There are also the intangible costs associated with lost tourism revenues, and impacts to wildlife habitat and animals. Typically, these impacts are translated into the general economy in the form of higher food and agricultural goods prices and increased utility costs.

Vulnerability – Development Trends

Population growth in Pima County will also require additional surface and ground water to meet the thirsty demands of potable, landscape, agricultural, and industrial uses. It is unlikely that significant growth will occur in the ranching and farming sectors given the current constraints on water rights, grazing rights, and available range land.

Pima County maintains a drought management website with drought related information and updates, and also facilitates the Pima County Local Drought Impact Group (LDIG), which is comprised of water providers and local, state, and federal agencies. Pima County has also developed a Drought Response Plan and Water Wasting Ordinance [18] that is administered and enforced through the Pima County Health Department for unincorporated areas of the county.

[18] A copy can be seen at: http://www.pima.gov/drought/PDFs/Drought_Ordinance.pdf

Drought planning should be a critical component of any domestic water system expansions or land development planning. The ADTF is also working cooperatively with water providers within the State to develop System Water Plans that are comprised of three components:

- *Water Supply Plan* – describes the service area, transmission facilities, monthly system production data, historic demand for the past five years, and projected demands for the next five, 10 and 20 years.
- *Drought Preparedness Plan* – includes drought and emergency response strategies, a plan of action to respond to water shortage conditions, and provisions to educate and inform the public.
- *Water Conservation Plan* – addresses measures to control lost and unaccounted for water, considers water rate structures that encourage efficient use of water, and plans for public information and education programs on water conservation.

The following are the major water providers that operate within Pima County and have developed System Water Plans with specific recommendations and requirements during times of drought:

- Tucson Water
- Marana
- Metro Water
- Flowing Wells Irrigation District
- Oro Valley
- Community Water Company of Green Valley

Vulnerability – EVRI

Table 5-11 summarizes the EVRI assessment for drought.

Table 5-11: Environmental Risk and Vulnerability Index (EVRI) scores for drought

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Limited	> 6 months	1.45
SOIL	Unlikely	Limited	> 6 months	1.45
			Overall EVRI Score	**1.25**

Vulnerability – Consequences/Impacts

Public – There is little direct environmental impact to public safety and health due to the existence of drought conditions. Indirect impacts are more likely and are typically seen in the form of damage to the environment which could impact agriculture, food supply and the economy.

Responders to the Incident – Drought is not the type of situation that typically requires an incident response element so there is little impact on them due to environmental factors.

Continuity of Operations / Delivery of Services – There is little threat to Pima County's ability to continue the functions of government operations and services.

Environment –Drought results in conditions which are conducive to fires by creating ample fuel in the form of dry grasses and trees. Drought may cause an increase in flooding potential with less ground vegetation to intercept rainfall and impedes the absorption of water into the ground to recharge the aquifer. Subsidence may be a secondary effect of drought as increases in ground water pumping exacerbate subsidence.

Economic / Financial Condition of Jurisdiction – Pima County's economy could be negatively impacted by drought in several ways. Agriculture: crop losses and increased irrigation costs may result in food supply shortages and higher food costs. Loss of revenue from recreational/tourism activities

related to or dependent upon water resources, such as, golfing, fishing, boating, or hunting. Higher feed and water costs associated with livestock production may result in a reduction in the food supply and higher food costs.

Public Confidence in Jurisdiction's Governance – Drought planning has been an on-going effort in Pima County and the State of Arizona. Pima County's Emergency Response and Recovery Plan (ERRP) has a Drought Annex which will guide emergency response to any drought emergency. The ERRP supports the Arizona State Emergency Response and Recovery Plan (AzSERRP) and the Arizona Drought Preparedness Plan (ADPR).

Sources

Arizona Department of Water Resources, 2010, *Arizona Drought Monitor Report - January 2010*

Arizona Division of Emergency Management, 2009, *State of Arizona Multi-Hazard Mitigation Plan, 2010 Update, DRAFT*.

Environmental Working Group's Farm Subsidy Database, 2011, http://farm.ewg.org/progdetail.php?fips=04019&progcode=total_dis&yr=mtotal

Federal Emergency Management Agency,1997, *Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy.*

Jacobs, Katharine and Morehouse, Barbara. June 11-13, 2003. "Improved Drought Planning for Arizona," from Conference on Water, Climate, and Uncertainty: Implications for Western Water Law, Policy and Management http://www.water.az.gov/gdtf/content/files/06262003/Improved_Drought_Planning_for_AZ_6-17.pdf

National Integrated Drought Information System, 2007, *National Integrated Drought Information System Implementation Plan*, NOAA.

NIDIS U.S. Drought Portal website is located at: http://www.drought.gov/portal/server.pt/community/drought.gov/202

NOAA, NWS, Climate Prediction Center, 2010, website located at: http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Pima County, 2011, Drought Management Website: http://www.pima.gov/drought/index.html

Profile Maps - No profile maps are provided.

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5.3.3 Earthquake

Description

An earthquake is a sudden motion or trembling caused by an abrupt release of accumulated strain within or along the edge of the Earth's tectonic plates. These rigid tectonic plates, some 50 to 60 miles thick, move slowly and continuously over the earth's interior, where they move away, past or under each other at rates varying from less than a fraction of an inch up to five inches per year. While this sounds small, at a rate of two inches per year, a distance of 30 miles would be covered in approximately one million years (FEMA, 1997). The tectonic plates continually bump, slide, catch, and hold as they move past each other which causes stress that accumulates along faults. When this stress exceeds the elastic limit of the rock, an earthquake occurs, immediately causing sudden ground motion and shaking. Secondary hazards may also occur, such as surface fault ruptures, ground failure, and tsunamis. While the majority of earthquakes occur near the edges of the tectonic plates, earthquakes may also occur in the interior of plates.

Ground motion is the vibration or shaking of the ground during an earthquake caused by the radiation of seismic waves. The severity of vibration generally increases with the amount of energy released and decreases with distance from the causative fault or epicenter of the earthquake. Additional factors, such as soft soils, can further amplify ground motions. Ground motion causes waves in the earth's interior, also known as seismic waves, and along the earth's surface, known as surface waves. Seismic waves include P (primary) waves and S (secondary) waves described as follows:

P (primary) waves are longitudinal or compressional waves similar in character to sound waves that cause back-and-forth oscillation along the direction of travel (vertical motion), with particle motion in the same direction as wave travel. They move through the earth at approximately 15,000 mph.

S (secondary) waves, also known as shear waves, are slower than P waves and cause structures to vibrate from side-to-side (horizontal motion) due to particle motion at right-angles to the direction of wave travel. Unreinforced buildings are more easily damaged by S waves.

Surface waves include Raleigh waves and Love waves. These waves travel more slowly and typically are significantly less damaging than seismic waves.

Seismic activity is commonly described in terms of magnitude and intensity. Magnitude (M) describes the total energy released and intensity (I) subjectively describes the effects at a particular location. Although an earthquake has only one magnitude, its intensity varies by location. Magnitude is the measure of the amplitude of the seismic wave and is expressed by the Richter scale. The Richter scale is a logarithmic measurement, where an increase in the scale by one whole number represents a tenfold increase in measured amplitude of the earthquake. Intensity is a measure of how strong the shock is felt at a particular location, expressed by the Modified Mercalli Intensity (MMI) scale.

Another way of expressing an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. If an object is dropped while standing on the surface of the earth (ignoring wind resistance), it will fall towards earth and accelerate faster and faster until reaching terminal velocity. The acceleration due to gravity is often called "g" and is equal to 9.8 meters per second squared (980 cm/sec/sec). This means that every second something falls towards earth, it's velocity increases by 9.8 meters per second. Peak ground acceleration (PGA) measures the rate of change of motion relative to the rate of acceleration due to gravity. For example, acceleration of the ground surface of 244 cm/sec/sec equals a PGA of 25.0 percent.

It is possible to approximate the relationship between PGA, the Richter scale, and the MMI, as shown in Table 5-12. The relationships are, at best, approximate, and also depend upon such specifics as the distance from the epicenter and depth of the epicenter. An earthquake with 10.0 percent PGA would roughly correspond to an MMI intensity of V or VI, described as being felt by everyone, overturning unstable objects, or moving heavy furniture.

Table 5-12: Earthquake PGA, magnitude and intensity comparison

PGA (%g)	Magnitude (Richter)	Intensity (MMI)	Description (MMI)
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 – 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at best, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rock noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 – 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	X or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: Wald, Quitoriano, Heaton, and Kanamori, 1999.

One of the secondary hazards from earthquakes is surface faulting, the differential movement of two sides of a fault at the earth's surface. Linear structures built across active surface faults, such as railways, highways, pipelines, and tunnels, are at high risk to damage from earthquakes. Displacement along faults, both in terms of length and width, varies but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles).

Earthquake-related ground failure, due to liquefaction, is another secondary hazard. Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure, and causing some of the empty spaces between granules to collapse. Pore-water pressure may also increase sufficiently to cause the soil to behave like a fluid (rather than a soil) for a brief period, causing

deformations. Liquefaction causes lateral spreads (horizontal movement commonly 10-15 feet, but up to 100 feet), flow failures (massive flows of soil, typically hundreds of feet, but up to 12 miles), and loss of bearing strength (soil deformations causing structures to settle or tip).

History

Seismic activity occurs on a regular basis throughout the State of Arizona, although most go undetected. Although rare, damaging earthquakes impacting Pima County have been recorded in the past as follows:

- The earliest recorded earthquake affecting Arizona, and possibly the largest, occurred in 1830. With an estimated Modified Mercalli Intensity (MMI) of IX recorded at San Pedro, AZ, approximately 25 miles west of Tucson, the earthquake would have caused massive damage to built structures (ADEM, March 1998).
- In 1887, the Sonoran earthquake caused significant destruction in southern Arizona towns, including Tucson, and was one of the largest earthquakes in North American history. The earthquake was caused by the reactivation of a basin and range normal fault that is similar to other faults in Arizona (DuBois & Smith, 1980). The epicenter was located approximately 100 miles south of Douglas, Arizona, along the Pitaycachi fault in Mexico, and caused great destruction at its epicenter. The earthquake was so large that it was felt from Guaymas, Mexico to Albuquerque, New Mexico. It is estimated variously to have been an intensity VII and magnitude 7.2 earthquake. In Arizona, water in tanks spilled over, buildings cracked, chimneys toppled, and railroad cars were set in motion. An observer at Tombstone, near the Mexican border, reported sounds ``like prolonged artillery fire" (ADEM, March 1998; Bausch & Brumbaugh, May 23, 1994; USGS, Sept. 12, 2003; Univ of AZ). With the increase in development, if such an earthquake occurred today it would cause extensive damage in southeastern Arizona (Jenny & Reynolds, 1989).

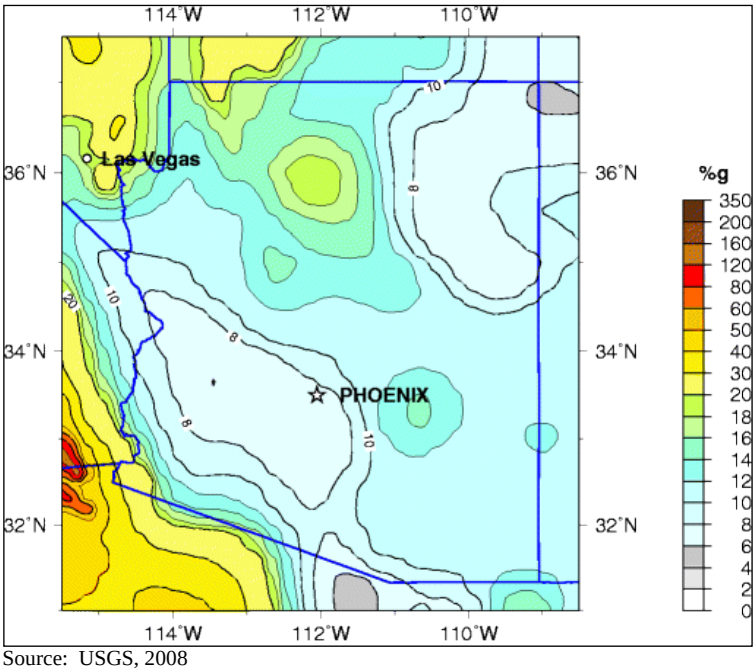
Probability/Magnitude

Probabilistic ground motion maps are typically used to assess the magnitude and frequency of seismic events. These maps estimate the probability of exceeding a certain ground motion, expressed as peak ground acceleration (PGA), over a specified period of years. For example, Figure 5-7 displays the probability of exceeding a certain ground motion, expressed as PGA, in 50 years in the Western United States. This is a common earthquake measurement that shows three things: the geographic area affected (colored areas on map below); the probability of an earthquake of each level of severity (e.g., 2% chance in 50 years); and the severity (PGA) as indicated by color.

Note that Figure 5-7 expresses a 2% probability of exceedance and, therefore, there is a 98% chance that the peak ground acceleration displayed will not be exceeded during 50 years. The use of a 50-year return period is based on statistical significance and does not imply that the structures are thought to have a useful life of only 50 years. Similar maps exist for other measures of acceleration, probabilities, and time periods.

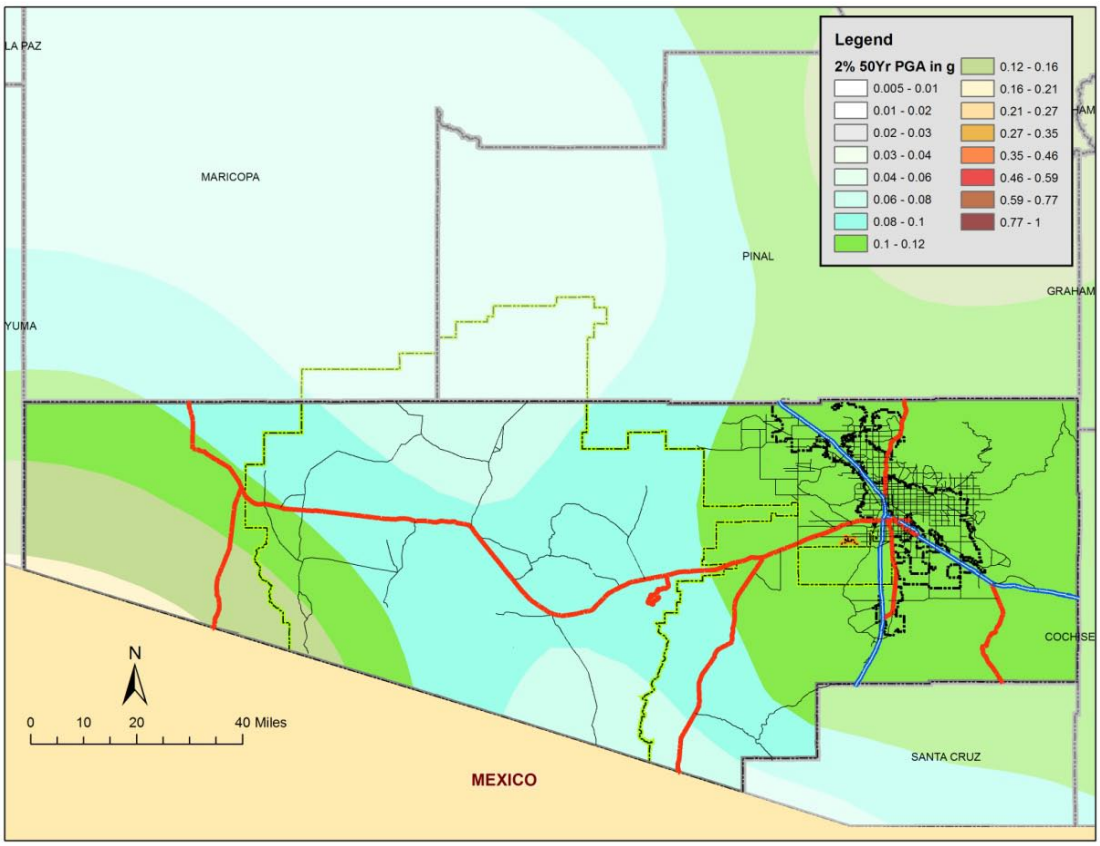
It is useful to note that according to the USGS, a PGA of approximately 10% gravity (0.10 g) is the approximate threshold of damage to older (pre-1965) dwellings or dwellings not made resistant to earthquakes. The 0.10 g measure was chosen because, on average, it corresponds to the MMI VI to VII levels of threshold damage in California within 25 km of an earthquake epicenter.

Figure 5-8 provides a more detailed view of the 2 percent, 50-year PGA map for Pima County. As demonstrated by this map, the central portion of Pima County has a PGA that ranges between 0.06g and 0.10g. The eastern third of the county is within the 0.10g to 0.12g range. The western portionof the county ranges from 0.08g to 0.16g with the highest PGA values occurring along the Yuma County and Mexico border. Overall, PGA values for Pima County are low in comparison with other counties within the State, and especially in areas of high population.



Source: USGS, 2008

Figure 5-7: Peak ground acceleration map for a 2% chance in 50 years recurrence



Source: USGS, 2008; JEF, 2011

Figure 5-8: Pima County PGA map for a 2% chance in 50 years recurrence

In general, the risk of seismic hazard in the urbanized portions of Pima County are relatively low; however, denser populations, existence of high rise buildings, existence of unreinforced masonry buildings, and the lack of earthquake awareness among its population elevate the risks associated with seismic activity.

The rate of seismicity in Pima County has historically been low, with the area's most recent quakes originating in San Luis in 1976 (M 6) and Baja, Mexico in 2010 (M 7.2). The largest impact of an earthquake on the metropolitan area would be the economic impact from a catastrophic southern California earthquake, which would disrupt approximately 60 percent of Arizona's fuel and 90 percent of Arizona's food goods. The Tucson metropolitan area could also be significantly affected by a major quake in the Yuma or Northern Arizona Seismic Belt (NASB). A repeat of the 1887 earthquake would result in significant damage to Arizona's population centers, particularly where development is located on alluvial plains and steep slopes. It should also be noted that although the small earthquakes occurring in Pima County are of low seismic risk to buildings, the repeated shaking could eventually cause structural damage. In unstable areas, small earthquakes may also trigger landslides and boulders rolling off mountain slopes (Jenny and Reynolds, 1989).

Vulnerability – CPRI Results

Earthquake CPRI results for each jurisdiction are summarized in Table 5-13 below.

Table 5-13: CPRI results by jurisdiction for earthquake

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Critical	< 6 hours	> 1 week	2.80
Oro Valley	Possible	Limited	< 6 hours	< 6 hours	2.20
Pascua Yaqui Tribe	Possible	Limited	< 6 hours	< 6 hours	2.20
Sahuarita	Possible	Negligible	< 6 hours	< 24 hours	2.00
Tucson	Possible	Limited	< 6 hours	> 1 week	2.50
Unincorporated Pima County	Possible	Limited	< 6 hours	< 1 week	2.40
				County-wide average CPRI =	**2.35**

Vulnerability – Loss Estimations

The 2007 Plan estimated seismic related losses to general residential and commercial buildings using the HAZUS-MH® program. As of the writing of this Plan, the HAZUS-MH® database has not been updated to reflect the 2010 Census data and is therefore unchanged since the 2007 Plan analyses were performed. Accordingly, the 2007 Plan residential and commercial loss estimates for earthquake will be carried forward with this Plan for the next 5 year cycle. By the end of that period, FEMA will have updated the HAZUS database to reflect current building counts. It is noted that all residential and commercial loss estimates are determined using the HAZUS database, which is based on 2000 Census data. The critical facility and population exposure estimates will reflect the 2010 Census information and the .

The earthquake hazard assessment utilized the HAZUS-MH software model including the following data: 100-, 250-, 500-, 750-, 1000-,1500-, 2000-, and 2500- year return period USGS probabilistic hazards. Developed for FEMA by the National Institute of Building Sciences (NIBS), HAZUS-MH integrates earthquake hazard modeling with GIS technology to determine the following annualized loss estimates for each jurisdiction:

- The aggregated population at risk at the census block level,
- The aggregated exposure and building count at the census block level for residential and commercial occupancies, and,
- The critical infrastructure at risk.

The earthquake risk assessment performed for Pima County did not explore the potential for collateral hazards such as liquefaction or landslide. However, losses associated with these ground failures would have been negligible given the level of shaking expected for Pima County (i.e., not enough strong shaking to trigger significant ground failure).

The annualized loss estimates developed represent the average of all eight of the modeled return periods (100-year through 2,500-year events). Table 5-14 provides a breakdown of potential exposure and losses due to annualized earthquake events by jurisdiction. Approximately 980,263 people may be at risk from earthquake hazards within Pima County. Annualized losses associated with earthquakes in Pima County may be expected to cause $3.1 million in damage to residential buildings and $310,000 in damage to commercial buildings. These anticipated losses are expected to equate to a countywide loss-to-exposure ratio of less than 0.0007.

The largest potential annualized losses to jurisdictions in Pima County include the City of Tucson and the unincorporated portions of Pima County. Together these jurisdictions account for $2.6 million in residential losses and $273,000 in commercial losses equating to 84 percent and 88 percent respectively of the total losses countywide.

Table 5-14: Potential exposure and loss from earthquake hazard

		Residential (From 2007 Plan)				Commercial (From 2007 Plan)				Critical Facilities	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Loss (x $1000)**	**Potential Exposure (x $1000)**	**Loss Ratio**	**Building Count**	**Potential Loss (x $1000)**	**Potential Exposure (x $1000)**	**Loss Ratio**	**Facility Count**	**Potential Exposure (x $1000)**
Marana	34,961	5,525	$130	$805,901	.00016	60	$8	$108,214	.00007	272	$765,099
Oro Valley	41,011	13,920	$170	$2,350,794	.00007	26	$7	$58,925	.00012	68	$395,165
Pascua Yaqui Tribe	3,745	646	$5	$46,231	.00011	2	Negligible	$2,308	.00022	16	$311,366
Sahuarita	25,259	1,290	$64	$188,135	.00034	9	$3	$18,133	.00017	76	$278,952
South Tucson	5,652	1,161	$31	$201,073	.00015	21	Negligible	$39,180	.00001	19	$48,227
Tohono O'odham	9,051	2,541	$86	$291,786	.00030	14	$14	$29,234	.00048	108	$234,840
Tucson	520,116	135,602	$1,408	$23,218,546	.00006	1,682	$179	$3,267,100	.00006	1,625	$6,467,814
Unincorporated	340,468	116,590	$1,256	$16,064,814	.00008	441	$94	$975,375	.00010	1,302	$3,449,956
Total	980,263	277,275	$3,150	$43,167,280	.00007	2,255	$310	$4,498,469	.00007	3,486	$11,951,419

Vulnerability – Development Trends

In general, the earthquake risk in the identified growth areas of the Pima County jurisdictions is at the borderline of the 10% g PGA, which as previously stated, is the approximate threshold of damage for older (pre-1965) dwellings or dwellings not made resistant to earthquakes. The Throughout the county, new development is typically regulated to be in compliance with current building codes that will provide for more stable seismic designs of new construction.

Vulnerability – EVRI

Table 5-15 summarizes the EVRI assessment for earthquake.

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Negligible	< 1 month	0.85
SOIL	Unlikely	Negligible	< 1 month	0.85
			Overall EVRI Score	**0.85**

Vulnerability – Consequences/Impacts

Since there have been no recent earthquakes of significance in Pima County, this is considered to be a lower priority threat. There were two powerful documented earthquakes which occurred in the 1800's, one which was centered 25 miles east of Tucson and another centered in Mexico (See hazard profile). Had either of these occurred in the now heavily populated and developed Tucson/Pima County metro area, the resulting damage and injury could have been markedly more severe. The Tucson/Pima County metro area has buried utilities (electric, natural gas, fuel), water and sewer lines, and ground transportation routes (vehicular, rail) and thoroughfares that, if compromised, could negatively impact local, interstate and international transportation and have economic impact far beyond the local area.

Public – Earthquakes pose a threat to the public both directly and indirectly. The effects may be more pronounced in the developed areas of Pima County as compared to rural communities. It will be important to make sure that isolated communities are included and prioritized in any response and recovery efforts.

Responders to the Incident – Response to damage areas is likely to be made more difficult by earthquake damage and may be complicated by aftershocks. Responders may face challenges due to unfamiliarity with earthquake response because of low frequency of exposure such conditions.

Continuity of Operations / Delivery of Services – Actual earthquake damage may occur in widespread areas and especially those more vulnerable to seismic shifting, such as, the downtown area due to its multi-story buildings. If this downtown area were to suffer damage, it could result in the loss of vital government services as much of the downtown office space is local, county, state and federal government. The loss of utilities, water/sewer, communications, transportation and other critical infrastructure and services could significantly impact community disaster resilience, emergency response activities and both short and long-term recovery.

Environment – It is not anticipated that there will be a significant impact on the environment unless there are fires or releases of hazardous materials. Ground shaking may result in damage in the form of surface rupture and liquefaction causing subsidence or sink holes.

Economic / Financial Condition of Jurisdiction – Though the threat of earthquake is considered to be relatively low based on historical data, the local and regional economy may be impacted as the population of the greater Pima County/Tucson area is now over 1 million. It is likely that jobs may be lost as businesses are damaged and may not recover. Damage to critical infrastructure may impede recovery efforts. If transportation routes are damaged food and other consumable goods may not be deliverable and, if utilities are interrupted, food supplies may spoil creating further hardships for the community.

Public Confidence in Jurisdiction's Governance – Speed of emergency response, efficiency and communication are critical to maintaining public confidence during and after any emergency or disaster. The effects of earthquake are destructive and disruptive to jurisdictions and aftershocks may continue after the immediate quake has passed. Power outages are likely and travel may be hindered due to damage, debris and blocked roads. Sharing information and details with the public about a

power outage, for instance (damaged or complete loss of equipment as opposed to simple repair) allows residents to better understand why it may take an excessive amount of time before power and services are restored. Keeping the public well informed as to the extent of damage, status of repairs and providing realistic expectations may have a positive impact on the public's confidence level. Lack of communication can be mistaken for lack of action, resulting in frustration, anger, and unrest.

Sources

Arizona Earthquake Information Center. Northern Arizona Universities seismic network: http://www4.nau.edu/geology/aeic/aeic.html

Arizona Integrated Seismic Network. Eight broadband seismometer – see http://www.azgs.az.gov/fema_award.shtml for locations and access to daily records.

Beyer, Scott, and Pearthree, P.A., 1994, *Bibliography of earthquake hazards in Arizona*: Arizona Geological Survey Open-File Report 94-03, 44 p.

DuBois, S.M., and Smith, A.W., 1980, *The 1887 earthquake in San Bernardino Valley, Sonora; historic accounts and intensity patterns in Arizona*: Arizona Bureau of Geology and Mineral Technology Special Paper no. 3, 112 p.

DuBois, S.M., Smith, A.W., Nye, N.K., and Nowak, T.A., Jr., 1982, *Arizona earthquakes, 1776-1980*: Arizona Bureau of Geology and Mineral Technology Bulletin 193, 456 p., 1 sheet, scale 1:1,000,000.

Geologic Map of Arizona. 2000, Product of the Arizona Geological Survey, Online at: http://www.azgs.az.gov/services_azgeomap.shtml

Pearthree, P.A., and Calvo, S.S., 1987, *The Santa Rita fault zone: Evidence for large magnitude earthquakes with very long recurrence intervals in the Basin and Range province of southeastern Arizona*: Seismological Society of America, Bulletin, v. 77, no. 1, p. 97-116.

Earthquake Hazards Program, 2009, US Geological Survey online at: http://earthquake.usgs.gov/hazards/products/conterminous/

P.A. Pearthree and D.B. Bausch, 1999, *Earthquake hazards in Arizona*: AZGS Map 34, text and map, scale 1:1,000,000.

P.A. Pearthree, compiler, 1998, *Quaternary fault data and map for Arizona*: AZGS OpenFile Report 9824, 122 p., scale 1:750,000, 1 disk.

P.A. Pearthree and others, 1996, *PlioQuaternary faulting and seismic hazard in the Flagstaff area, northern Arizona*: AZGS Bulletin 200, 40 p., 2 sheets, scale 1:50,000 and 1:100,000.

D.B. Bausch and D.S. Brumbaugh, 1994, *Seismic hazards in Arizona:* Flagstaff, AZ Earthquake Information Center, 49 p., 2 sheets, scale 1:1,000,000.

S.M. DuBois and others, 1982, *Arizona earthquakes*: AZGS Bulletin 193, 456 p., scale 1:1,000,000.

DuBois/A.W. Smith, 1980, *The 1887 earthquake in San Bernardino Valley, Sonora: Historic accounts & intensity patterns in AZ*: AZGS Special Paper 3, 112 p.

Arizona State University, May 26, 2003."Earthquake information for the State of Arizona & the world." http://activetectonics.la.asu.edu/e-quakes/

Bausch, Douglas B. and David S. Brumbaugh, May 23, 1994. Seismic Hazards in Arizona –Arizona Ground Shaking Intensity & 100 yr Acceleration Contour Maps, Online at: .http://www4.nau.edu/geology/aeic/staterep.txt

Jenny, J.P. and S.J. Reynolds, 1989. "Geologic Evolution of Arizona" in Arizona Geological Society Digest, No. 17.

Petersen, Mark D., Frankel, Arthur D., Harmsen, Stephen C., Mueller, Charles S., Haller, Kathleen M., Wheeler, Russell L., Wesson, Robert L., Zeng, Yuehua, Boyd, Oliver S., Perkins, David M., Luco, Nicolas, Field, Edward H., Wills, Chris J., and Rukstales, Kenneth S., 2008, Documentation for

the 2008 Update of the United States National Seismic Hazard Maps: U.S. Geological Survey Open-File Report 2008–1128, 61 p.

US Geological Survey (USGS):

- February 7, 2003, "Definition of %g – What is the relation to Building Damage?" http://geohazards.cr.usgs.gov/eq/faq/parm02.html
- September 12, 2003, "Earthquake History of Arizona." http://wwwneic.cr.usgs.gov/neis/states/arizona/arizona_history.html

Wald, David J., Vincent Quitoriano, Thomas H. Heaton and Hiro Kanamori,1999. "Relationship between Peak Ground Acceleration, Peak Ground Motion and Modified Mercalli Intensity in California" in Earthquake Spectra, Vol. 15, No. 3, 557-564. http://pasadena.wr.usgs.gov/shake/pubs/regress/regress.html

Profile Maps

No Profile Maps provided

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5.3.4 Extreme Temperature

Description

Extreme temperatures on either the cold or hot side of the thermometer can occur within any area and can often have adverse impacts on the health and welfare of a community or region. These extreme temperatures can impact people, pets, plants and infrastructure such as power lines and above and below-ground pipes throughout the area.

Extreme heat is the combination of very high temperatures and exceptionally humid conditions that exceed regionally based indices for perceived risk. According to the National Weather Service, heat is the leading weather-related killer in the United States and has killed more people than lightning, tornadoes, floods and hurricanes combined in the last 10 years. The major human risks associated with extreme heat are as follows:

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

Extreme cold is normally associated with northern climates and regions, but in reality is much like extreme heat in that it is relative to what is considered normal cold temperatures for a region. In Arizona, sustained, below freezing temperatures can prove to be dangerous and damaging. For example, economic losses due to frozen crops, downed power lines, or burst pipelines can be significant. Sustained conditions of freezing temperatures can also pose a dangerous health risk to people and their animals.

History

Extreme temperature events occur in Pima County on a regular basis, but the damaging events typically occur during the summer and winter months. The following are examples of documented past events:

- According to a report prepared by the Arizona Dept of Health Services (ADHS, 2010), a total of 624 heat related deaths have occurred in Pima County over the period of 1992-2009, with the majority occurring between 2000 and 2009.
- Deaths of illegal immigrants in the desert areas along the Arizona-Mexico border are also attributed to extreme heat. In 2005, roughly 80 migrants died in the Tucson sector alone from heat exposure, while more than 180 total deaths occurred from heat exposure along the border (Guido, 2008).
- In February 2011, record breaking cold blanketed the southern portion of Arizona. Temperatures in Pima County ranged from 15 to 20 degrees and with the wind chill factor, the estimates went as low as zero degrees. Across the county, individual water pipes were either frozen or burst, closing businesses, schools, and government buildings. Freezing temperatures shut down some Tucson Water pumps overnight, leaving over 1,000 homes and business without water service. About 14,000 natural gas customers in Tucson's Rita Ranch and eastern Foothills had gas service shut-off

due to low main line pressures emanating from Texas. The City of Tucson opened two shelters for those without heat and dozens of area schools were closed (Tucson Sentinel, 2011).

Probability and Magnitude

There are no recurrence or non-exceedance probabilities developed for extreme temperature events in Arizona or Pima County. Table 4-1 in Section 4 of this Plan, provide example normal and extreme temperature ranges for various weather stations within the county. In general, extreme temperatures vary from normal by 10 to over 30 degrees, with highs that exceed 110 degrees and lows extending into the 5-10 degrees Fahrenheit range.

One indicator of the degree of danger associated with extreme heat is the Heat Index (HI) or the "Apparent Temperature". According the NWS, the HI is an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature. Figure 5-9 is a quick reference chart published by the NWS that shows the HI based on current temperature and relative humidity, and levels of danger for HI values. It should be noted that the HI values were devised for shady, light wind conditions and that exposure to full sunshine can increase HI values by up to 15°F. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

Relative Humidity (%)

Temperature (°F)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
80	77	78	78	79	79	79	80	80	80	81	81	82	82	83	84	84	85	86	86	87
81	78	79	79	79	79	80	80	81	81	82	82	83	84	85	86	86	87	88	90	91
82	79	79	80	80	80	80	81	81	82	83	84	84	85	86	88	89	90	91	93	95
83	79	80	80	81	81	81	82	82	83	84	85	86	87	88	90	91	93	95	97	99
84	80	81	81	81	82	82	83	83	84	85	86	88	89	90	92	94	96	98	100	103
85	81	81	82	82	82	83	84	84	85	86	88	89	91	93	95	97	99	102	104	107
86	81	82	83	83	83	84	85	85	87	88	89	91	93	95	97	100	102	105	108	112
87	82	83	83	84	84	85	86	87	88	89	91	93	95	98	100	103	106	109	113	116
88	83	84	84	85	85	86	87	88	89	91	93	95	98	100	103	106	110	113	117	121
89	84	84	85	85	86	87	88	89	91	93	95	97	100	103	106	110	113	117	122	
90	84	85	86	86	87	88	89	91	92	95	97	100	103	106	109	113	117	122	127	
91	85	86	87	87	88	89	90	92	94	97	99	102	105	109	113	117	122	126	132	
92	86	87	88	88	89	90	92	94	96	99	101	105	108	112	116	121	126	131		
93	87	88	89	89	90	92	93	95	98	101	104	107	111	116	120	125	130	136		
94	87	89	90	90	91	93	95	97	100	103	106	110	114	119	124	129	135	141		
95	88	89	91	91	93	94	96	99	102	105	109	113	118	123	128	134	140			
96	89	90	92	93	94	96	98	101	104	108	112	116	121	126	132	138	145			
97	90	91	93	94	95	97	100	103	106	110	114	119	125	130	136	143	150			
98	91	92	94	95	97	99	102	105	109	113	117	123	128	134	141	148				
99	92	93	95	96	98	101	104	107	111	115	120	126	132	138	145	153				
100	93	94	96	97	100	102	106	109	114	118	124	129	136	143	150	158				
101	93	95	97	99	101	104	108	112	116	121	127	133	140	147	155					
102	94	96	98	100	103	106	110	114	119	124	130	137	144	152	160					
103	95	97	99	101	104	108	112	116	122	127	134	141	148	157	165					
104	96	98	100	103	106	110	114	119	124	131	137	145	153	161						
105	97	99	102	104	108	112	116	121	127	134	141	149	157	166						
106	98	100	103	106	109	114	119	124	130	137	145	153	162	172						
107	99	101	104	107	111	116	121	127	134	141	149	157	167							
108	100	102	105	109	113	118	123	130	137	144	153	162	172							
109	100	103	107	110	115	120	126	133	140	148	157	167	177							
110	101	104	108	112	117	122	129	136	143	152	161	171								
111	102	106	109	114	119	125	131	139	147	156	166	176								
112	104	107	111	115	121	127	134	142	150	160	170	181								
113	104	108	112	117	123	129	137	145	154	164	175									
114	105	109	113	119	125	132	140	148	158	168	179									
115	106	110	115	121	127	134	143	152	162	173	184									
116	107	111	116	122	129	137	146	155	166	177										
117	108	112	118	124	132	140	149	159	170	181										
118	108	113	119	126	134	142	152	162	174	186										
119	109	114	121	128	136	145	155	166	178											
120	110	116	122	130	138	148	158	170	182											
121	111	117	124	132	141	151	162	174	187											
122	111	118	125	134	143	154	165	178												
123	112	119	127	136	146	157	169	182												
124	113	120	129	138	148	160	172													
125	114	121	130	140	151	163	176													

Heat Index

Extreme Danger	Heat stroke likely.
Danger	Sunstroke, musde cramps, and/or heat exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity.
Extreme Caution	Sunstroke, musde cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Caution	Fatigue possible with prolonged exposure and/or physical activity.

Figure 5-9: National Weather Service Heat Index Chart

Vulnerability – CPRI Results

Extreme Temperature CPRI results for each community are summarized in Table 5-16 below.

Table 5-16: CPRI results by jurisdiction for extreme temperature

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Likely	Limited	> 24 hours	> 1 week	2.50
Oro Valley	Highly Likely	Critical	> 24 hours	> 1 week	3.25
Pascua Yaqui Tribe	Highly Likely	Limited	> 24 hours	< 1 week	2.85
Sahuarita	Highly Likely	Catastrophic	6 to 12 hours	< 1 week	3.75
Tucson	Highly Likely	Negligible	> 24 hours	> 1 week	2.65
Unincorporated Pima County	Highly Likely	Limited	< 6 hours	< 6 hours	3.10
				County-wide average CPRI =	**3.02**

Vulnerability – Loss Estimations

Losses due to extreme heat or cold primarily occur in the form of death and illness for people and animals, and infrastructure damage that is primarily associated with extreme cold. There are currently no statistical analyses for projecting heat or cold related deaths in the State, however, ADHS does track data and monitor trends and other factors to determine if a statistical significance exists. Past history would indicate that multiple deaths due to extreme heat are highly likely, and especially for illegal immigrants that attempt to cross the Arizona deserts during the summer months. The homeless and low income populations are particularly vulnerable to extreme temperatures due to the increased exposure to the natural elements and decreased ability to compensate in the form of heating and cooling apparatus. Property and infrastructure damages are typically associated with hard freezes.

Vulnerability – Development Trends

Growth in Pima County over the past five years has significantly increased the amount population and infrastructure exposed to extreme temperatures. There is also an increased demand on resources such as power in summers and natural gas in the winter. The primary intersect of extreme temperature hazards and future development of the county is in the general increase in population and infrastructure that would be exposed. Advanced building codes requiring adequate burial depth of water lines are generally being used and enforced.

Over the past two decades, as the metropolitan area has dramatically grown in size the "urban heat island" effect has developed, which cause temperatures in the center of metropolitan areas to become much warmer than those in rural areas. The concrete and asphalt of urban areas retains the heat of the day, and releases it slowly as compared to the surrounding desert terrain, which cools much quicker at night. As development continues to occur within Tucson and its environs, heat conditions will continue to increase.

Vulnerability – EVRI

Table 5-17 summarizes the EVRI assessment for extreme heat.

Table 5-17: Environmental Risk and Vulnerability Index (EVRI) scores for extreme heat

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Negligible	< 1 month	0.85
SOIL	Unlikely	Negligible	< 1 month	0.85
			Overall EVRI Score	**0.85**

Vulnerability – Consequences/Impacts

Public – Extreme temperature conditions result in threats to public health and safety. This potentially hazardous condition affects humans, domestic animals, livestock and agriculture. People who work outdoors are especially vulnerable as are the ill and elderly. Sickness and death may occur if proper precautions are not taken.

Responders to the Incident – Emergency response personnel may be subject to hazardous working conditions when working in extreme temperatures. Law enforcement and fire personnel who must wear heavy and restrictive safety gear may become susceptible to heat exhaustion or heat stroke.

Continuity of Operations / Delivery of Services – There is little threat to Pima County's ability to continue the functioning of government operations and services unless there are major power outages or water/gas service interruptions.

Environment – If the duration of an extreme temperature incident continues for an extended period of time, there will be a corresponding increase in energy consumption with a resulting environmental impact. Other impacts to plant and animal life can also alter the local environment.

Economic / Financial Condition of Jurisdiction – Pima County may be impacted financially by extreme temperature in the areas of tourism, service industries, recreation/sports and agriculture. Extended closures of businesses and industry that are forced by a loss of services may also have a short term economic impact.

Public Confidence in Jurisdiction's Governance – Although Pima County residents usually become acclimated to the high temperatures associated with life in the desert, it is still incumbent upon governmental and private agencies to prepare for extended periods of extreme high and low temperatures. Cooperative response programs and planning to include cooling or heated stations and shelters will bolster the confidence of the public in their respective jurisdictions.

Sources

AZ Dept of Health Services, 2004, Prevention Bulletin, Volume 18, No. 4, http://www.azdhs.gov/diro/pio/preventionbulletin/july04.pdf

FEMA,1997, Multi-Hazard Identification & Risk Assessment – A Cornerstone of the Nat'l Mitigation Strategy.

Guido, Zack, 2008, *Anticipating Summer Heat – A Look at the Impacts and Extreme Temperatures in the Southwest*, Southwest Climate Outlook, May 2008 Issue, University of Arizona, CLIMAS, http://www.ispe.arizona.edu/climas/forecasts/swarticles.html

Maricopa County Department of Public Health, Division of Disease Control, Office of Epidemiology and Data Services, 2009, Heat Caused and Heat Related Death Occurrences in Maricopa County, http://www.maricopa.gov/Public_Health/EPI/pdf/heat/2008annualreport.pdf

Mrela, C. K., Torres, C., 2009, *Deaths from Exposure to Excessive Natural Heat Occurring in Arizona, 1992-2009*, Arizona Department of Health Services, available a the following URL: http://www.azdhs.gov/plan/report/heat/heat09.pdf

NASA, 2010, *NASA Assets Provide Orbital View to Study Phoenix Heat Waves*, http://www.nasa.gov/centers/johnson/home/phoenix_heatwaves_feature_prt.htm

National Weather Service, Warning and Forecast Office – Phoenix, 2009, http://www.wrh.noaa.gov/psr/general/safety/heat/

Tucson Sentinel, 2011, articles at the following URLs: http://www.tucsonsentinel.com/local/report/020311_tucson_water_freeze/cold-shuts-down-some-tucson-water-pumps/

http://www.tucsonsentinel.com/local/report/020311_heat_shelters/cold-pueblo-thousands-without-heat-city-opens-shelters/

University of Arizona Library, *Books of the Southwest website portal is located at:* http://southwest.library.arizona.edu/azso/body.1_div.3.html

Profile Maps – No profile maps are provided.

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5.3.5 Flood / Flash Flood

Description

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

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

Damaging floods in the County include riverine, sheet, alluvial fan, and local area flooding. Riverine flooding occurs along established watercourses when the bankfull capacity of a watercourse is exceeded by storm runoff or snowmelt and the overbank areas become inundated. Sheet flooding occurs in regionally low areas with little topographic relief that generate floodplains over a mile wide, Alluvial fan flooding is generally located on piedmont areas near the base of the local mountains, such as the Tortolita Fan, that are characterized by multiple, highly unstable flowpaths that can rapidly change during flooding events. Local area flooding is often the result of poorly designed or planned development wherein natural flowpaths are altered, blocked or obliterated, and localized ponding and conveyance problems result. Erosion is also often associated with damages due to flooding.

Another major flood hazard comes as a secondary impact of wildfires in the form of dramatically increased runoff from ordinary rainfall events that occur on newly burned watersheds. Denuding of the vegetative canopy and forest floor vegetation, and development of hydrophobic soils are the primary factors that contribute to the increased runoff. Canopy and floor level brushes and grasses intercept and store a significant volume of rainfall during a storm event. They also add to the overall watershed roughness which generally attenuates the ultimate peak discharges. Soils in a wildfire burn area can be rendered hydrophobic, which according the NRCS is the development of a thin layer of nearly impervious soil at or below the mineral soil surface that is the result of a waxy substance derived from plant material burned during a hot fire. The waxy substance penetrates into the soil as a gas and solidifies after it cools, forming a waxy coating around soil particles. Hydrophobic soils, in combination with a denuded watershed, will significantly increase the runoff potential, turning a routine annual rainfall event into a raging flood with drastically increased potential for soil erosion and mud and debris flows.

History

Flooding is clearly a major hazard in Pima County as shown in Tables 5-2 through 5-4. Pima County has been part of 13 disaster declarations for flooding, with three of those declarations occurring in the past five years. There have been at least 68 other non-declared events of reported flooding incidents that met the thresholds outlined in Section 5.1, 25 of which occurred in the last five years. The following incidents represent examples of major flooding that has impacted the County:

- During August and September of 1983, nearly seven inches of rain fell, saturating the soil around the Tucson metropolitan area. These conditions were exacerbated when a surge of moisture from Tropical Storm Octave, which was located off the central Baja California coast, moved northeast across the area. The result over a four-day period were torrential rains ranging from five to nine inches, causing flooding in Tucson and southeast Arizona. Bridges in the area, including all spanning the Santa Cruz River except one, were damaged or partially washed away. Additional damage occurred along the other watercourses throughout the area. Several buildings fell into Rillito Creek due to bank erosion and extensive damage occurred to agriculture in Marana. Cost estimates (using 1984 dollars) to repair and mitigate flood damage were estimated at $105.7 million. Four deaths in Eastern Pima County were attributed to the flood.
- In late December 1992 - early January 1993, a series of winter storms produced record breaking precipitation amounts and severe weather across much of Arizona. Heavy rains combined with melting snowpack caused heavy flooding of both local washes and regional rivers within Pima County. Nearly every community and city within the county was impacted by the storms at some level. Most of the heavy damage was associated with the Gila, San Pedro, and Santa Cruz Rivers. According to the USACE Flood Damages Report, the total public and private damages from the 1993 floods were estimated to exceed $12 million in Pima County alone.[19] The flooding prompted a federal disaster declaration (FEMA-977-DR-AZ) for almost the entire state.
- On August 14, 2005 and August 23, 2005 intense heavy rains caused significant damage to public infrastructure throughout Pima County. The severe runoff resulted in damages to numerous roads, traffic lights, water well fields, berms, crossings, and police vehicles. After over an inch of rain fell across a large portion of the Tucson Metro Area, some locations with more than two inches, several roads became flooded, closed, and impassable. In addition to all the flooded roadways, several trailer homes located in the southern portion of the Tucson Metro Area, were flooded and surrounded by rising water. Rescue teams evacuated several people from these homes. Brawley wash was out of its banks and flooding roadways causing them to be impassable. Over $260,000 in damages were estimated (NCDC, 2010)
- In late July and early August 2006, several areas of the state were struck by severe storms and flooding during the period of July 25 to August 4, 2006. Tropical moisture poured into Southeast Arizona, saturating the ground at most locations. As rainfall continued, additional runoff quickly filled rivers and washes, exceeding bank full capacities and flooding homes and businesses as well as nearby roads. Some roadways were washed away due to the strong flood waters. Lots of flash flooding occurred throughout the Tucson Metro Area due to saturated grounds and extremely heavy rainfall. Numerous road were closed due to flooding throughout the entire Metro Area for many hours. A USGS stream gage was destroyed by flood waters in Rincon Creek. Additionally, there were numerous swift water rescues and car stranded in flooded roadways. It was estimated that nearly 100 vehicles were flooded. Several rivers running through the Tucson Metro Area flooded on July 31, 2006. The Rillito River flooded with water over the cement banks near Dodge Boulevard. Additionally, the Rillito River was over bankfull just east of the Swan Road Bridge. River Road near La Cholla Road was flooding from the Rillito River. Sabino Creek was out of its banks and houses were flooded near Sabino Canyon and Bear Canyon. Below is a listing of some of the damage, but not all, caused by the flooding and an estimate for the cost of repairs:
    - Sabino Canyon Recreation area road and facility damaged, $100,000
    - Forty homes and businesses flooded, $1,200,000
    - One home destroyed due to flooding, $150,000
    - Water main broke near the Mt. Lemmon highway, $20,000
    - Catalina Highway road washed away, $50,000

[19] US Army Corps of Engineers, Los Angeles District, 1994, *Flood Damage Report – State of Arizona – Floods of 1993*

- Agricultural irrigation system damaged, $500,000
- Cement plant flooded, $400,000
- Gravel pit flooded, $30,000
- General infrastructure damage, $500,000.

The flooding prompted a federal disaster declaration (FEMA-1660-DR-AZ) for Gila, Graham, Greenlee, Pima, and Pinal Counties. Total disaster expenditures exceeded $13.6 million (ADEM, 2010; PCRFCD, 2011).

- On February 19, 2008 a state of emergency was declared for Pima County for flooding and damages due to 8.5 inches of precipitation that fell in and around Mt. Lemmon within Pima County in less than a 24-hour period. Damages to roads left residents stranded in their homes, limited access to food and medical assistance and damaged potable water supply lines, which impacted transmission and distribution of potable water to homes. The rainfall and snowmelt created conditions that threatened the health and safety of residents and exceeded the capabilities of Pima County. Several people in Tucson needed to be rescued from flowing washes. Damages were estimated to exceed $770,000 (NCDC, 2010).
- In January 2010, sixteen hikers were trapped on Sabino Canyon Trail at approximately 11 AM on January 21st after the stream rose above its banks, covering low water crossings. The San Simon and Vamori Washes in the Tohono Oodham Nation rose 1-2 feet out of their banks during the evening of January 21st. Several other washes flowed out of their banks, resulting in barricaded roadways near Saguaro National Park East and West, including East Tucson and Avra Valley. A motorist was trapped in the Canada del Oro Wash near Rancho del Lago at approximately 7 AM on January 22nd requiring a swift water rescue. Storm-wide damages were estimated at $300,000 (NCDC, 2011). A presidential disaster was declared (FEMA-1888-DR-AZ) for several counties and Indian tribes in the state including Pima County.
- In July 2010, torrential rainfall across portions of eastern Pima county resulted in numerous reports of flash flooding in the Tucson metro area. Flash flooding was observed on Tanque Verde Creek with a peak depth of 11.69 feet at Tanque Verde Guest Ranch. Approximately 30 homes on Barbary Coast Road, Gold Dust Road, and Kitt Carson were flooded. Numerous swift water rescues were performed in the Tucson metro area, near the county fairgrounds, in the Recon Valley area, and on the Old Spanish Trail in the Hilton Head Ranch area. Damages were estimated to exceed $500,000 (NCDC, 2011)

Numerous other flood related incidents are summarized in the historic hazard database provided in Appendix D.

Probability and Magnitude

For the purposes of this Plan, the probability and magnitude of flood hazards in Pima County jurisdictions are based on the 1% probability floodplains delineated on FEMA Flood Insurance Rate Maps (FIRMs), plus any provisional floodplain delineations used for in-house purposes by participating jurisdictions. FEMA has recently completed a map modification program to update the FIRMs for the County into a digital FIRM (DFIRM) format. The effective date for the new DFIRM maps is June 16, 2011. DFIRM floodplain GIS base files were obtained from FEMA and are the basis for the flood hazard depictions in this Plan.

Two designations of flood hazard are used. Any “A” zone is designated as a HIGH hazard area. MEDIUM flood hazard areas are all “Shaded X” zones. All “A” zones (e.g. – A, A1-99, AE, AH, AO, etc.) represent areas with a one percent (1%) probability of being flooded at a depth of one-foot or greater in any given year. All “Shaded X” zones represent areas with a 0.2% probability of being flooded at a depth of one-foot or greater in any given year. These two storms are often referred to as the 100-year and 500-year storm, respectively.

Maps 1A and 1B show the flood hazard areas for the entire county and the general Tucson Metropolitan Area, respectively. Maps 1C through 1H present flood hazards for each of the incorporated jurisdictions and the Pascua Yaqui Tribe.

Vulnerability – CPRI Results

Flooding CPRI results for each community are summarized in Table 5-18 below.

Table 5-18: CPRI results by jurisdiction for flood

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Likely	Catastrophic	12-24 hours	< 6 hours	2.95
Oro Valley	Likely	Catastrophic	< 6 hours	< 1 week	3.45
Pascua Yaqui Tribe	Highly Likely	Critical	6 to 12 hours	< 24 hours	3.35
Sahuarita	Highly Likely	Critical	< 6 hours	< 1 week	3.60
Tucson	Highly Likely	Limited	< 6 hours	< 6 hours	3.10
Unincorporated Pima County	Highly Likely	Critical	< 6 hours	> 6 hours	3.40
				County-wide average CPRI =	**3.31**

Vulnerability – Loss Estimations

The estimation of potential exposure to high and medium flood hazards was accomplished by intersecting the human and facility assets with the flood hazard limits depicted on the profile maps. Loss estimates to all facilities located within the high and medium flood hazard areas were made based on the loss estimation tables published by FEMA (FEMA, 2001). Most of the assets located within high hazard flood areas will be subject to three feet or less of flooding. Using the FEMA tables, it is assumed that all structural assets located within the high hazard areas will have a loss-to-exposure ratio of 0.20 (or 20%). A loss to exposure ratio of 0.05 (5%) is assumed for assets located in the medium hazard areas. Table 5-19 summarizes the critical facility, population, and residential housing unit exposure and loss estimates for the high and medium flood hazards.

In summary, $268.8 million and $21.0 million in critical facility related losses are estimated for high and medium flood hazards, for all the participating jurisdictions in Pima County. An additional $1.09 billion and $146.8 million in high and medium flood losses to 2010 Census residential housing units is estimated for all participating Pima County jurisdictions. Regarding human vulnerability, a total population of 57,745 people, or 5.95% of the total population, is potentially exposed to a high hazard flood event. A total population of 32,361 people, or 3.33% of the total population, is potentially exposed to a medium hazard flood event. Based on the historic record, multiple deaths and injuries are plausible and a substantial portion of the exposed population is subject to displacement depending on the event magnitude.

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

Table 5-19: Pima County exposure and loss estimates due to flooding

FLOOD HAZARD EXPOSURE / LOSS	Marana	Oro Valley	Pascua Yaqui Tribe	Sahuarita	South Tucson	Tucson	Unincorporated Pima County	Total
Total Critical Facilities	**272**	**132**	**16**	**76**	**19**	**1,625**	**1,302**	**3,442**
Facilities Exposed to High Hazard	101	7	16	23	0	101	89	337
Percentage of Total Facilities	37.13%	5.30%	100.00%	30.26%	0.00%	6.22%	6.84%	9.79%
Estimated Replacement Cost (x $1,000)	$392,077	$9,248	$311,366	$130,337	$0	$232,604	$270,652	$1,346,284
Estimated Structure Loss (x $,000)	$78,415	$1,850	$62,273	$26,067	$0	$46,521	$54,130	$269,257
Facilities Exposed to Medium Hazard	39	3	0	1	0	70	24	137
Percentage of Total Facilities	14.34%	2.27%	0.00%	1.32%	0.00%	4.31%	1.84%	3.98%
Estimated Replacement Cost (x $1,000)	$97,998	$19,510	$0	$5,300	$0	$205,158	$94,179	$422,146
Estimated Structure Loss (x $1,000)	$4,900	$976	$0	$265	$0	$10,258	$4,709	$21,107
Total Population	**34,622**	**40,557**	**3,675**	**25,142**	**5,593**	**520,368**	**340,692**	**970,648**
Population Exposed to High Hazard	5,311	1,617	3,675	782	3	21,290	25,067	57,745
Percent Exposed	15.34%	3.99%	100.00%	3.11%	0.05%	4.09%	7.36%	5.95%
Population Exposed to Medium Hazard	7,755	621	16	726	0	16,314	6,929	32,361
Percent Exposed	22.40%	1.53%	0.44%	2.89%	0.00%	3.14%	2.03%	3.33%
Total Residential Building Count	**14,573**	**20,053**	**892**	**10,549**	**2,112**	**230,157**	**159,016**	**437,352**
Estimated Replacement Cost (x $1,000)	**$3,629,307**	**$6,831,456**	**$187,175**	**$2,229,431**	**$452,144**	**$40,805,270**	**$42,706,058**	**$96,840,841**
Structures Exposed to High Hazard	2,163	829	892	286	1	10,140	10,361	24,672
Percentage of Total Facilities	14.84%	4.13%	100.00%	2.71%	0.05%	4.41%	6.52%	5.64%
Estimated Replacement Cost (x $1,000)	$538,834	$282,310	$187,175	$60,416	$180	$1,798,046	$2,573,291	$5,440,252
Estimated Structure Loss (x $,000)	$107,767	$56,462	$37,433	$12,083	$36	$359,609	$514,658	$1,088,048
Structures Exposed to Medium Hazard	2,987	313	0	292	0	7,488	2,984	14,064
Percentage of Total Facilities	20.50%	1.56%	0.00%	2.77%	0.00%	3.25%	1.88%	3.22%
Estimated Replacement Cost (x $1,000)	$744,063	$106,706	$0	$61,686	$0	$1,328,512	$695,271	$2,936,238
Estimated Structure Loss (x $1,000)	$37,203	$5,335	$0	$3,084	$0	$66,426	$34,764	$146,812

Vulnerability – Repetitive Loss Properties

Repetitive Loss (RL) properties are those NFIP-insured properties that since 1978, have experience multiple flood losses. FEMA tracks RL properties and in particular to identify Severe RL (SRL) properties. RL properties demonstrate a track record of repeated flooding for a certain location and are one element of the vulnerability analysis. RL properties are also important to the NFIP, since structures that flood frequently put a strain on the National Flood Insurance Fund. FEMA records dated January 2010 (provided by ADEM in April 2010) indicate that there are 12 identified RL properties in Pima County and a total of 25 separate claims. Building and content loss payments for those 12 properties totaled approximately $460,000. None of the payments have occurred within the last five years. Table 5-20 summarizes the RL property characteristics by jurisdiction.

Table 5-20: Repetitive loss property statistics for Pima County jurisdictions

Jurisdiction	No. of Properties	No. of Properties Mitigated	Total Payments
Oro Valley	1	0	$41,805
Tucson	4	0	$173,829
Unincorporated Pima County	7	3	$243,978

Source: FEMA, 2010

Vulnerability – Development Trends

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

Vulnerability – EVRI

Table 5-21 summarizes the EVRI assessment for flood.

Table 5-21: Environmental Risk and Vulnerability Index (EVRI) scores for flood

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Critical	< 1 month	1.45
SOIL	Unlikely	Negligible	< 1 month	1.75
			Overall EVRI Score	**1.35**

Vulnerability – Consequences/Impacts

Public – As demonstrated by Pima County's past flood events, the impact to the general public is typically property damage and loss, injury, and in some cases, death. Of the 13 State and/or federally declared flood events that included Pima County, it is estimated that approximately 39 persons were killed and 1,087 injured [20]. Without proper mitigation, education, and enforcement of a community's floodplain management regulations, these numbers could increase, especially given the county's record growth in population.

Several of the deaths, injuries, and rescues associated with flooding often take place when citizens attempt to drive across high or moving waters. Other factors in flood related injuries, illness and death include disease as a result of unhygienic conditions and water-borne diseases.

[20] The number of deaths and injuries attributed to Pima County only is not known.

In Pima County, most populated areas are located outside mapped floodplains, however, it is estimated that approximately 57,745 people, or 5.95% of Pima County's population, are located within high flood hazard areas.

Responders to the Incident – Flooding is one of Pima County's top hazards and clean-up activities following floods often pose hazards to workers and volunteers involved in the effort. Potential dangers include electrical hazards, carbon monoxide exposure, musculoskeletal hazards, heat or cold stress, motor vehicle-related dangers, fire, drowning, and exposure to hazardous materials. Because flood disaster sites are unstable, clean-up crews might encounter sharp debris, biological hazards, exposed electrical lines, blood or other body fluids, and animal and human remains. Responders are prone to the same dangers the general public is, but at a higher level as they may be putting themselves in harm's way by performing rescue activities. It is anticipated that in the case of a significant/large scale flood event, emergency responders would be well prepared with protective equipment such as hard hats, goggles, gloves, life jackets, and other necessary equipment.

Continuity of Operations / Delivery of Services – It is not anticipated that flooding will significantly affect continuity of Pima County government; based on historical experience. There may be an impact on the delivery of services due to impassable roadways and damaged infrastructure that may physically hinder response to calls for emergency services and provision of routine government services. Several government and emergency service facilities within Marana and the Pascua Pueblo are located within high hazard flood zones which may impact those communities ability to provide services during a severe flood event. It is likely that any disruptions or delays in delivery of services will be of short duration and restoration will be a major priority.

Environment – Flooding may have an impact both negatively and positively. Erosion may wash away soil and leave agricultural areas barren and it may deposit rich soil in other areas enriching otherwise infertile areas. Aquifers may be recharged. Water supplies may become contaminated by sewage if water treatment plants are overcome by flood waters or due to the danger of sewage/pollutants being introduced into international waterways which flow through Pima County. Contamination of water affects public health, the food supply and pets, livestock and wildlife.

Economic / Financial Condition of Jurisdiction – Recovery and rebuilding costs, decline in tourism, impact on businesses and local economy are just a few of the real and potential hardships of flooding in Pima County. The extent of the damage will depend on factors, such as, the areas affected and duration of the event.

Public Confidence in Jurisdiction's Governance – Speed of emergency response, efficiency and communication are critical factors to maintaining the public's confidence during and after a flood. The effects of flooding are destructive and disruptive to jurisdictions and often continue for some time after the immediate event. Power outages are common and travel/mobility may be affected by flood waters, debris and blocked/impassable roads. There may be initial periods when government may have less resources than needed due to the magnitude of the pressing needs of communities demanding services. As gradual progress is made, initial public demands will be met and recovery may begin.

Emergency public information release is critical to keep the communities aware of what has happened, how it is affecting the community and what is being done about the situation. Reports of extent of damage, status of repairs and restoration of services and infrastructure contribute to a sense of healing and recovery with a positive effect on the public's perceptions of the effectiveness of Pima County government. Effective and timely communications leads to realistic expectations while a lack of communications can be misinterpreted as lack of action, unpreparedness or incompetence resulting in anger, fear or mistrust

Sources

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update, DRAFT.

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

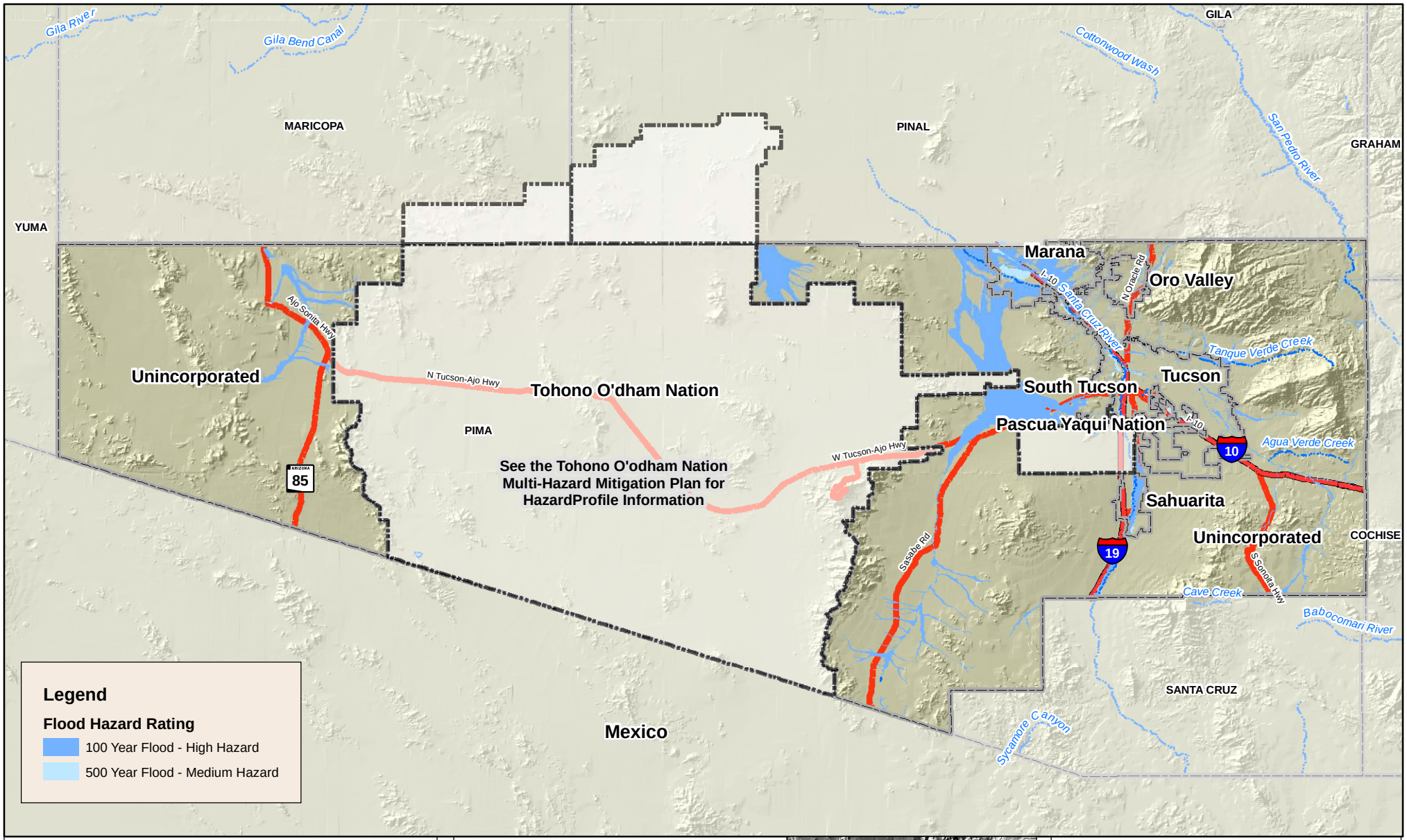
U.S. Dept of Commerce, National Climatic Data Center, 2010, Storm Events Database, accessed via the following URL: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

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

Profile Maps

Maps 1A and 1B – Flood Hazard Maps for Pima County

Maps 1C through 1H – Jurisdiction Specific Flood Hazard Maps



Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Major Watercourses

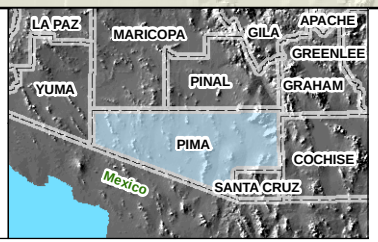
Roads

- Interstates
- Highways

N

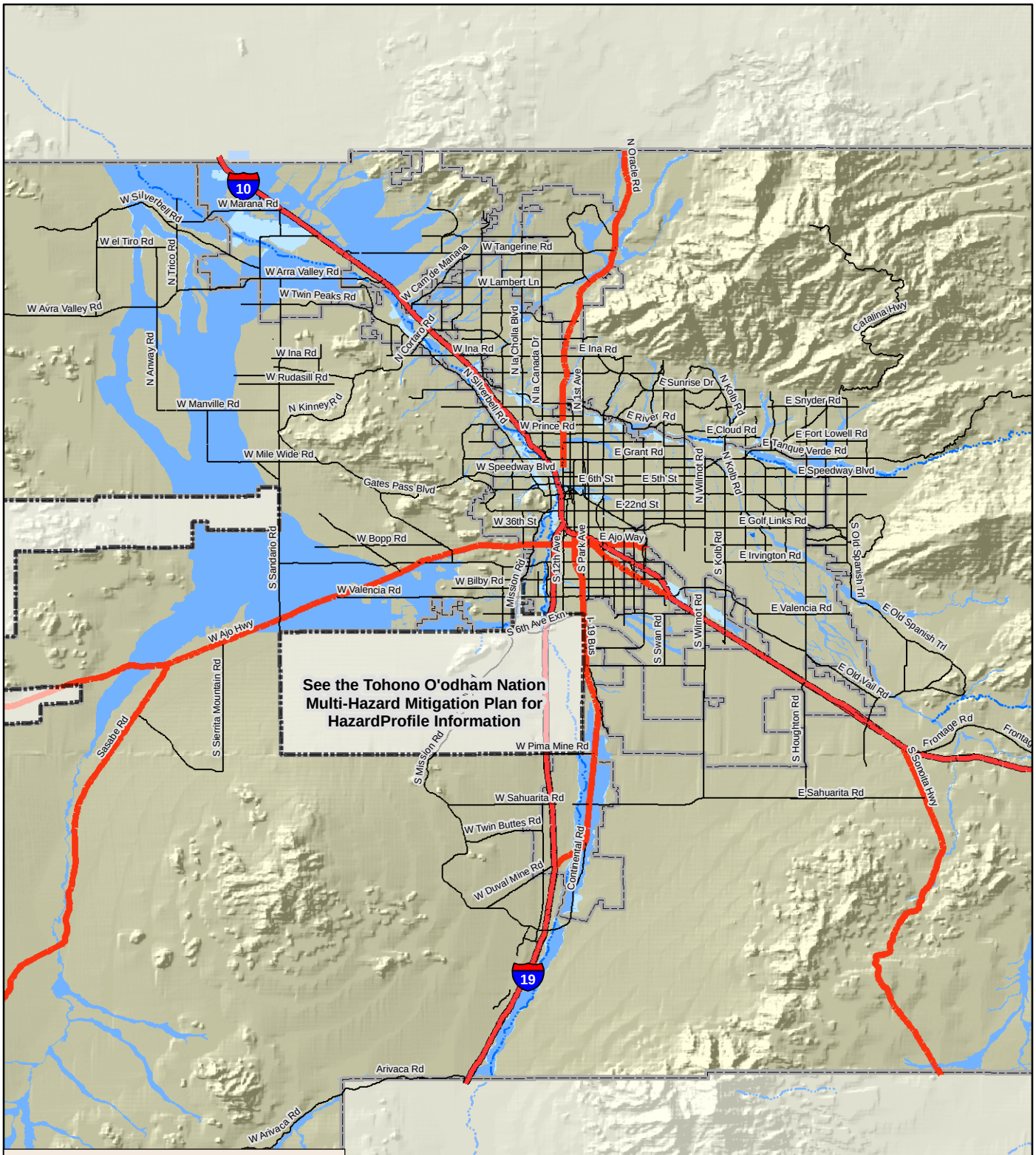
0 5 10 20 Miles

Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1A
Pima County Flood Hazard Map as of April 2011



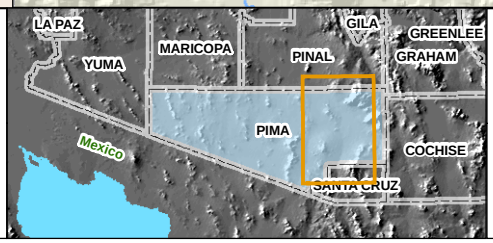
Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Pascua Yaqui Nation
- Unincorporated
- Indian Reservation
- Major Watercourses

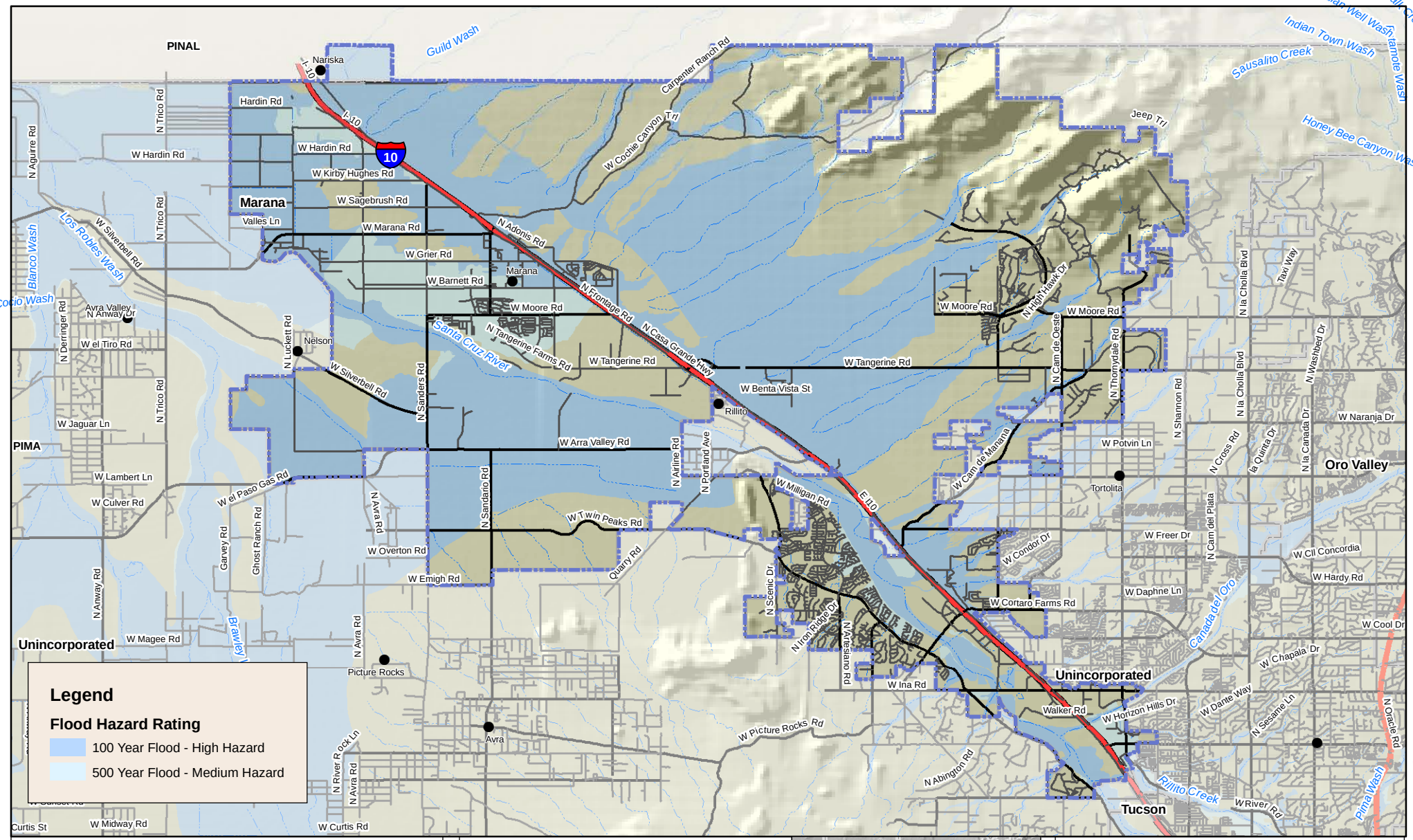
Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1B
Pima County Flood Hazard Map as of April 2011



Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Lakes
- Cities, Towns, Places
- Watercourses

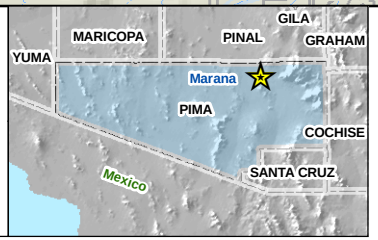
Roads

- Interstates
- Highways
- Arterials
- Streets

N

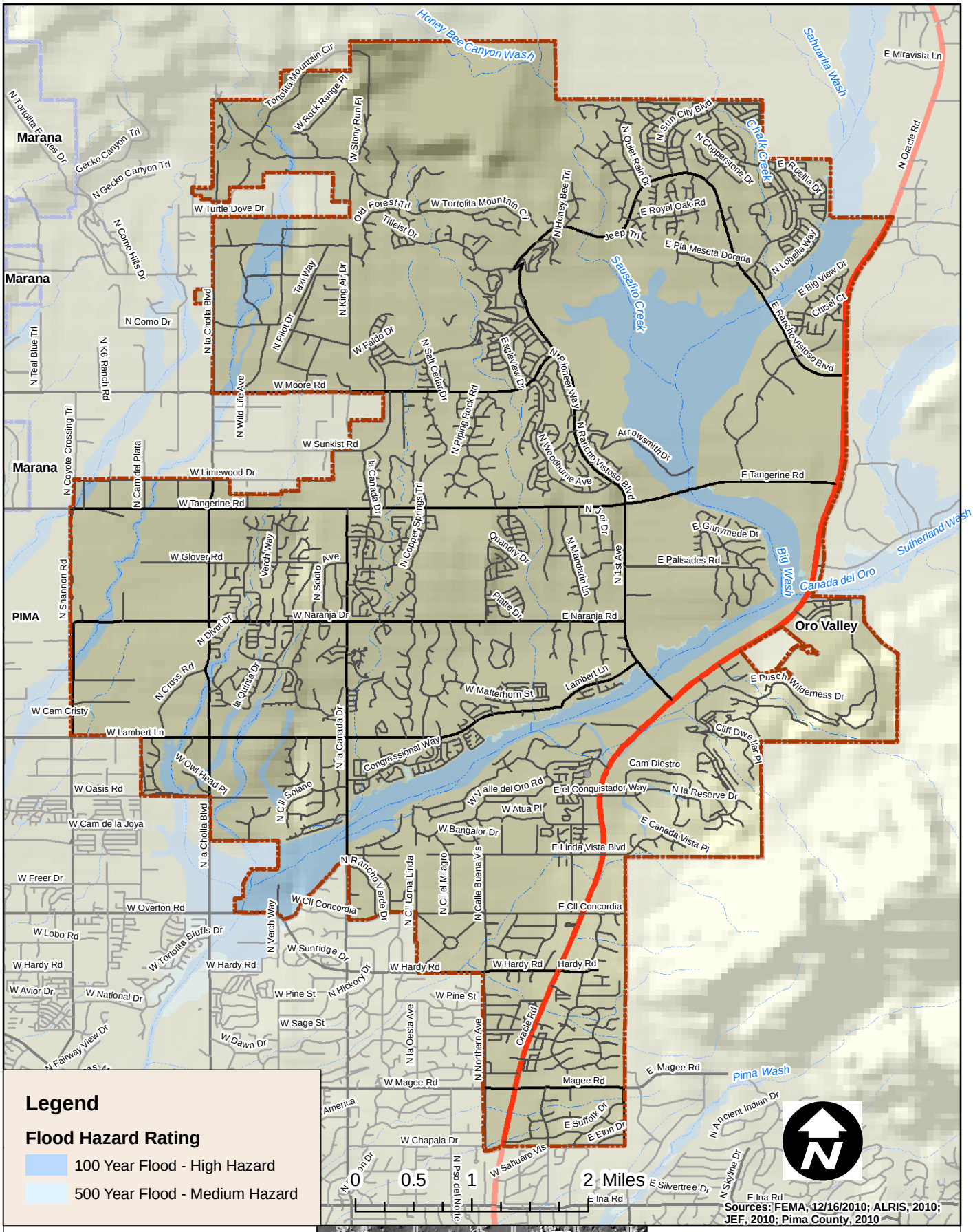
0 1 2 4 Miles

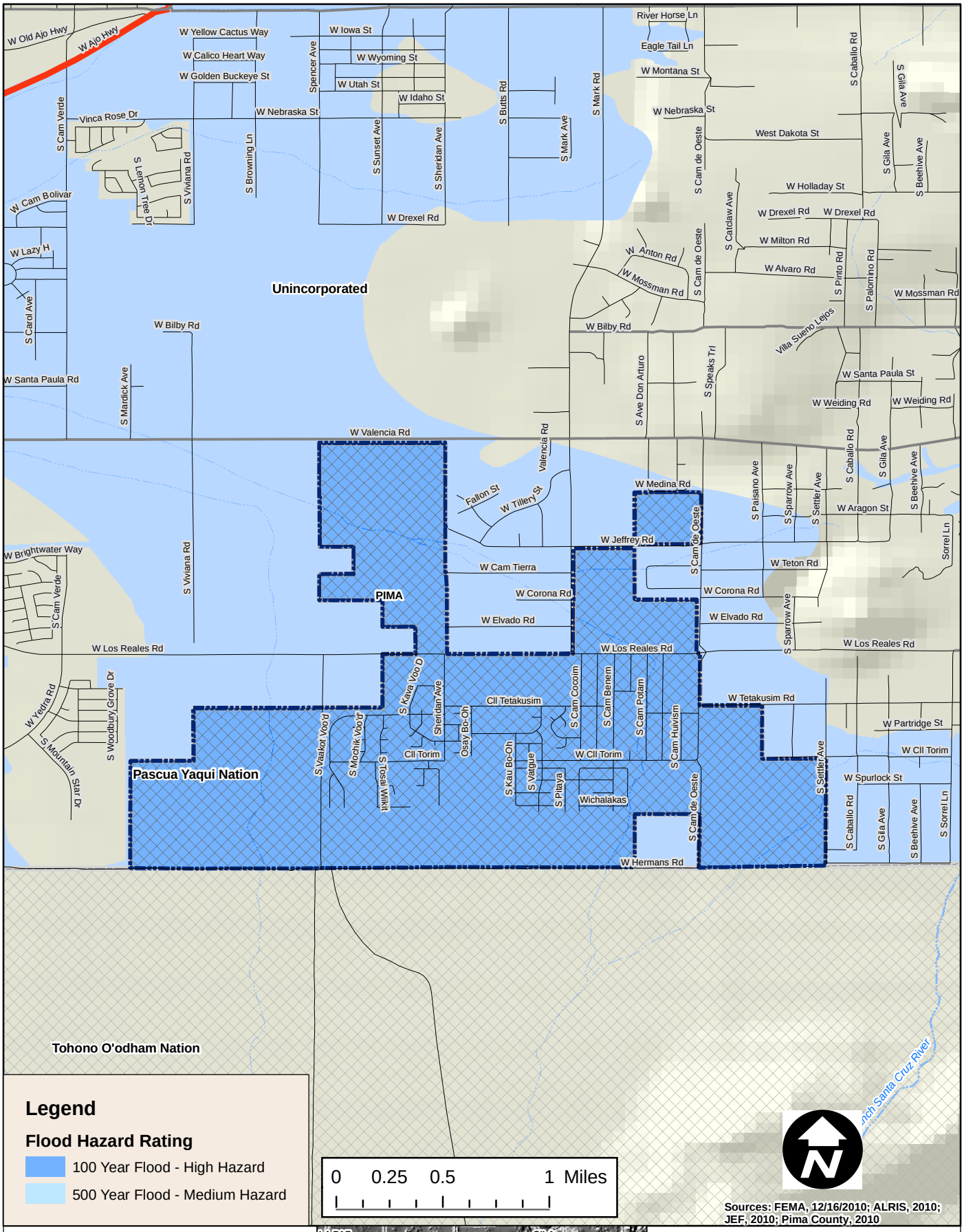
Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1C
Town of Marana Flood Hazard Map as of April 2011


Legend
Flood Hazard Rating
100 Year Flood - High Hazard
500 Year Flood - Medium Hazard
0 0.5 1 2 Miles
Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010
Marana
PIMA
Oro Valley
Honey Bee Canyon Wash
Sahuarita Wash
Chalk Creek
Sausalito Creek
Big Wash
Canada del Oro
Sutherland Wash
Pima Wash
N Oracle Rd
N Shannon Rd
N Cll Concordia
N Cll Loma Linda
N Cll el Milagro
N Calle Buena Vis
N Rancho Verde Dr
N Northern Ave
N Oracle Rd
N Sun City Blvd
N Copperstone Dr
E Ruelia Dr
E Miravista Ln
E Royal Oak Rd
E Pla Meseta Dorada
N Lobelia Way
E Big View Dr
Chisel Ct
E Rancho Vistoso Blvd
N Pioneer Way
N Rancho Vistoso Blvd
Arrowsmith Dr
E Tangerine Rd
E Ganymede Dr
E Palisades Rd
N 1st Ave
N Mandarin Ln
N Joel Dr
Quandy Dr
Platte Dr
N Copper Springs Trl
N Piping Rock Rd
N Woodburne Ave
Eagleview Dr
N Honey Bee Trl
Jeep Trl
W Tortolita Mountain Cir
Tortolita Mountain Cir
W Rock Range Pl
W Stony Run Pl
Old Forest Trl
Titleist Dr
W Turtle Dove Dr
N Tortolita Fairways Dr
Gecko Canyon Trl
N Gecko Canyon Trl
N Como Hills Dr
N Como Dr
N Teal Blue Trl
N K6 Ranch Rd
N Coyote Crossing Trl
N Cam del Plata
N la Cholla Blvd
N Wild Life Ave
N Pilot Dr
Taxi Way
N King Air Dr
W Faldo Dr
N Salt Cedar Dr
W Moore Rd
W Sunkist Rd
W Limewood Dr
W Tangerine Rd
N la Canada Dr
W Glover Rd
Verch Way
N Scioto Ave
W Naranja Dr
E Naranja Rd
N Divot Dr
N Cross Rd
la Quinta Dr
W Cam Cristy
W Lambert Ln
Lambert Ln
W Matterhorn St
E Pusch Wilderness Dr
Cliff Dwellers Pl
Congressional Way
W Owl Head Pl
W Oasis Rd
N Cll Solano
W Cam de la Joya
N la Cholla Blvd
W Valle del Oro Rd
E el Conquistador Way
W Atua Pl
Cam Diestro
N la Reserve Dr
E Canada Vista Pl
W Bangalor Dr
E Linda Vista Blvd
W Freer Dr
W Overton Rd
W Lobo Rd
W Tortolita Bluffs Dr
W Sunridge Dr
W Hardy Rd
Hardy Rd
W Avior Dr
W National Dr
W Pine St
N Hickory Dr
W Sage St
W Dawn Dr
N Fairway View Dr
N la Cesta Ave
E Magee Rd
W Magee Rd
Magee Rd
E Suffolk Dr
E Eton Dr
N Ancient Indian Dr
W Chapala Dr
W Sahuaro Vis
E Silvertree Dr
N Skyline Dr
E Ina Rd
Legend
Community
City of South Tucson
City of Tucson
Town of Marana
Town of Oro Valley
Town of Sahuarita
Unincorporated
Indian Reservation
Lakes
Major Watercourses
Roads
Interstates
Highways
Arterials
Streets
LA PAZ
YUMA
MARICOPA
GILA
GREENLEE
PINAL
GRAHAM
Oro Valley
PIMA
Mexico
COCHISE
SANTA CRUZ
Pima County Multi-Jurisdictional Hazard Mitigation Plan
Map 1D
Town of Oro Valley Flood Hazard Map as of April 2011



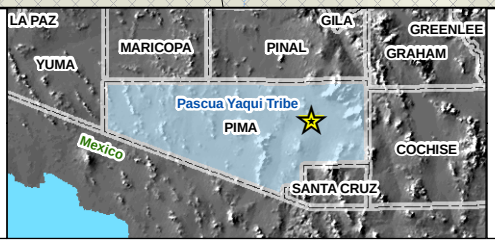
Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Pascua Yaqui Nation
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

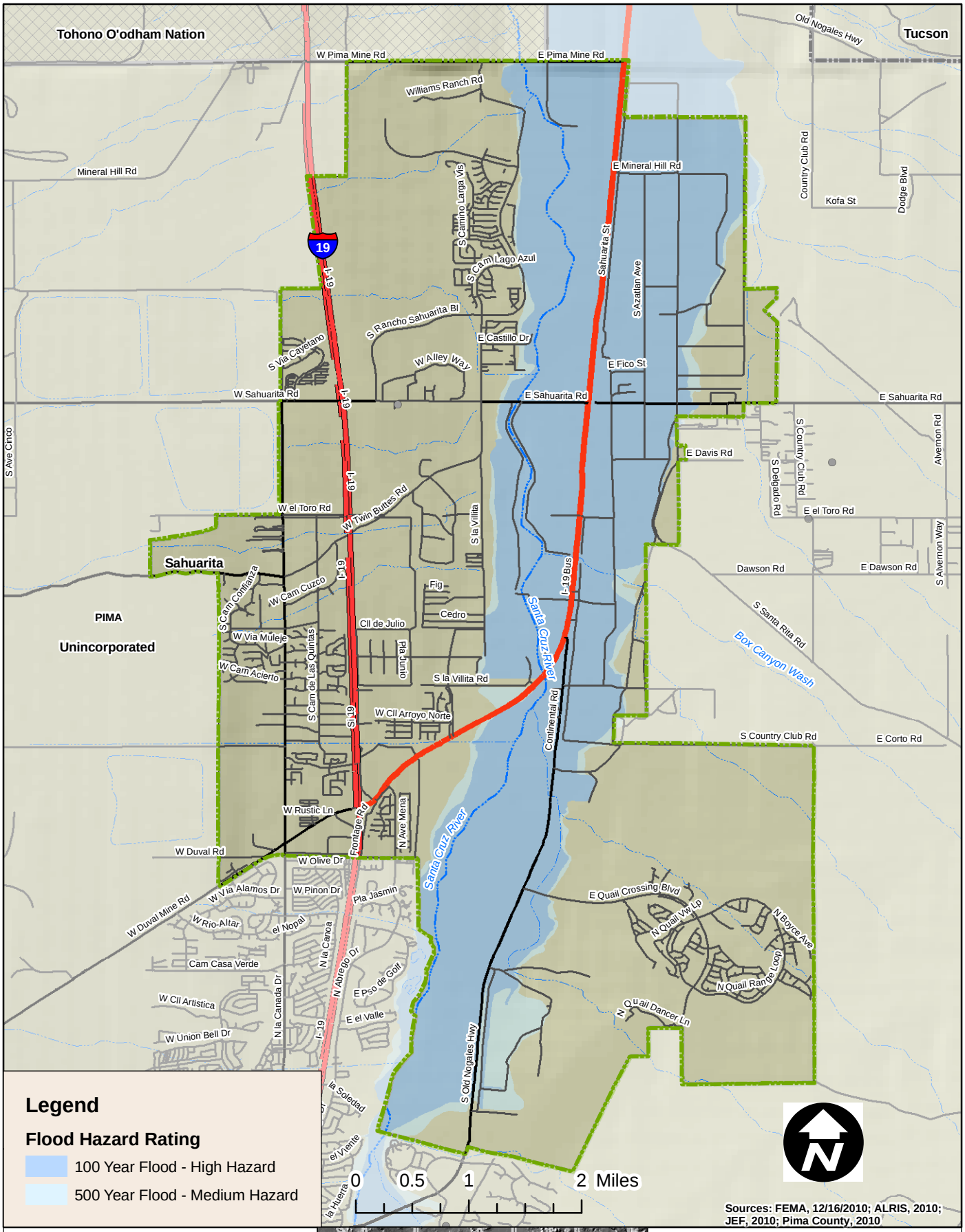
Roads

- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1E
Pascua Yaqui Tribe Flood Hazard Map as of April 2011



Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

Roads

- Interstates
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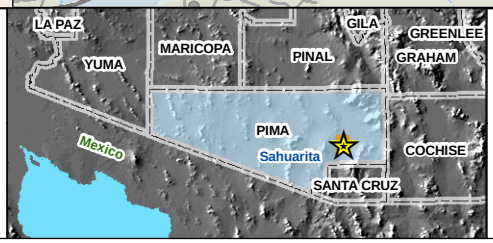
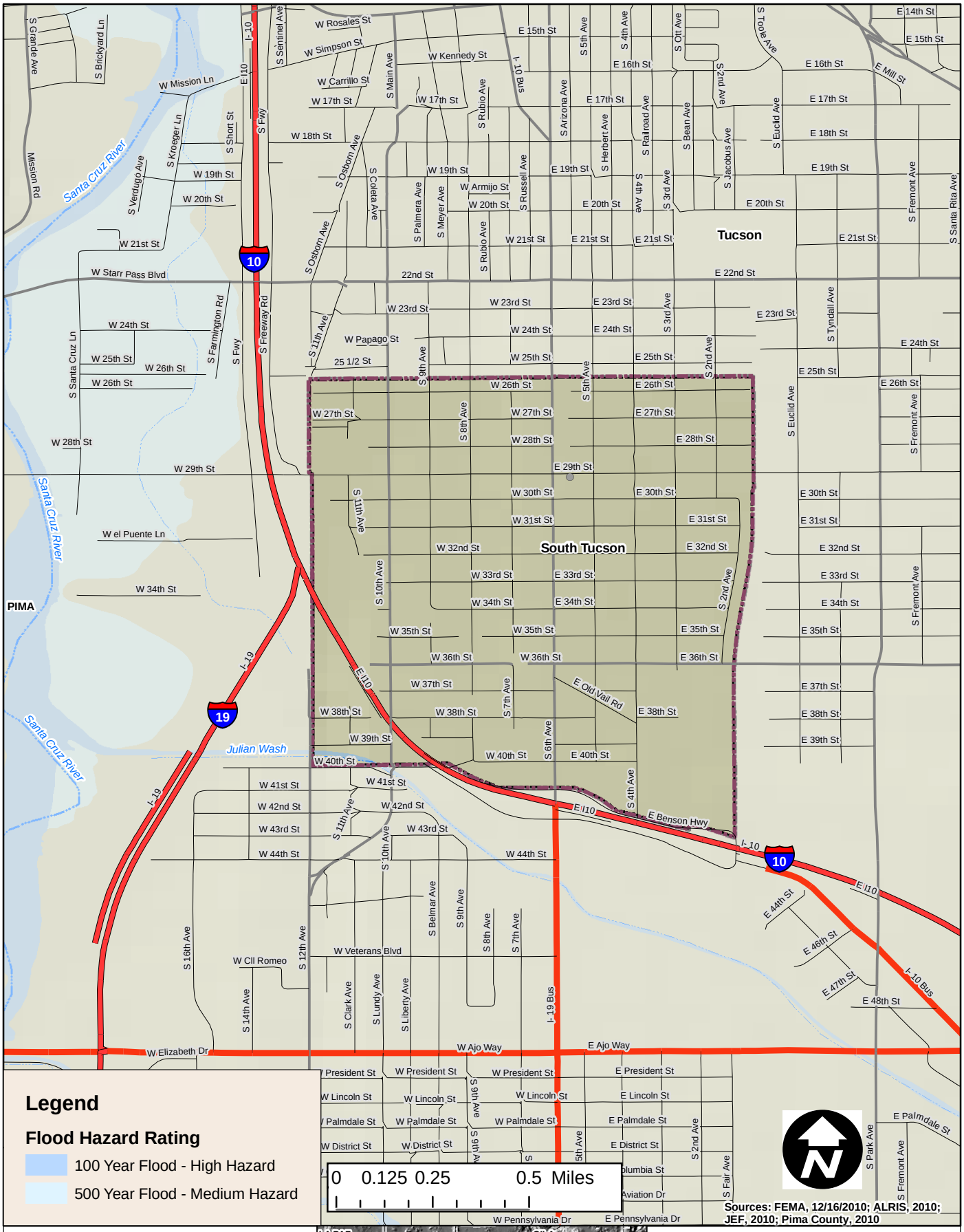
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1F
Town of Sahuarita Flood Hazard Map as of April 2011



Legend

Flood Hazard Rating

- 100 Year Flood - High Hazard
- 500 Year Flood - Medium Hazard

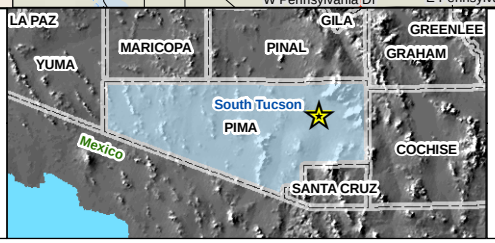
Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

Roads

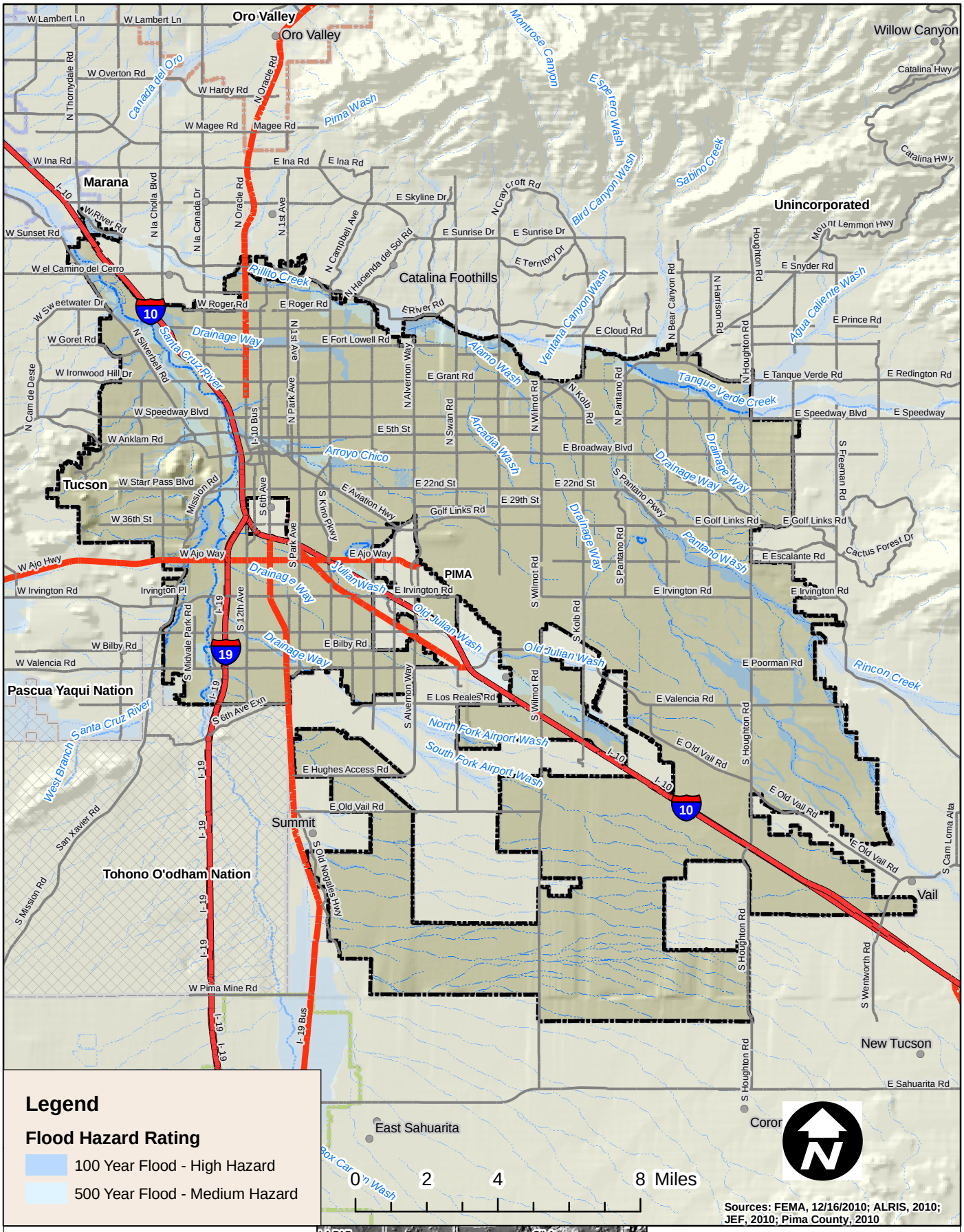
- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1G

City of South Tucson Flood Hazard Map as of April 2011



Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
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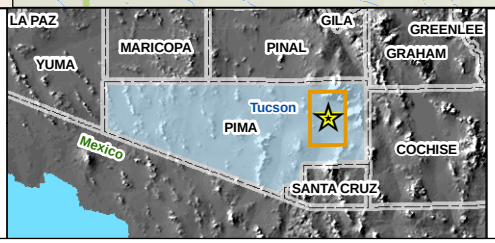
- Lakes
- Major Watercourses

Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 1H
City of Tucson
Flood
Hazard Map
as of April 2011

5.3.6 Hazardous Materials Incidents

Description

The threat of exposure to Hazardous Materials (HAZMAT) in our modern society is prevalent nationwide and throughout Pima County. HAZMAT incidents can occur from either point source spills or from transportation related accidents. In Pima County, the primary areas of risk associated with HAZMAT incidents are located near or along storage / manufacturing facilities, major roads and rail lines, and pipelines that transport hazardous substances. These substances may be highly toxic, reactive, corrosive, flammable, explosive, radioactive or infectious, with potential to contaminate air, soil, and water resources and pose a serious risk to life, health, environment and property. HAZMAT incidents can result in the evacuation of a few people, a specific facility, or an entire neighborhood(s) depending on the size and magnitude of the release and environmental conditions.

The Arizona State Emergency Response Commission (AZSERC), established by Arizona Law (Arizona Revised Statutes-Title 26, Chapter 2, Article 3) is tasked with the implementation of the Emergency Planning and Community Right to Know Act (EPCRA) in Arizona. Local Emergency Planning Committees (LEPC) are appointed by AZSERC, as required by EPCRA, first to design, then to regularly review and update a comprehensive emergency plan for an emergency planning district. There are 15 LEPC's in Arizona - one in each county.

State statutes and Sections 311 and 312 of EPCRA set forth hazardous chemical storage reporting requirements and thresholds for facilities possessing hazardous materials. The legislation requires that facilities storing or producing hazardous materials in quantities that exceed a defined Threshold Planning Quantity (TPQ), submit an annual chemical inventory report (Tier II Hazardous Chemical Inventory Form) to AZSERC, the appropriate LEPC, and local fire department, by March 1 of each year. Facilities holding an Extremely Hazardous Substance (EHS) at quantities exceeding the Threshold Planning Quantities (TPQ) must provide the notifications as well as a representative to participate in the county emergency planning process.

For the purposes of this Plan, the Planning Team chose to focus only on those HAZMAT facilities and chemicals that are classified by the Environmental Protection Agency (EPA) as extremely hazardous substances (EHS) Typical EHS materials transported and stored routinely in the county include chlorine gas, sulphuric acid, and hydrogen flouride.

History

According to the National Response Commission database, there are at least 42 reported incidents of HAZMAT releases that have occurred since 1991 within Pima County that involved at least one injury/fatality or some amount of property damage. Many of the incidents were tied to vehicular accidents involving passenger vehicles, semi tractor trailers, and/or railroad cars. The following incidents represent examples of hazardous materials incidents that have occurred in Pima County:

- In December of 1997, a tractor trailer rig carrying 8,000 gallons of ethylene glycol rolled over spilling approximately half of the load. One injury was reported (NRC, 2011).
- In March of 1998, a 55 gallon drum of molybdenum pentachloride fell off the back of a truck and was struck by 2 passenger vehicles releasing approximately 7 cubic feet of the material. One injury was reported (NRC, 2011).
- In June of 1998, a half-inch natural gas distribution line was ruptured at a mobile home and ignited into an open natural gas flame. The mobile home was destroyed with damages estimated at $100,000 (NRC, 2011).
- In April of 2005, a railcar released an unknown amount of sulphuric acid causing a railroad employee to become sick. The release was due to a faulty gasket (NRC, 2011)
- In July of 2006, four locomotives and six railcars carrying hydrochloric acid derailed. The locomotives remained upright, but the railcars all turned over on their sides and hydrochloric acid was reported as leaking. One injury was reported (NRC, 2011).

- In September of 2009, 500 gallons of asphalt was spilled from a tanker truck and entered a storm drain that ultimately drains to the Santa Cruz River. Approximately $2,000 in damages was reported (NRC, 2011).

Probability and Magnitude

There are no known probability statistics regarding HAZMAT incidents for Pima County.

Typically, the magnitude of impact from a HAZMAT incident can be projected by using models such as ALOHA and CAMEO with assumed incident characteristics such as chemical type and source amount, spill location and amount, release time and rate, surface type, temperature, humidity, wind direction and speed, chemical stability factors. Those modeling efforts, however, are beyond the scope of this Plan.

For the purpose of this Plan, the Planning Team chose to establish two (2) hazard classifications, high and medium, for profiling EHS hazards. High hazard exposure areas are assumed to be located within a one-mile radius or offset of any Tier II EHS facility, roadway and railway transportation corridor where EHS materials are known to be stored or transported on a somewhat regular basis. Similarly, the medium hazard exposure areas are assumed to be located within a second one-mile wide band that is offset from the High hazard area. All other areas are considered to be Low hazard.

Maps 2A and 2B show the HAZMAT hazard areas for the entire county and Tucson Metropolitan area. Maps 2C through 2H show the HAZMAT hazard areas for each jurisdiction.

Vulnerability – CPRI Results

HAZMAT CPRI results for each participating jurisdiction are summarized in Table 5-22 below.

Table 5-22: CPRI results by jurisdiction for HAZMAT

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Catastrophic	< 6 hours	< 24 hours	2.90
Oro Valley	Possible	Critical	< 6 hours	< 24 hours	2.60
Pascua Yaqui Tribe	Possible	Critical	6 to 12 hours	< 24 hours	2.60
Sahuarita	Likely	Catastrophic	< 6 hours	< 1 week	3.45
Tucson	Possible	Limited	< 6 hours	< 24 hours	2.30
Unincorporated Pima County	Highly Likely	Limited	< 6 hours	< 6 hours	3.10
				County-wide average CPRI =	**2.83**

Vulnerability – Loss Estimations

The estimation of potential exposure to high and medium HAZMAT hazards was accomplished by intersecting the human and critical facility assets with the HAZMAT hazard limits depicted on Maps 2A through 2H. Table 5-23 summarizes the critical facility, population, and residential housing unit exposure to the high and medium HAZMAT hazards. No losses are estimated for this hazard.

In summary, $11.2 billion and $366.6 million in critical facilities are exposed to high and medium HAZMAT hazards, for all the participating jurisdictions in Pima County. An additional $94.4 billion and $1.94 billion in county-wide Census 2010 residential housing units are estimated to be exposed to high and medium HAZMAT hazards. Regarding human vulnerability, a total population of 945,139 people, or 97.4% of the total county-wide population, is potentially exposed to a high hazard HAZMAT event. A total population of 20,977 people, or 2.2% of the total population, is potentially exposed to a medium hazard HAZMAT event. It is recognized that EHS incidents typically occur in a single localized area and do not impact an entire county or community at one time. These numbers are intended to represent the collective community or county-wide exposure. Actual losses for an individual incident are likely to be only a fraction of the numbers presented here. Because of the nature of this hazard, structural damage is highly unlikely and decontamination costs related to replacements cost would only be a small fraction.

Table 5-23: Pima County exposure estimates due to HAZMAT

HAZMAT HAZARD EXPOSURE / LOSS	Marana	Oro Valley	Pascua Yaqui Tribe	Sahuarita	South Tucson	Tucson	Unincorporated Pima County	Total
Total Critical Facilities	**272**	**132**	**16**	**76**	**19**	**1,625**	**1,302**	**3,442**
Facilities Exposed to High Hazard	269	131	4	76	19	1,603	1,119	3,221
Percentage of Total Facilities	98.90%	99.24%	25.00%	100.00%	100.00%	98.65%	85.94%	93.58%
Estimated Replacement Cost (x $1,000)	$764,814	$438,755	$222,516	$278,952	$48,227	$6,462,354	$3,022,273	$11,237,892
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Exposed to Medium Hazard	3	0	12	0	0	17	85	117
Percentage of Total Facilities	1.10%	0.00%	75.00%	0.00%	0.00%	1.05%	6.53%	3.40%
Estimated Replacement Cost (x $1,000)	$285	$0	$88,850	$0	$0	$4,985	$272,522	$366,642
Estimated Structure Loss (x $1,000)	$0	$0	$0	$0	$0	$0	$0	$0
Total Population	**34,622**	**40,557**	**3,675**	**25,142**	**5,593**	**520,368**	**340,692**	**970,648**
Population Exposed to High Hazard	34,160	40,163	154	22,193	5,593	520,130	322,746	945,139
Percent Exposed	98.67%	99.03%	4.19%	88.27%	100.00%	99.95%	94.73%	97.37%
Population Exposed to Medium Hazard	394	361	3,521	2,595	6	236	13,864	20,977
Percent Exposed	1.14%	0.89%	95.81%	10.32%	0.11%	0.05%	4.07%	2.16%
Total Residential Building Count	**14,573**	**20,053**	**892**	**10,549**	**2,112**	**230,157**	**159,016**	**437,352**
Estimated Replacement Cost (x $1,000)	**$3,629,307**	**$6,831,456**	**$187,175**	**$2,229,431**	**$452,144**	**$40,805,270**	**$42,706,058**	**$96,840,841**
Structures Exposed to High Hazard	14,257	19,767	50	8,864	2,112	230,081	151,124	426,255
Percentage of Total Facilities	97.83%	98.57%	5.61%	84.03%	100.00%	99.97%	95.04%	97.46%
Estimated Replacement Cost (x $1,000)	$3,550,650	$6,735,120	$7,615	$1,873,283	$452,144	$40,791,306	$40,999,837	$94,409,955
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0
Structures Exposed to Medium Hazard	255	263	842	1,440	0	76	5,912	8,788
Percentage of Total Facilities	1.75%	1.31%	94.39%	13.65%	0.00%	0.03%	3.72%	2.01%
Estimated Replacement Cost (x $1,000)	$63,407	$88,587	$179,560	$304,256	$0	$13,964	$1,295,202	$1,944,976
Estimated Structure Loss (x $1,000)	$0	$0	$0	$0	$0	$0	$0	$0

Vulnerability – Development Trends

As the vulnerability analysis indicates, nearly 100 percent of Pima County population and infrastructure is exposed to some level of EHS threat. That exposure will only worsen as development increases. It may be advantageous to pursue designating certain roadways as EHS corridors to limit the exposure, and establishing buffer zones along corridors known to be frequent EHS transport routes. Development of high-density population land uses such as schools, nursing homes, apartment complexes, etc., should be discouraged within these zones.

EHS facilities that have potential for critical or catastrophic HAZMAT releases should be located on flat topography and take care to protect against negative climate and microclimate conditions; utilize shading from excessive sun in warm climate and/or other best management practices.

Vulnerability – EVRI

Table 5-24 summarizes the EVRI assessment for HAZMAT.

Table 5-24: Environmental Risk and Vulnerability Index (EVRI) scores for HAZMAT

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Possible	Limited	< 1 month	1.60
WATER	Possible	Limited	> 6 months	1.90
SOIL	Possible	Limited	> 6 months	1.90
			Overall EVRI Score	**1.80**

Vulnerability – Consequences/Impacts

Public – Hazardous materials present a significant, potential hazard to public safety/health and the environment when misused or released in an uncontrolled manner, such as, in the case of a transportation or production accident. Pima County has an extensive highway system comprised of two (2) interstate highways and a major rail line, both of which are connected to an international border. There is a large amount of HAZMAT which passes through the County on a daily basis. This includes an international airport which transports and transfers air freight. Underground gasoline, jet fuel and natural gas pipelines also run through Pima County with a large tank farm.

There are various forms and types of HAZMAT, i.e. solids, powders, liquids and gases, each presenting unique and varying degrees of concentration and toxicity. Contact and ingestion of toxic vapors or consumption of contaminated foods or water are the principle means of injury to the public. Radiation is another threat which may or may not be associated with terrorism. Radioactive materials are present at hospitals and are transported through the County by the Department of Defense.

Other impacts are indirect and may involve the closure of roads, schools, hospitals, businesses and government facilities. During such closures, public safety responder access may be impossible or delayed. There may also be economic damage as industry and commerce are affected.

Responders to the Incident – HAZMAT situations are very dangerous and must be managed directly by highly trained and certified technicians. HAZMAT teams must wear protective equipment in order to conduct rescues, decontamination, mitigation and clean-up activities. Proper disposal and containment is crucial to remove these materials from the site and to prevent further injury and environmental damage. At any stage of HAZMAT operations, responders are subject to potentially lethal exposure to agents and chemicals which may cause lethal, acute and chronic injury and disease. Fires, explosions and toxic plumes are also very real threats to responders and the citizenry alike.

Continuity of Operations / Delivery of Services – Pima County's ability to continue the functions of government operations and services may become threatened depending on the incident locale and duration. Public safety responders may be hindered in their ability to access those requesting or

needing services because of road closures and/or hazardous conditions requiring special equipment to permit access.

Environment – Threats to the environment involve contact contamination and ingestion hazards by humans and animals and the danger of contamination of watersheds, livestock and agriculture affecting food supply. These effects may be of short duration while other incidents affecting water may become a long lasting problem.

Economic / Financial Condition of Jurisdiction – Pima County's economy could be negatively impacted by HAZMAT incidents in several ways:

- Agriculture: crop losses through damage and contamination may result in higher consumer prices and/or supply shortages, locally and regionally.
- Recreation/Tourism: loss of revenue from the service/hospitality industry and recreational activities related to or dependent upon natural resources, such as, golfing, fishing, boating, hunting or general tourism.
- Livestock: higher feed and water costs may result in a reduction in the food supply and higher food costs

Public Confidence in Jurisdiction's Governance – HAZMAT planning has been an on-going effort in Pima County and the State of Arizona. Pima County's Emergency Response and Recovery Plan (ERRP) has a HAZMAT Annex which will guide emergency response to any HAZMAT emergency. The ERRP supports the Arizona State Emergency Response and Recovery Plan (AzSERRP) and the Local Emergency Planning Committee (LEPC) plans.

Sources

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan.

National Response Center, 2011, database obtained from website. URL at:
http://www.nrc.uscg.mil/nrchp.html

U.S. Department of Transportation, 1996, North American Emergency Response Guidebook

Profile Maps

Maps 2A and 2B – County-Wide and Tucson Metro Area HAZMAT Hazard Maps

Maps 2C through 2H– Jurisdiction Specific HAZMAT Hazard Maps

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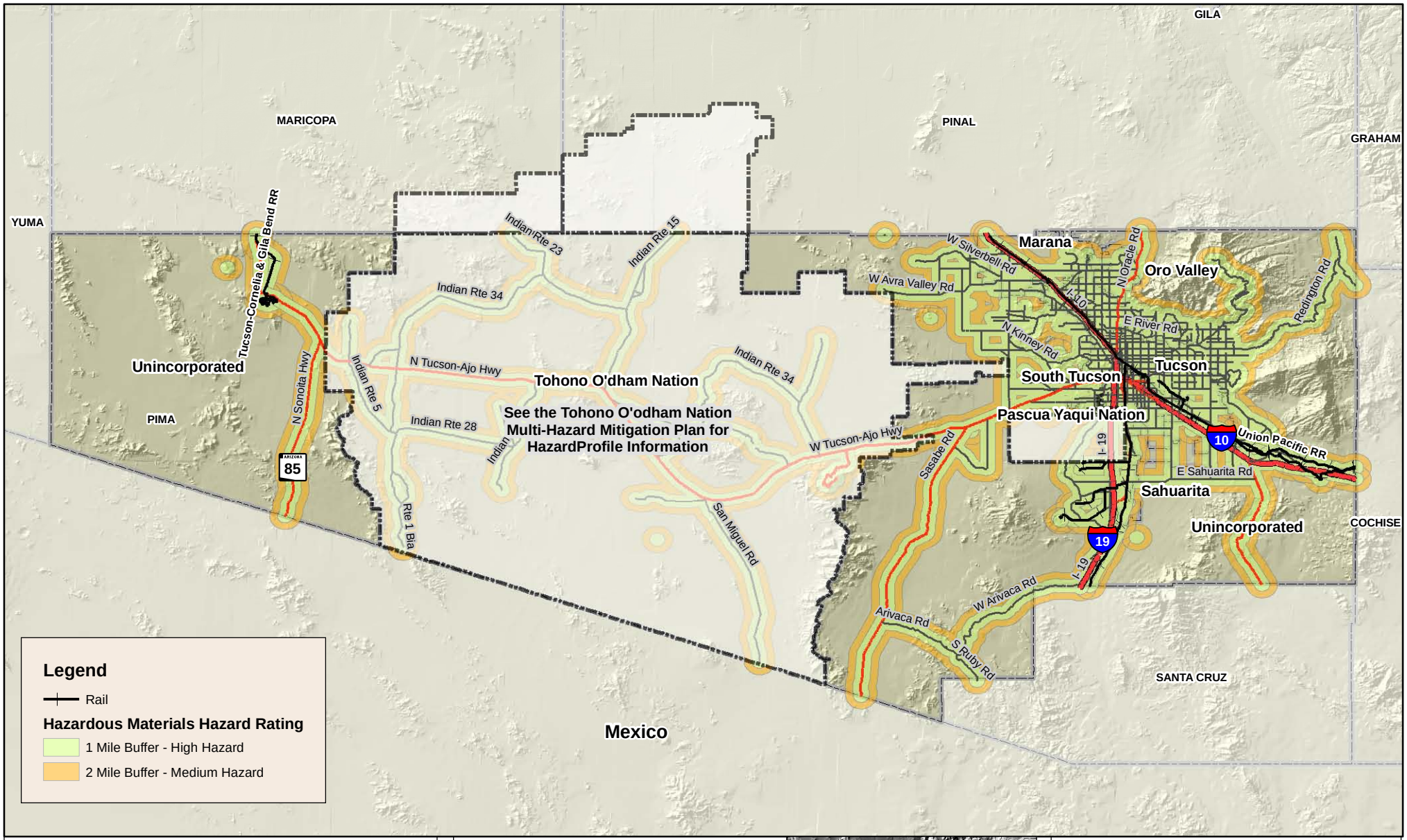


Legend

Community

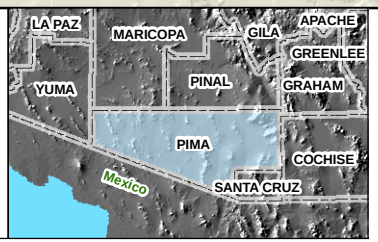
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation

HAZMAT Roads

- Interstates
- Highways
- Arterials

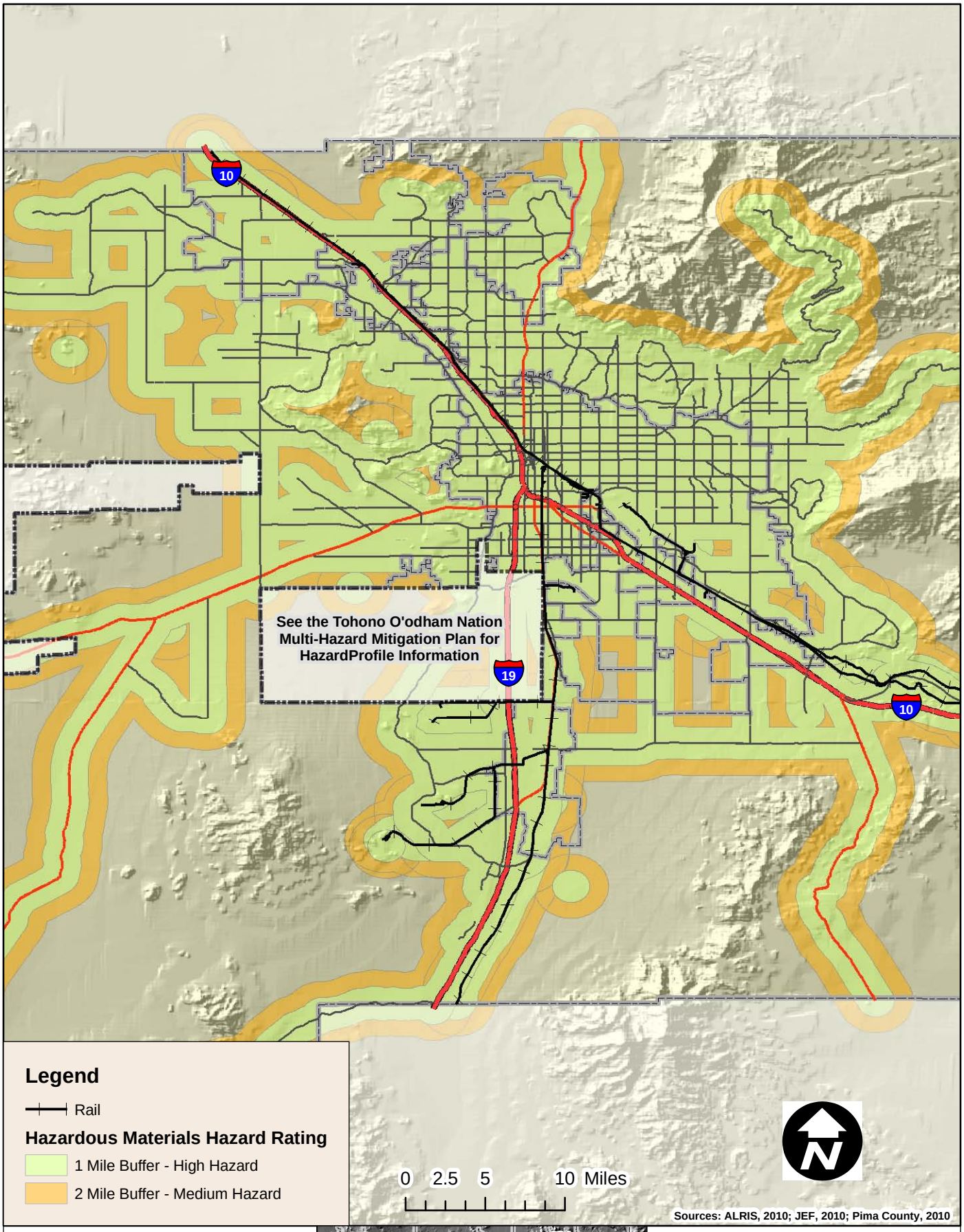
0 5 10 20 Miles

Sources: ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2A
Pima County Hazardous Materials Hazard Map as of April 2011



Legend

Community

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- City of Tucson
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- Town of Oro Valley
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- Unincorporated
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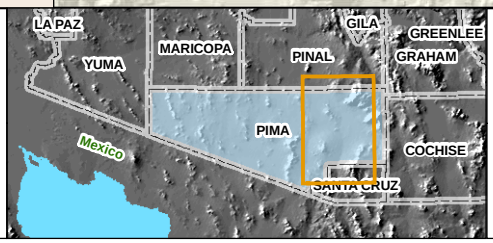
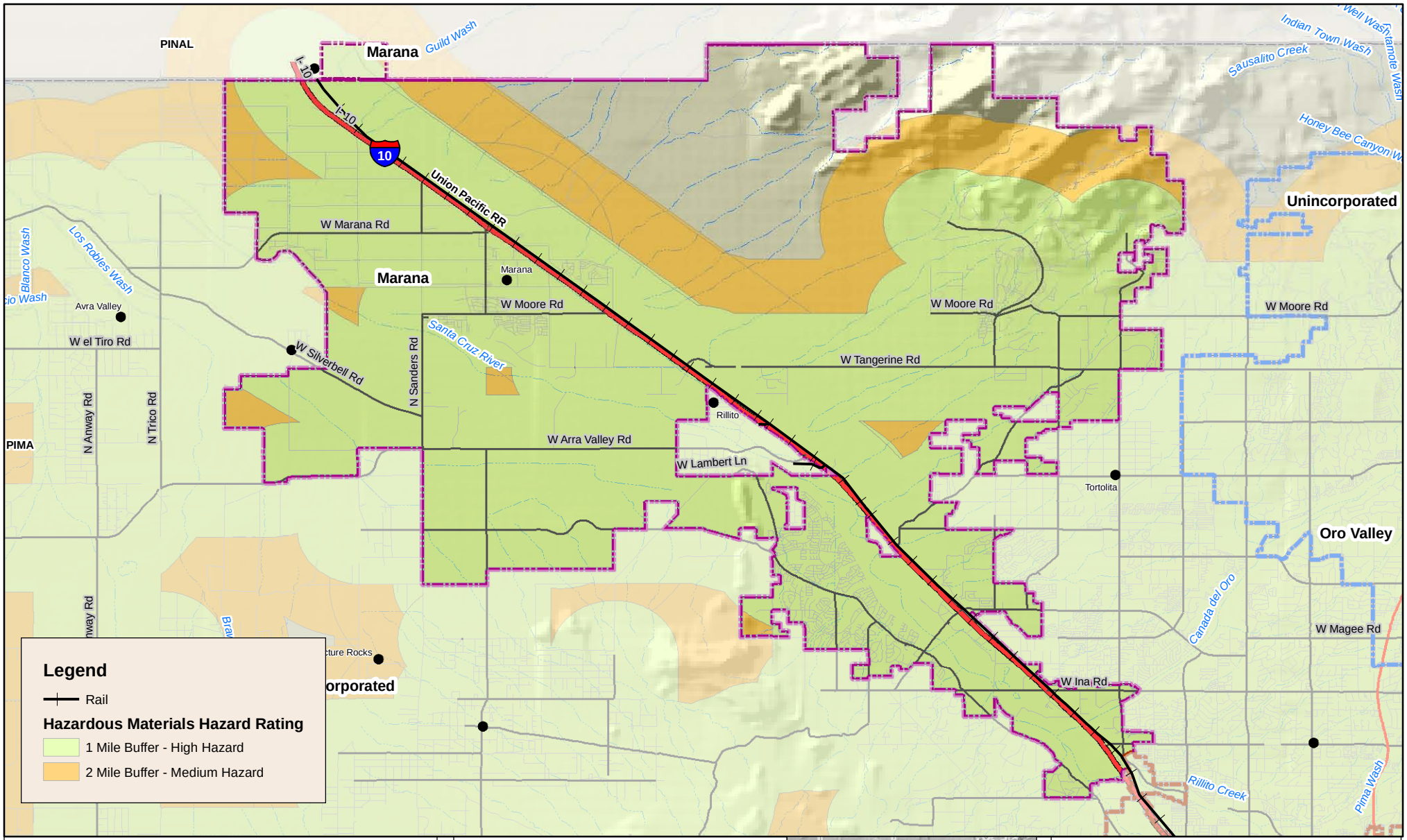
HAZMAT Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2B
Pima County Hazardous Materials Hazard Map as of April 2011



Legend

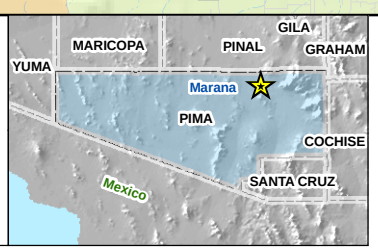
- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Cities, Towns, Places
- Watercourses
- Local Streets

HAZMAT Roads

- Interstates
- Highways
- Arterials

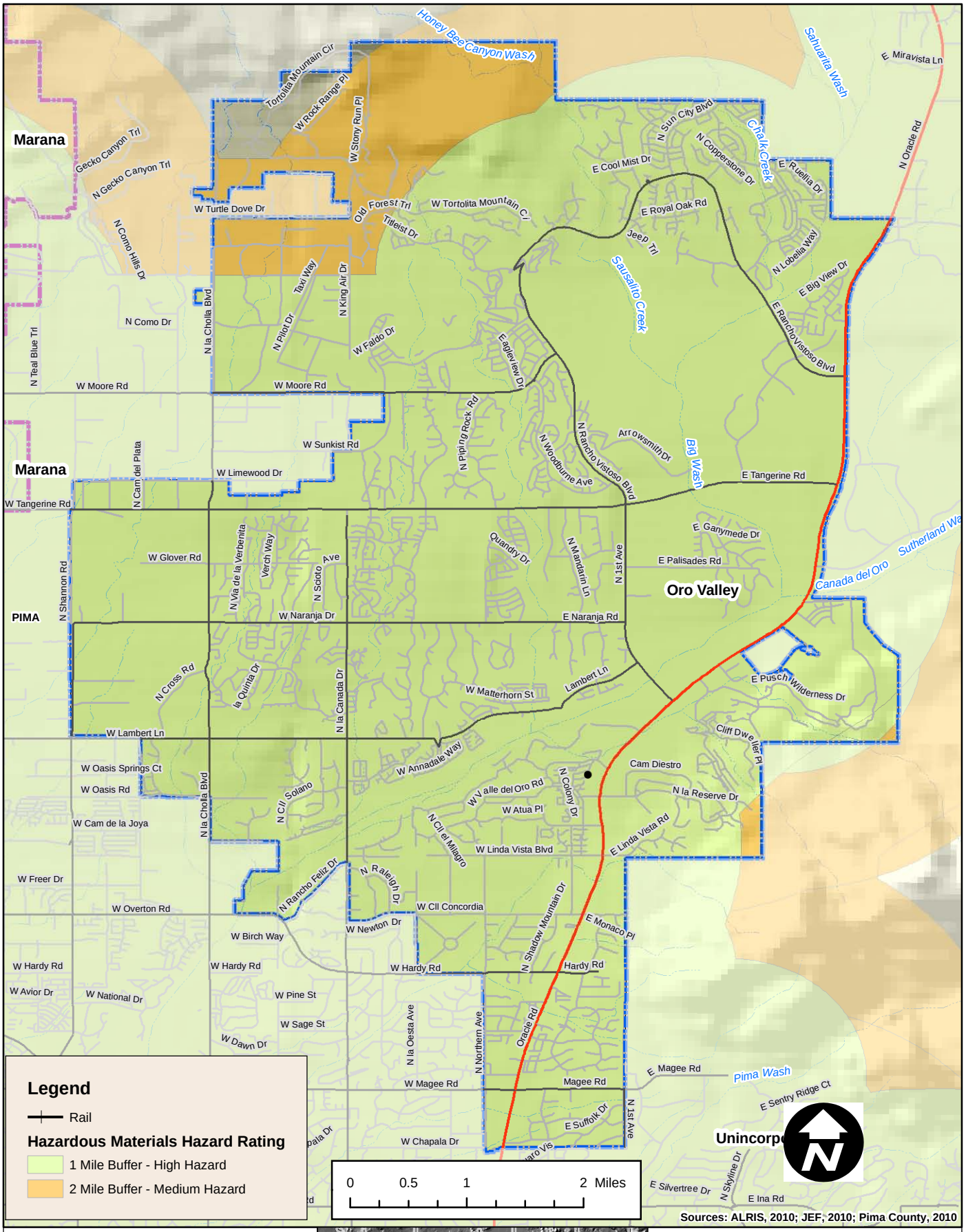
0 1 2 4 Miles

Sources: ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2C
Town of Marana Hazardous Materials Hazard Map as of April 2011

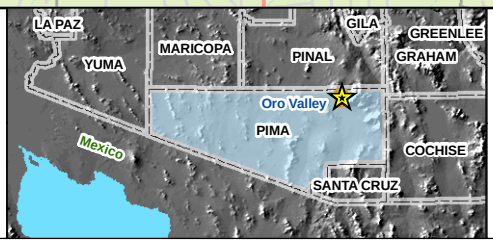


Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Cities, Towns, Places
- Major Watercourses
- Local Streets

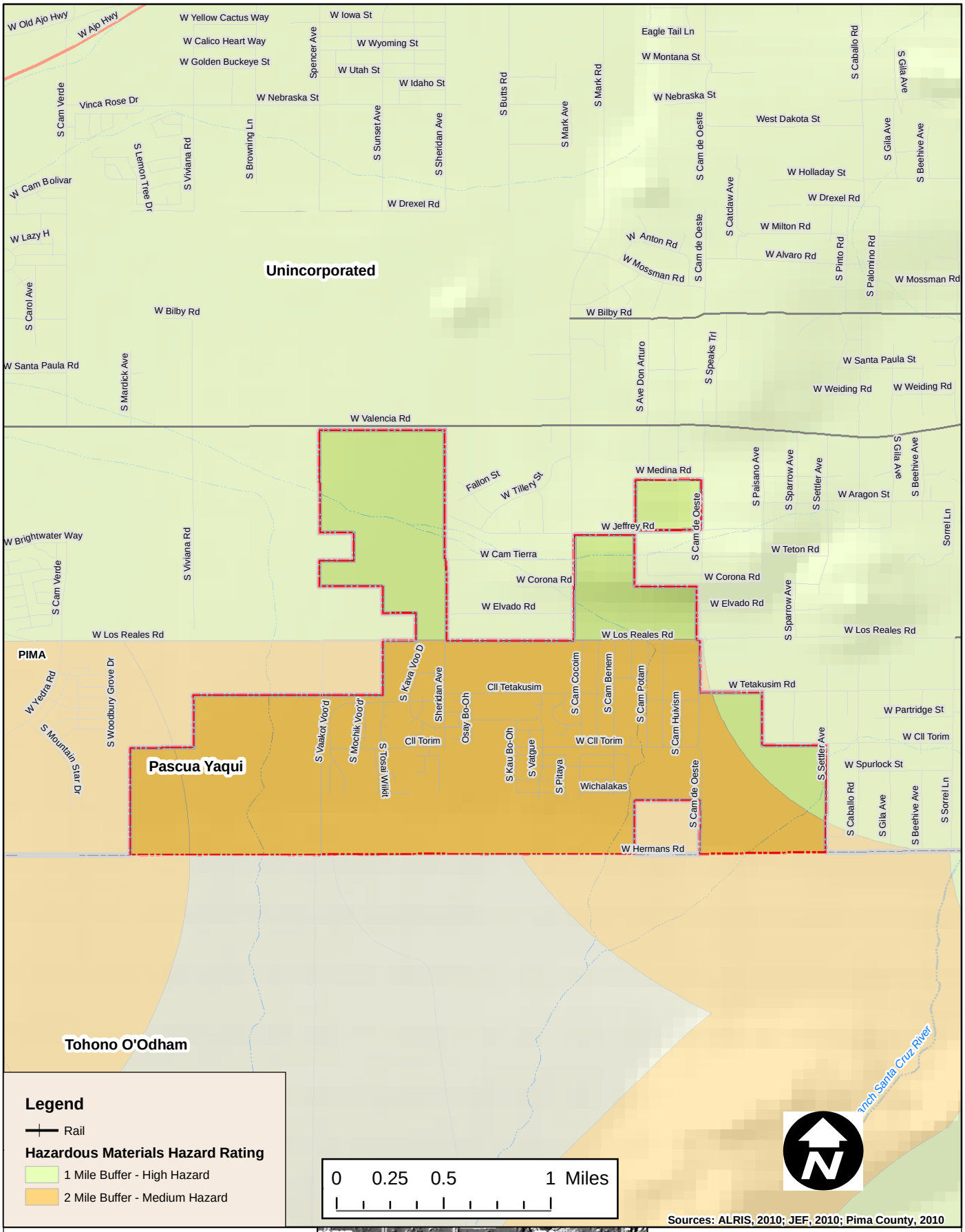
HAZMAT Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2D
Town of Oro Valley
Hazardous Materials
Hazard Map
as of April 2011



Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Major Watercourses
- Cities, Towns, Places
- Local Streets

HAZMAT Roads

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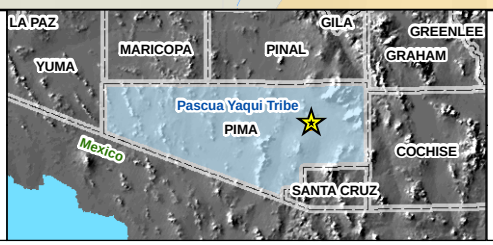
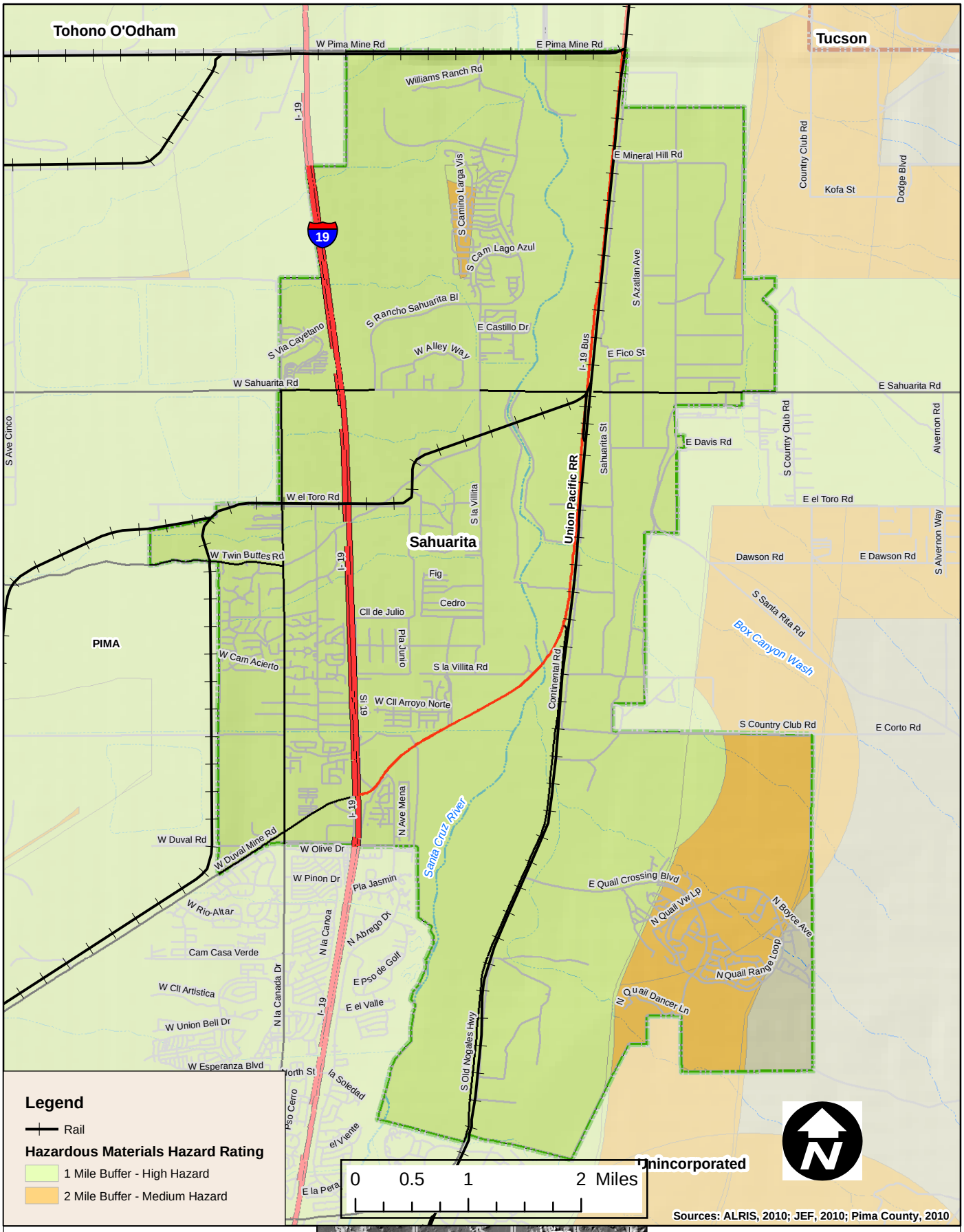
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2E
Pascua Yaqui Tribe Hazardous Materials Hazard Map as of April 2011



Legend

- Marana
- Oro Valley
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- Sahuarita
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- Tucson
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- Local Streets

HAZMAT Roads

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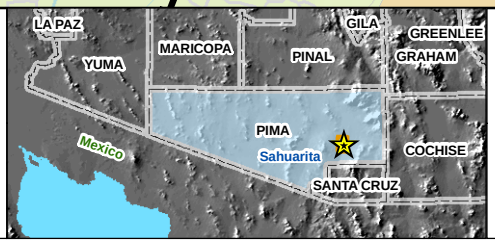
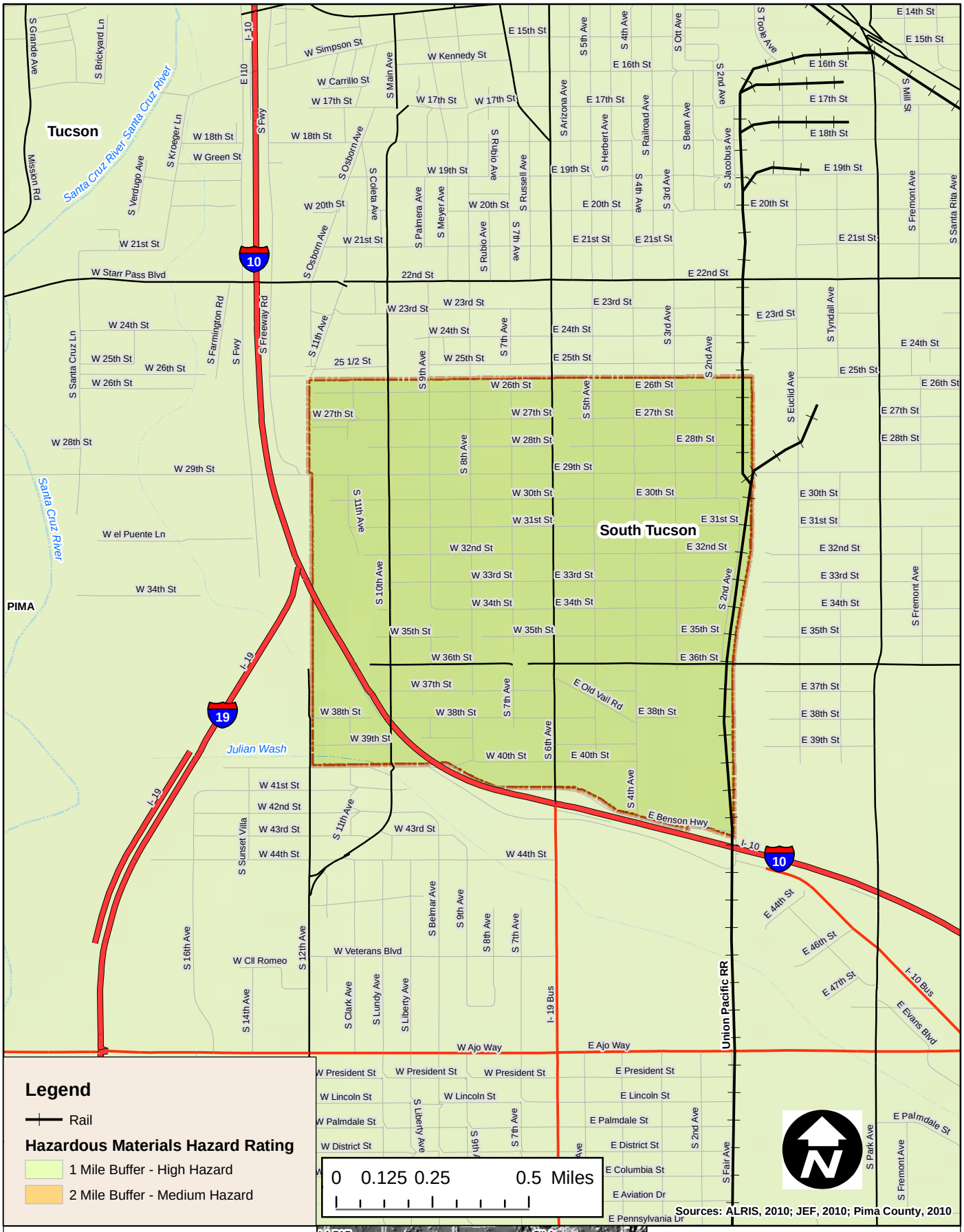
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2F

Town of Sahuarita Hazardous Materials Hazard Map as of April 2011


Tucson
South Tucson
PIMA
Santa Cruz River
Santa Cruz River Santa Cruz River
Julian Wash
I-10
I-19
I-10 Bus
I-19 Bus
Union Pacific RR
W Simpson St
W Kennedy St
W Carrillo St
W 17th St
W 18th St
W Green St
W 19th St
W 20th St
W 21st St
W Starr Pass Blvd
22nd St
E 22nd St
W 23rd St
W 24th St
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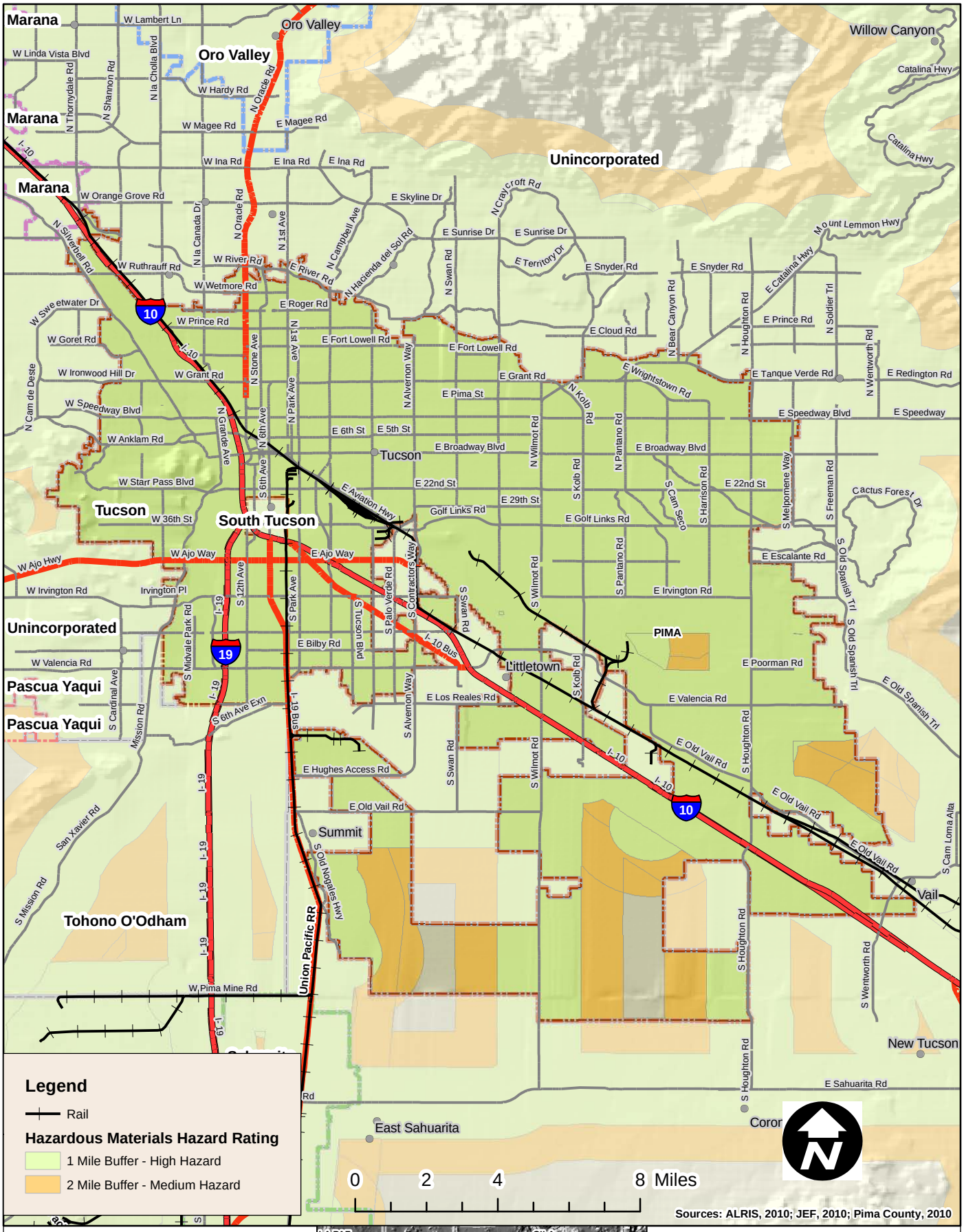
E 46th St
E 47th St
E Old Vail Rd
E Benson Hwy
E Evans Blvd
W Veterans Blvd
W Cll Romeo
W Ajo Way
E Ajo Way
W President St
E President St
W Lincoln St
E Lincoln St
W Palmdale St
E Palmdale St
W District St
E District St
E Columbia St
E Aviation Dr
E Pennsylvania Dr
S Grande Ave
S Brickyard Ln
Mission Rd
S Verdugo Ave
S Kroeger Ln
S Santa Cruz Ln
S Farmington Rd
S Fwy
S Freeway Rd
S Osborn Ave
S Coletta Ave
S Palmera Ave
S Meyer Ave
S Rubio Ave
S Russell Ave
S 7th Ave
S Arizona Ave
S Herbert Ave
S Railroad Ave
S Bean Ave
S Jacobus Ave
S 3rd Ave
S 4th Ave
S 5th Ave
S Ott Ave
S Toole Ave
S Mill St
S Fremont Ave
S Santa Rita Ave
S Tyndall Ave
S Euclid Ave
S Main Ave
S 11th Ave
S 9th Ave
S 8th Ave
S 10th Ave
S 6th Ave
S 2nd Ave
S Belmar Ave
S Sunset Villa
S 16th Ave
S 12th Ave
S 14th Ave
S Clark Ave
S Lundy Ave
S Liberty Ave
S Park Ave
S Fair Ave
Legend
Rail
Hazardous Materials Hazard Rating
1 Mile Buffer - High Hazard
2 Mile Buffer - Medium Hazard
0 0.125 0.25 0.5 Miles
Sources: ALRIS, 2010; JEF, 2010; Pima County, 2010
Legend
Marana
Oro Valley
Pascua Yaqui
Sahuarita
South Tucson
Tucson
Unincorporated
Indian Reservation
Major Watercourses
Local Streets
HAZMAT Roads
Interstates
Highways
Arterials
LA PAZ
YUMA
MARICOPA
PINAL
GILA
GREENLEE
GRAHAM
South Tucson
PIMA
Mexico
COCHISE
SANTA CRUZ
Pima County Multi-Jurisdictional Hazard Mitigation Plan
Map 2G
City of South Tucson Hazardous Materials Hazard Map as of April 2011
SOUTH TUCSON



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 2H
City of Tucson
Hazardous Materials
Hazard Map
as of April 2011

5.3.6 Levee Failure

Description

FEMA defines levees as man-made structures, usually earthen embankments, that are designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding (FEMA, 2009). National flood policy now recognizes the term "levee" to mean only those structures which were designed and constructed according to sound engineering practices, have up to date inspection records and current maintenance plans, and have been certified as to their technical soundness by a professional engineer. FEMA has classified all other structures that impound, divert, and/or otherwise impede the flow of runoff as "non-levee embankments". In Pima County, these "non-levee embankments" might be comprised of features such as roadway and railway embankments, canals, irrigation ditches and drains, and agricultural dikes. Currently there is no State or Federal Levee Safety Program and no official state or federal levee inventory. It is anticipated that FEMA will institute a National Levee Safety Program in the near future.

By design, a levee and many non-levee embankments increase the conveyance capacity of a watercourse by artificially creating a deeper channel through embankments that extend above the natural overbank elevation. Upon failure, floodwaters will return to the natural overbank areas. FEMA urges communities to recognize that all areas downstream of levees and embankments are at some risk of flooding and that there are no guarantees that a levee or embankment will not fail or breach if a large quantity of water collects upstream.

Mechanisms for levee failure may include seismic events, extreme wave action, leakage and piping, overtopping, and material fatigue. Failure by overtopping could occur due to an inadequate design capacity, sediment deposition and vegetation growth in the channel, subsidence, and/or runoff that exceeds the design recurrence interval of the levee. Failure by piping could be due to embankment cracking, fissures, animal boroughs, embankment settling, or vegetal root penetrations.

History

Levees (certified or not) have been used in Pima County for over a hundred years to protect communities and agricultural assets from flooding, as well as to facilitate the delivery and removal of irrigation water. These levees range from simple earthen embankments pushed up by small equipment to large engineered embankments lining both sides of a watercourse. The structural integrity of levees with regard to flood protection and policy has been discussed at a national level since the early 1980s but was elevated to a high priority after the collapse and breach of the New Orleans levees after Hurricane Katrina in 2005.

There are no documented failures of certified levees within Pima County. Non-levee embankment failures, however, occur on a regular basis and the risk posed by the many uncertified embankments in the county's inventory is great.

Probability and Magnitude

There are varied probability or magnitude criteria regarding levee failure due to variability in levee design, ownership and maintenance. For flood protection credit under the NFIP, FEMA has established certain deterministic design criteria that are based on the 1 percent (100-year) storm event and a corresponding minimum freeboard requirements. Federally constructed levees are usually designed for larger, more infrequent events that equate to 250 to 500 year events plus freeboard. Recent recertification procedures proposed by U.S. Army Corps of Engineers, require that a certifiable levee have at least a 90% assurance of providing protection from overtopping by the 1% chance exceedance flood for all reaches of a levee system with a design freeboard height of at least three feet. For levees with less than three feet of design freeboard, the assurance is increased to 95%, and no certification will be made for levees with less than two feet of freeboard unless approved via a waver process. This assurance is only for containment (overtopping failure) and does not include probability of failure by any other mode (USACE, 2007). All of the FEMA certified levees within Pima County

are designed to safely convey the 100-year event, with a factor of safety provided by a minimum additional freeboard of 3 feet.

The recent DFIRM data provided by FEMA delineates recognized levees within the county and provides a special flood zone designation of "Shaded Zone X – Protected by Levee" for areas that are protected by a levee, but otherwise subject to 100-year flooding should the levee fail or be removed. For the purpose of this Plan, the Planning Team chose to identify the special levee protection zones as the high hazard areas of levee failure. It is recognized that this initial hazard area assignment will require further analysis to account for the failure impact areas of the many non levee embankments.

The currently identified high hazard levee failure zones are indicated on Maps 3A – 3D, which depict the county as a whole, and the incorporated limits of Marana, Oro Valley, and Tucson. No other jurisdictions have levees or high hazard zones identified within their incorporated or reservation boundaries.

Vulnerability – CPRI Results

Levee Failure CPRI results for each jurisdiction are summarized in Table 5-25 below.

Table 5-25: CPRI results by jurisdiction for levee failure

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Catastrophic	6 to 12 hours	< 1 week	2.85
Oro Valley	Unlikely	Catastrophic	12 to 24 hours	< 1 week	2.25
Pascua Yaqui Tribe	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Sahuarita	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Tucson	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Unincorporated Pima County	Possible	Negligible	< 6 hours	< 6 hours	1.90
				County-wide average CPRI =	**1.67**

Vulnerability – Loss Estimations

There are no commonly accepted methods for estimating potential levee related losses. Many variables including storm size and duration, as well as location, size, speed, and timing at which a levee breach forms, all contribute to the potential for human and economic losses. Accordingly, no estimates of loss are made in this Plan. Potential exposure of human and facility assets to the high hazard levee failure areas will be estimated instead. Table 5-26 summarizes the critical facility, population, and residential housing unit exposure to high levee failure hazards.

In summary, $66.6 million in county-wide critical facilities are exposed to a high hazard levee failure. An additional $135.5 million in county-wide 2010 Census residential housing units are estimated to be exposed to a high hazard levee failure. Regarding human vulnerability, a total population of 2,777 people, or 1.54% of the total county-wide population, is potentially exposed to a high hazard levee failure event. Should a levee structure fail suddenly, it is plausible that death and injury might occur. It can also be expected that a substantial portion of the exposed population is subject to displacement depending on the event magnitude.

It is duly noted that the exposure numbers presented above represent a comprehensive evaluation of the County as a whole. It is unlikely that a storm event would occur that would fail all of the levees at the same time. Accordingly, actual event based losses and exposure are likely to be only a fraction of those summarized above.

Vulnerability – Development Trend Analysis

With the new focus on residual downstream risk for the land-side of levees and a general refocusing of national levee regulation and policy, it is likely that new and old developments in these areas will need to be revisited to determine if additional measures are necessary for adequate flood protection. Many structures located downstream of non-levee embankments are being re-mapped into Special Flood Hazard Zones. New developments should be evaluated to determine if sufficient protection is proposed to mitigate damages should the upstream structure fail.

Table 5-26: Pima County exposure estimates due to levee failure

LEVEE FAILURE HAZARD EXPOSURE / LOSS	Marana	Oro Valley	Pascua Yaqui Tribe	Sahuarita	South Tucson	Tucson	Unincorporated Pima County	Total
Total Critical Facilities	**272**	**132**	**16**	**76**	**19**	**1,625**	**1,302**	**3,442**
Facilities Exposed to High Hazard	4	3	0	0	0	11	7	25
Percentage of Total Facilities	1.47%	2.27%	0.00%	0.00%	0.00%	0.68%	0.54%	0.73%
Estimated Replacement Cost (x $1,000)	$2,472	$19,510	$0	$0	$0	$855	$66,974	$89,811
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0
Total Population	**34,622**	**40,557**	**3,675**	**25,142**	**5,593**	**520,368**	**340,692**	**970,648**
Population Exposed to High Hazard	371	548	0	0	0	41	1,358	2,317
Percent Exposed	1.07%	1.35%	0.00%	0.00%	0.00%	0.01%	0.40%	0.24%
Total Residential Building Count	**14,573**	**20,053**	**892**	**10,549**	**2,112**	**230,157**	**159,016**	**437,352**
Estimated Replacement Cost (x $1,000)	**$3,629,307**	**$6,831,456**	**$187,175**	**$2,229,431**	**$452,144**	**$40,805,270**	**$42,706,058**	**$96,840,841**
Structures Exposed to High Hazard	132	278	0	0	0	10	509	929
Percentage of Total Facilities	0.91%	1.39%	0.00%	0.00%	0.00%	0.00%	0.32%	0.21%
Estimated Replacement Cost (x $1,000)	$32,835	$94,650	$0	$0	$0	$1,847	$112,868	$242,200
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0

Vulnerability – EVRI

Table 5-27 summarizes the EVRI assessment for levee failure.

Table 5-27: Environmental Risk and Vulnerability Index (EVRI) scores for levee failure

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Critical	> 6 months	1.75
SOIL	Unlikely	Critical	> 6 months	1.75
			Overall EVRI Score	**1.45**

Vulnerability – Consequences/Impacts

Public – Proper floodplain management is a critical consideration in mitigation against loss of life and property. Levees are an important part of the plans to protect people, homes and vital infrastructure, not only in Pima County proper, but also in other local cities and towns. The greater Pima County area is experiencing increases in population and a corresponding development of supporting infrastructure resulting in greater potential harm should extraordinary flooding overwhelm the levee system. In this case, dangers to public health include standing water which increases the breeding of mosquitoes which spread the West Nile Virus, contamination of drinking water, and improper treatment of and/or release of sewage into waterways.

Responders to the Incident – Following a levee failure event, responders would face the same basic hazards as the public. They must, however, drive emergency response vehicles, operate equipment and work for extended periods in hazardous conditions caused by severe weather and flood conditions. Dangers include exposure to heat/cold, rain, driving hazards, drowning, fire, electrical hazards, biological hazards, and hazardous materials. During emergency operations, it is anticipated that workers and volunteers will be well-equipped with personal protective equipment and other safety gear that offer protection from injury, exposure to health hazards and which increase their visibility, such as, hard hats, gloves, high visibility vests, respirators, flotation vests, eye protection, etc.

Continuity of Operations / Delivery of Services – It is not anticipated that complications due to levee failure will significantly affect the continuity of Pima County government. There may be an impact on the delivery of services due to impassable roadways and damaged infrastructure that may physically hinder response to calls for emergency services and provision of routine government services. Barring a major incident, it is likely that any disruptions or delays in delivery of services will be of short duration and restoration will be a major priority.

Environment – Levee failure may impact the environment negatively by creating new flood pathways through alteration of natural watercourses. Erosion may wash away soil leaving agricultural areas barren. Other areas may lose grasses and vegetation which provide natural erosion mitigation. Water supplies may become contaminated by sewage if water treatment plants are overcome by flood waters or due to the danger of sewage/pollutants being introduced into waterways. Contamination of water affects public health, the food supply and pets, livestock and wildlife.

Economic / Financial Condition of Jurisdiction – The failure of levees would result in negative impact on local commerce and would affect the mobility of the community and transportation routes which permit restocking/resupply of store inventories of items necessary for recovery, such as, water, food, construction materiel. The extent of the damage will depend on factors, such as, the areas affected and duration of the event.

Public Confidence in Jurisdiction's Governance – Speed of emergency response, efficiency and communication are critical factors to maintaining the public's confidence during and after a flood. The after-effects of levee failure may be destructive and disruptive to jurisdictions and often continue for some time after the immediate event. Power outages are common and travel/mobility may be affected

by flood waters, debris and blocked or impassable roads. There may be initial periods when county government may have fewer resources than are needed due to the magnitude of the pressing needs of communities demanding services. Over time and, as progress is made, initial public demands for services will be met and emergency response will begin to transition into the recovery phase.

Emergency public information is critical to keep the communities aware of what has happened, what is happening, and what is going to happen. In addition, they must be apprised of the impact of events, how they are affecting the community and what will be done to recover from the situation and the time table of return to pre-event conditions. Reports of extent of damage, status of repairs and restoration of services and infrastructure contribute to a sense of healing and recovery with a positive effect on the public's perceptions of the effectiveness of Pima County government. Effective and timely communications leads to realistic expectations while a lack of communications can be misinterpreted as lack of action, unpreparedness or incompetence resulting in anger, fear or distrust of government.

Sources

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update.

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

FEMA, 2009, Web page at URL: http://www.fema.gov/plan/prevent/fhm/lv_intro.shtm#3

USACE, 2007, *Certification of Levee Systems for the National Flood Insurance Program (NFIP) – DRAFT*, ETL 1110-2-570.

Profile Maps

Map 3A – County-wide Levee Failure Hazard Map

Maps 3B through 3D – Levee Failure Hazard Maps for Marana, Oro Valley, and Tucson.

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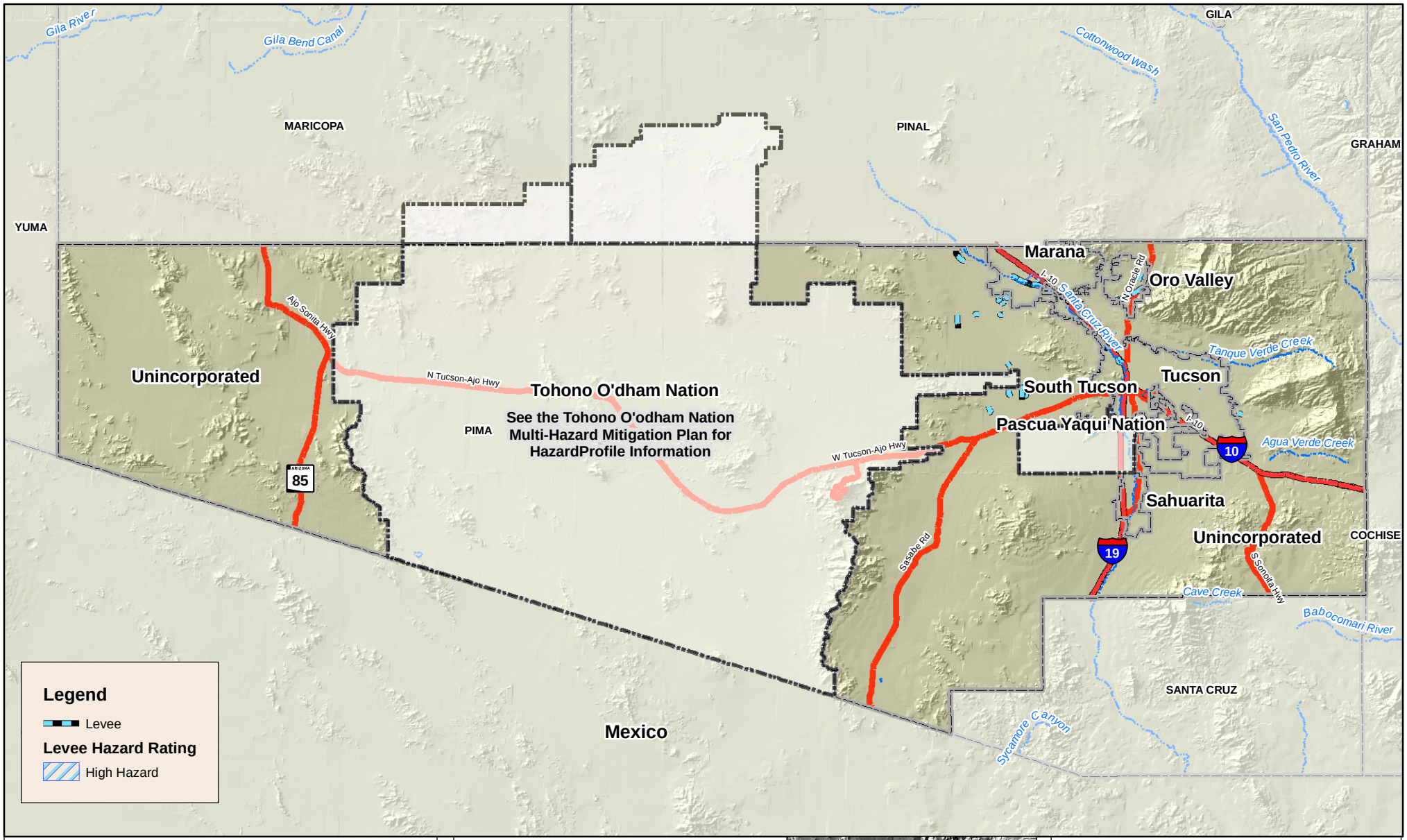


Legend

Community

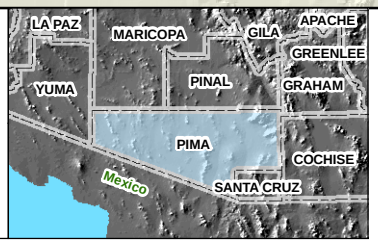
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Major Watercourses

Roads

- Interstates
- Highways

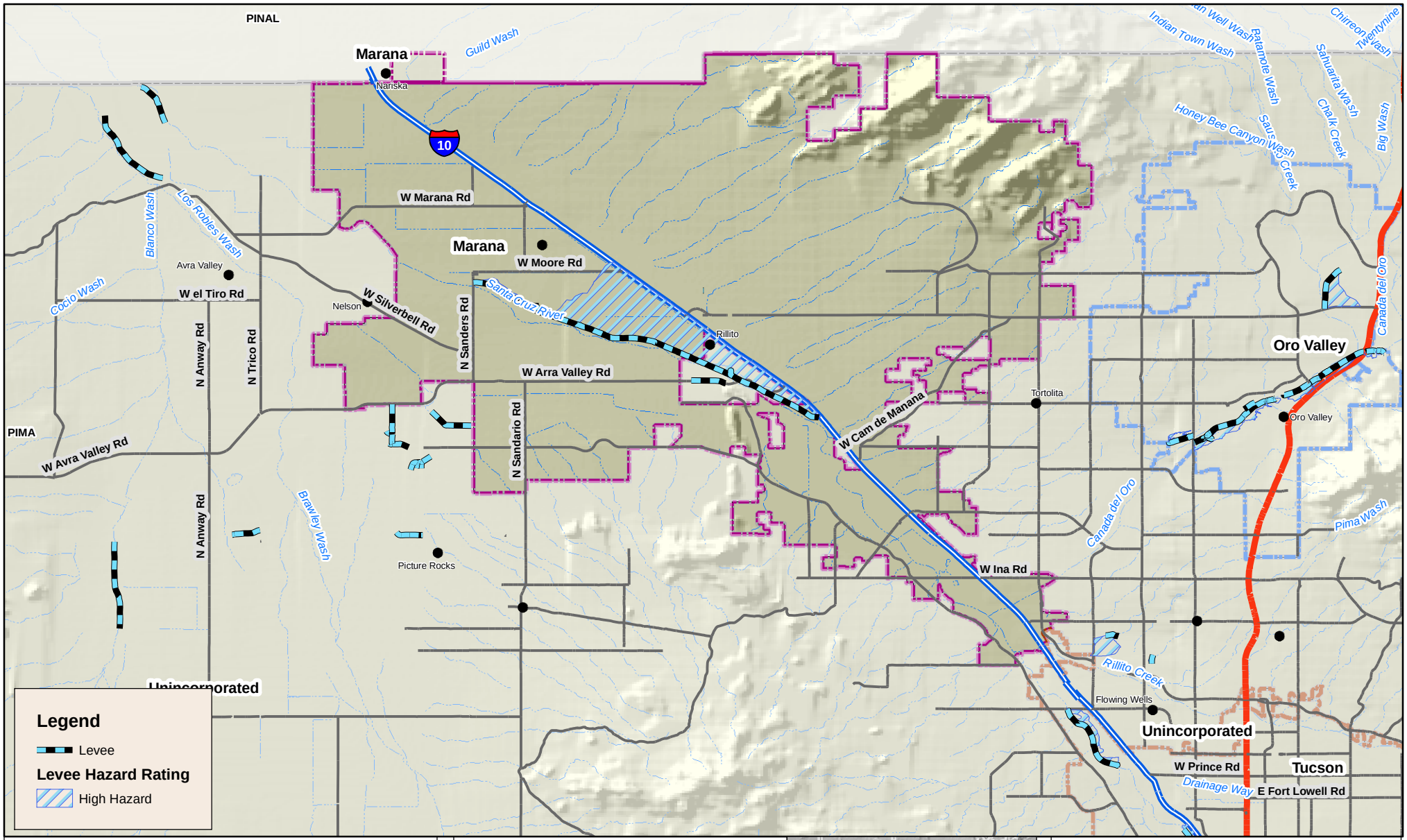
0 5 10 20 Miles

Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 3A
Pima County Levee Failure Hazard Map as of April 2011

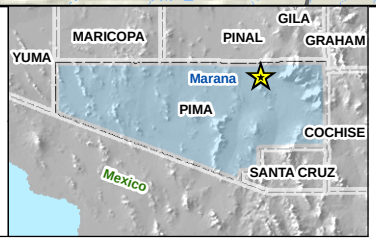


Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Cities, Towns, Places
- Watercourses
- Interstates
- Highways
- Arterials

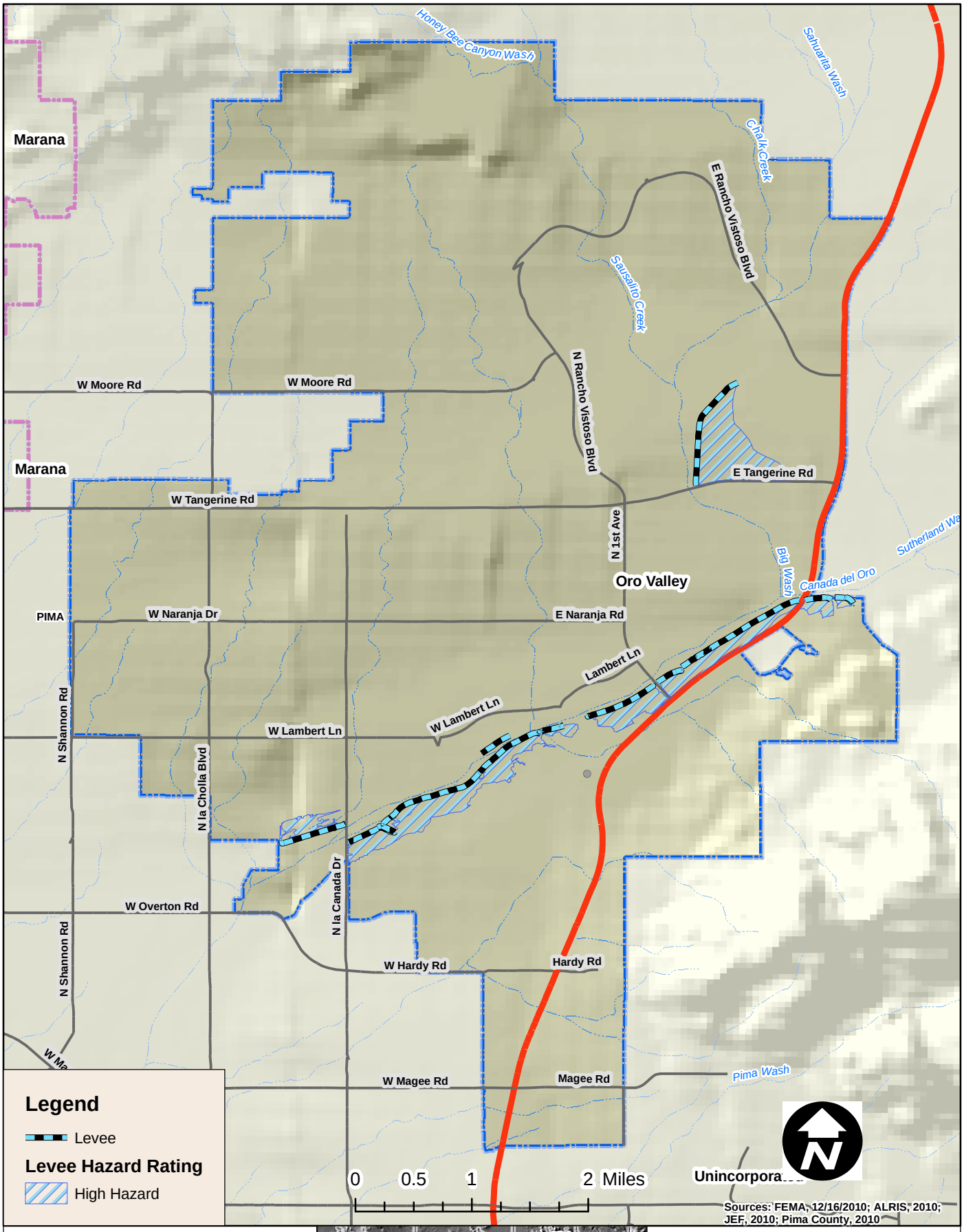
0 1.25 2.5 5 Miles

Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010



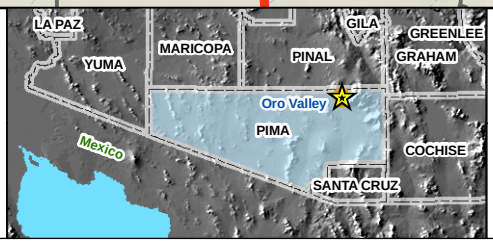
Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 3B
Town of Marana Levee Failure Hazard Map as of April 2011



Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses
- Interstates
- Highways
- Arterials

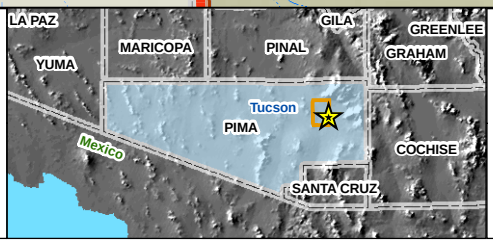


Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 3C
Town of Oro Valley
Levee Failure
Hazard Map
as of April 2011

Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses
- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 3D
City of Tucson
Levee Failure
Hazard Map
as of April 2011

5.3.8 Severe Wind

Description

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

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

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

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

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

History

According to Tables 5-2 and 5-3, Pima County has had one state / federal declaration involving severe winds. Table 5-4 indicates that at least 183 other severe wind events that meet the criteria listed in Section 5.1, have occurred. The combined economic loss of those events is over $29.2 million to property and agriculture in the last 50 years, and there were at least 3 deaths and 103 injuries, with most being related to dust storm related accidents on Interstate 10. In reality, severe wind events occur on a significantly more frequent basis throughout the county, but do not always have reported damages associated with every event. For example, a total of 119 thunderstorm related and 1 tornado related severe wind events were noted in the NCDC database for period of April 2006 through April 2011. However, not all of those events had reports of damages, fatalities, or injuries associated with them. The following are examples of documented past events that have occurred in the last five years:

- In July 2006, a thunderstorm over eastern portions of the Tucson Metro area produced strong winds which downed a 125 foot tall tree onto an apartment complex on Speedway Boulevard near Kolb Road. There were no injuries but eight families were evacuated from the apartment complex so that repairs could be made. Damage was estimated at the time to be about $350,000 (NCDC, 2011).
- In October 2006, a nearly stationary F0 tornado caused damage to a trailer, parked at a residence on Avra Valley Road in Marana, AZ, by blowing it onto its side. Also, a few homes near the intersection of West Avra Valley Road and North Anway Road experienced minor damage. Damages were estimated at $13,000 (NCDC, 2011)

- In July 2007, approximately 100 trees were uprooted and knocked down at Oro Valley Country Club on Greenock Road due to a wet microburst. An additional 30 trees were uprooted at a nearby shopping plaza at Oracle Road and 1st Avenue. The uprooted trees caused roof damage to several houses. The storms also blew off part of a roof at the Blue Moon stables in Oro Valley. Damages were estimated to exceed $150,000. (NCDC, 2011).
- In July 2007, two mobile homes were destroyed and a traditional home partially destroyed in the Ventana Section of the Tucson Foothills. There were two uprooted trees at Grant Road and Kolb Road in Tucson and an estimated 60 mph gust due to thunderstorms in Tucson. A roof also collapsed at a furniture store near 22nd street and Wilmot road. In addition, these thunderstorms knocked down about 20 power poles near Palo Verde Road and Irvington Road. There were 18,000 customers without power in the Tucson area. Damages were estimated to exceed $225,000 (NCDC, 2011).
- In August 2008, extensive wind damage occurred on the north side of Tucson due to a microburst. Reported damages included 28 power poles knocked down (including a dozen at River Road and Dodge Blvd) resulting in 35,000 customers without power, some for an extended period as much as two days. Damage was also reported at the Jewish Community Center near River Road and Alvernon Way. There was also roof damage to numerous businesses and hundreds of trees knocked down.. Damages were estimated to exceed $2.5 million. (NCDC, 2011).
- In June 2009, severe thunderstorm downburst winds caused significant damage at Three Points. Several mobile homes and nearby sheds were either heavily damaged or destroyed. A more substantial brick veneer building was also damaged, with varying degrees of roof damage reported to several homes in Three Points. Several large trees were uprooted completely. Winds from this severe thunderstorm were estimated to be near 85 mph. Three Points Fire reported one injury was received by flying glass, after winds blew out a house window. Damages were estimated to exceed $150,000. (NCDC, 2011).
- In August 2010, local broadcast media reported up to 3 dozen trees damaged or uprooted in Rancho Vistoso neighborhood. A few ceramic roof tiles were also blown off homes. In addition, a NWS Employee reported several trees down in Dove Mountain with one tree leaning up against a home. There was only slight tile damage to the home. Also, local broadcast media reported trees and power lines down in Marana at Interstate 10 and Marana/Trico Road as well as a roof ripped off a mobile home. The Marana Airport also sustained damage. Two small airplanes were ripped from their tie down chains and were flipped over while another plane was blown into a field. A large hangar door was blown off its tracks and a few other hangars also sustained light damage. In the same area, several power poles and lines were downed on Twin Peaks Road east of N. Sandario Road. Damages were estimated to exceed $100,000. (NCDC, 2011).

Map 4 is a depiction of historic locations and severity of severe wind events impacting Pima County over the period of 1952 to 2010. Data points are plotted based on coordinate information provided in the NCDC database and are not intended to represent the actual extent of impact for the particular event.

Probability and Magnitude

Most severe wind events are associated with thunderstorms as previously mentioned. The probability of a severe thunderstorm occurring with high velocity winds increases as the average duration and number of thunderstorm events increases. The average annual duration of thunderstorms in Pima County ranges from 80 to 90 minutes and is among the longest in the nation (ADEM, 2004). According to the NCDC database records for the past five years, Pima County averages about 25 severe wind events a year For that same five year time period, approximately $5.8 million in damages were estimated.

The NWS issues a severe thunderstorm watch when conditions are favorable for the development of severe thunderstorms. The local NWS office considers a thunderstorm severe if it produces hail at least 3/4-inch in diameter, wind of 58 mph or higher, or tornadoes. When a watch is issued for a region, residents are encouraged to continue normal activities but should remain alert for signs of approaching

storms, and continue to listen for weather forecasts and statements from the local NWS office. When a severe thunderstorm has been detected by weather radar or one has been reported by trained storm spotters, the local NWS office will issue a severe thunderstorm warning. A severe thunderstorm warning is an urgent message to the affected counties that a severe thunderstorm is imminent. The warning time provided by a severe thunderstorm watch may be on the order of hours, while a severe thunderstorm warning typically provides an hour or less warning time.

Based on the historic record, the probability of tornados occurring in Pima County is limited. Tornado damage severity is measured by the Fujita Tornado Scale, which assigns a numerical value of 0 to 5 based on wind speeds, as shown in Table 5-28, with the letter F preceding the number (e.g., FO, F1, F2). Most tornadoes last less than 30 minutes, but some last for over an hour. The path of a tornado can range from a few hundred feet to miles. The width of a tornado may range from tens of yards to more than a quarter of a mile.

Table 5-28: Fujita Tornado Scale

Category	Wind Speed	Description of Damage
F0	40-72 mph	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
F1	73-112 mph	Moderate damage. The lower limit is the beginning of hurricane speed. Roof surfaces peeled off; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 mph	Severe damage. Roofs and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
F4	207-260 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	261-318 mph	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked.

Source: FEMA, 1997.

Vulnerability – CPRI Results

Severe Wind CPRI results for each community are summarized in Table 5-29 below.

Table 5-29: CPRI results by jurisdiction for severe wind

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Critical	6 to 12 hours	< 24 hours	2.45
Oro Valley	Likely	Limited	< 6 hours	< 6 hours	2.65
Pascua Yaqui Tribe	Likely	Limited	6 to 12 hours	< 6 hours	2.50
Sahuarita	Highly Likely	Limited	< 6 hours	< 24 hours	3.20
Tucson	Highly Likely	Limited	6 to 12 hours	< 24 hours	3.05
Unincorporated Pima County	Highly Likely	Critical	< 6 hours	< 24 hours	3.50
				County-wide average CPRI =	**2.89**

Vulnerability – Loss Estimations

The entire County is assumed to be equally exposed to the damage risks associated with severe winds. Typically, incidents are fairly localized and damages associated with individual events are relatively small. Based on the historic record over the last five years, it is feasible to expect average annual losses of $1.0 to $1.5 million (county-wide). It is difficult to estimate losses for individual jurisdictions within the County due to the lack of discrete data.

Vulnerability – Development Trend Analysis

Future development will expand the exposure of life and property to the damaging effects of severe wind events. Enforcement and/or implementation of modern building codes to regulate new developments in conjunction with public education on how to respond to severe wind conditions are arguably the best way to mitigate against losses.

Vulnerability – EVRI

Table 5-30 summarizes the EVRI assessment for severe wind.

Table 5-30: Environmental Risk and Vulnerability Index (EVRI) scores for severe wind

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Negligible	< 1 month	0.85
SOIL	Unlikely	Negligible	< 1 month	0.85
			Overall EVRI Score	**0.85**

Vulnerability – Consequences/Impacts

Public – The term "severe winds" encompasses a wide array of threats, i.e. microbursts, tropical cyclones, tornadoes, gustnados, and severe thunderstorms. Severe wind conditions have resulted in injury, death and damage by falling trees, poles, debris and/or collapsing structures. Indirect impacts may be injuries or death due to power outages and accidents.

Responders to the Incident – Responders face threats of blowing and falling debris as well as downed power lines, hazardous driving conditions, and collapsed structures during search and rescue and recovery operations. Exhaustion may become a factor when working extended shifts in hazardous conditions while performing strenuous emergency and rescue duties.

Continuity of Operations / Delivery of Services – There is a potential threat to Pima County's ability to continue the operation of government services for periods of time. this depends upon the severity of the event, time of occurrence and duration. The negative effects of limiting government services and its ability to respond are usually short term and can be due to shortage of resources, impassable roads, downed power poles/lines, power interruptions and any associated flooding.

Environment – Severe winds can cause environmental harm by indirect means such as fires and release of hazardous fumes resulting from damage to structures. Winds can cause damage to tress, plants and agriculture.

Economic / Financial Condition of Jurisdiction – Damaging winds occur every year in Pima County causing monetary losses due to damage of property, inventory, vehicles, lost wages, death and injuries. Property losses in Pima County due to severe winds over the last 5 years alone totals more than $6 million, and that does not account for less tangible economic losses such as lost wages and non-production due to power outages or damaged structures.

Public Confidence in Jurisdiction's Governance – Pima County emergency response agencies will continue to respond to severe wind events as promptly and efficiently as possible. Emergency operations centers will be activated as needed to coordinate response, rescue and recovery operations. Most wind events are of short duration and in most cases the community will be restored to pre-event status within hours.

Sources

Arizona Division of Emergency Management, 2004, State of Arizona All Hazard Mitigation Plan.

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update.

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

U.S. Dept of Commerce, National Climatic Data Center, 2011, Storm Events Database, accessed via the following URL: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

Profile Maps

Map 4 – Severe Wind Event Map

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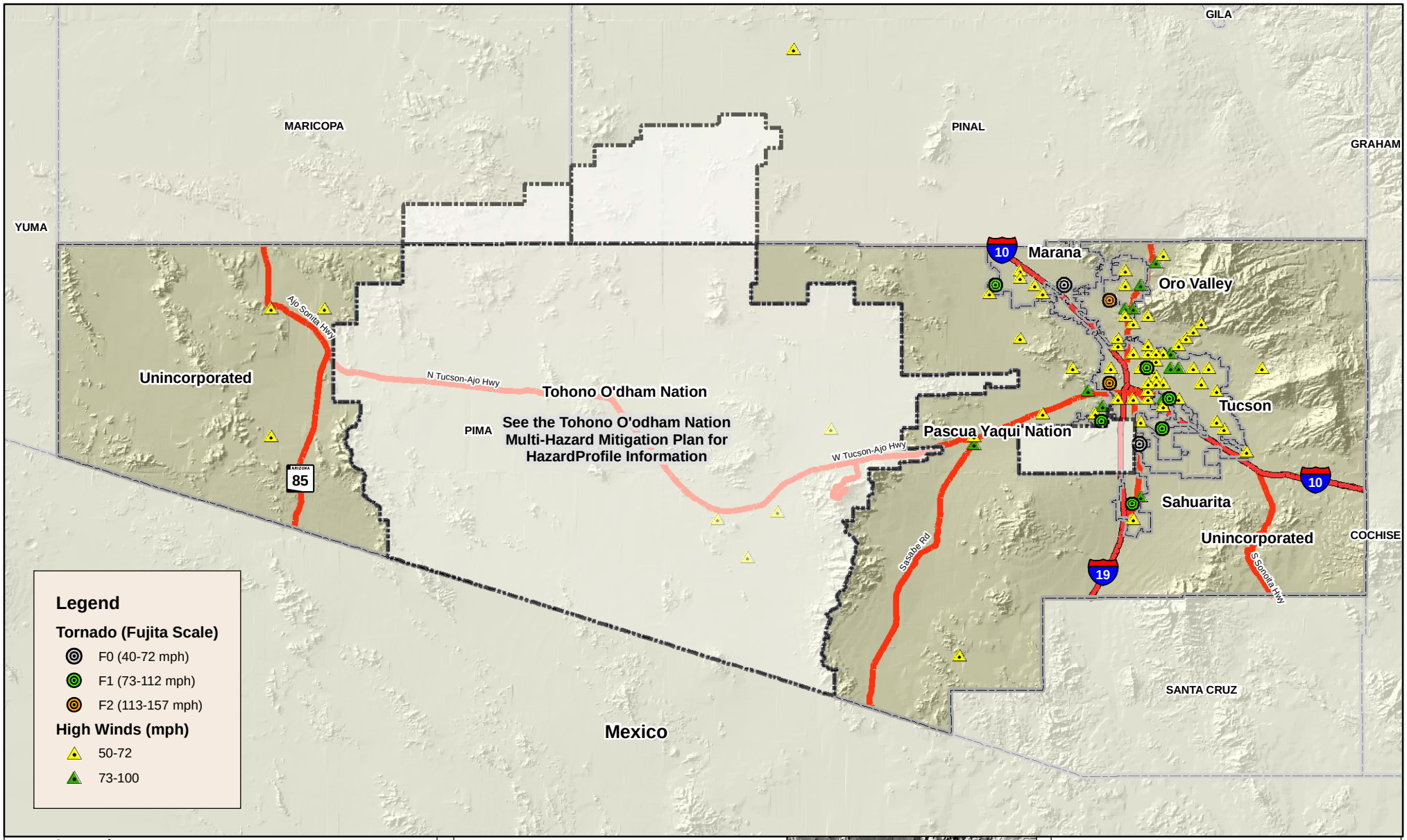


Legend

Community

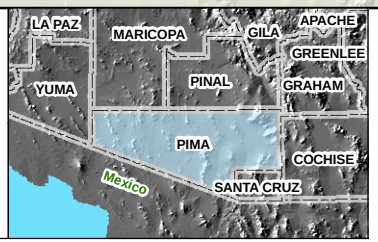
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation

Roads

- Interstates
- Highways

0 5 10 20 Miles

Sources: NCDC, 2010; ALRIS, 2010; JEF, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 4
Pima County
Severe Wind Historic
Hazard Map
1952 - 2010

5.3.9 Subsidence

Description

Subsidence occurs when the original land surface elevation drops due to changes in the subsurface. Causes of subsidence include, but are not limited to, removal of fluids (water, oil, gas, etc.), mine collapse, and hydrocompaction. Of these causes, hydrocompaction and mine collapse tend to be localized events, while fluid removal may occur either locally or regionally. The main cause for subsidence in Pima County is excessive groundwater withdrawal, wherein the volume of water withdrawn exceeds the natural recharge. Once an area has subsided, it is likely the ground elevation will not rise again due to consolidation of the soils, even if the pumped groundwater is replaced.

Subsidence causes regional drainage patterns to change. Impacts include unexpected flooding, storm drain backwater, reversal of channel and sewer system drainage patterns, and damages to infrastructure both in the subsurface (water, sewer, electric lines, well casings, etc.) and surface (roads, canals, drainages, surveyed benchmarks, etc.). Subsidence also causes fissures to develop along tension cracks that form at the edge of the subsiding area and over shallow pinnacles of bedrock.

Land-use areas that are predominantly agricultural tend to experience the most intense subsidence due to groundwater based irrigation practices. Subsidence is not, however, restricted to only rural areas since exponential population growth also places great demands on groundwater.

History

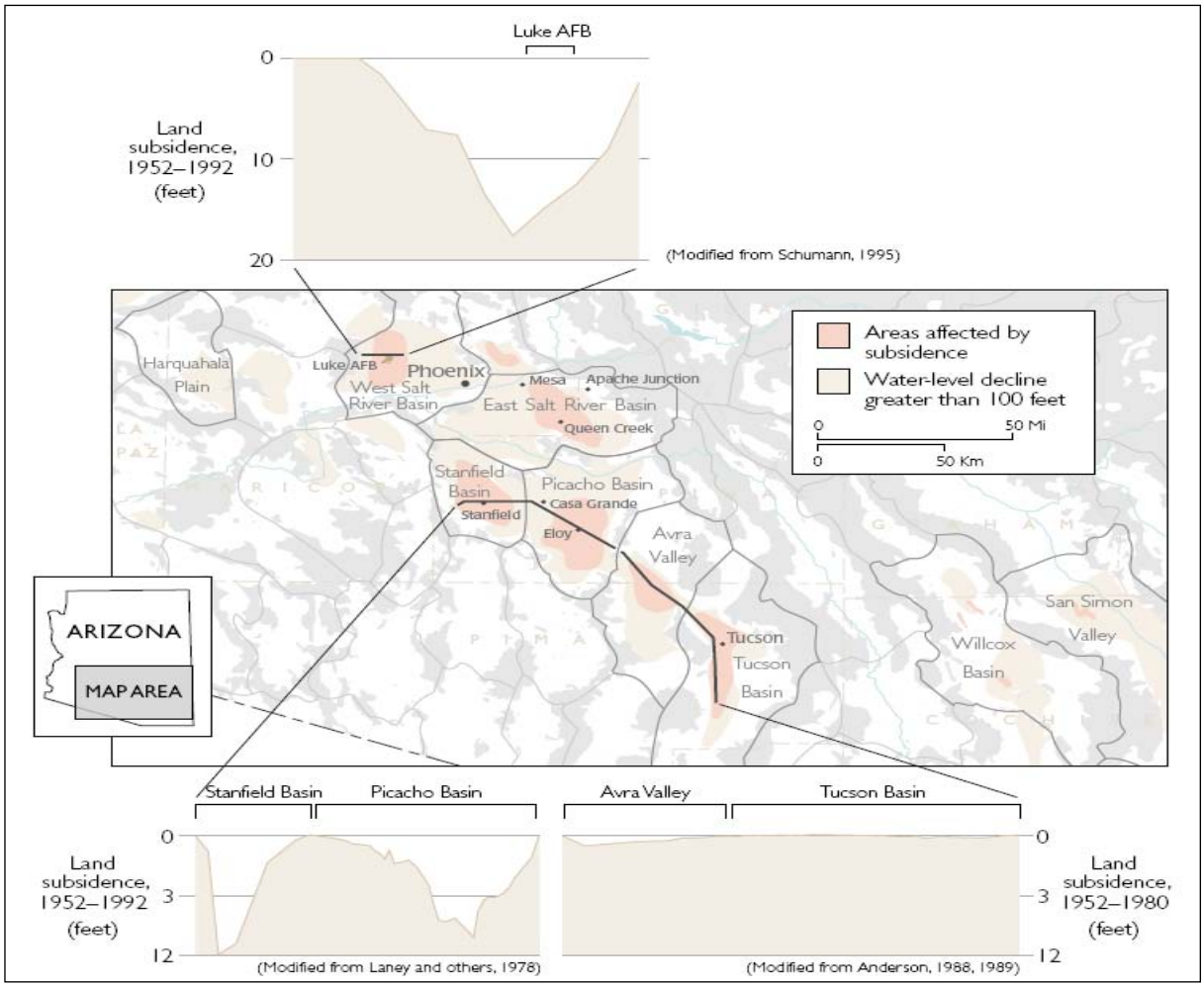
In an article published in the University of Arizona Water Resources Research Center's *Arroyo* (Gelt, 2002), the following observations were made regarding subsidence in the Tucson Basin:

> *"A recent study indicated that the subsidence rate in parts of the Tucson basin is increasing. If this, in fact, is occurring, then the event might presage a development expected by some geologists; i.e., subsidence as a growing problem in urban areas in Arizona.*
>
> *Subsidence has been detected in certain urban areas of the state. It has occurred for example in sections of the Phoenix metropolitan area. And even some of the subsidence in the Casa Grande area may be attributable to urban groundwater use. That subsidence is occurring in Tucson has been recognized for a period of time. The concern now is that the Tucson subsidence rate is increasing. The damage and disruption to be expected from extensive subsidence occurring in a large metropolitan area thus gain importance as an issue.*
>
> *Research has demonstrated that between 1947 and 1981, the Tucson basin ground surface dropped 3 millimeters (twelve-hundreds of an inch) for every meter of water loss. Recent research conducted by John S. Sumner, University of Arizona professor emeritus of geosciences, and graduate student Michael A. Hatch indicates that between 1987 and 1991 the surface of the Tucson Basin dropped an average of 24 millimeters (about an inch) for every drop of one meter in the water table, with subsidence ranging from half an inch to 2 inches. The water table under Tucson has been dropping about one meter or over three feet a year since the 1940s.*
>
> *Hatch points out that if the average subsidence rate in the Tucson basin of a half-inch to two inches per year continues for the next 30 years, much of the basin will settle about a foot during that time. Some areas might even subside up to four feet.*
>
> *Sumner and Hatch further suggest that the subsidence rate may be increasing because of a loss of elasticity within the basin, the result of various subsurface developments. Because of the consistent groundwater pumping within the area, the water table might have dropped below the clay layers. Without the water, the clay particles are compressed more tightly by the weight of the overlying rocks, and their water storage capacity is thus permanently reduced. Subsidence would then be inelastic because the sinking of the ground surface is permanent. Recharge would not reverse the process."*

Active subsidence has been occurring in certain areas of Pima County for over 60 years and is primarily due to groundwater overdraft. By 1980 ground-water levels in the southern areas of the state had declined at least 100 feet in many locations and between 300 and 500 feet in some specific areas (Carpenter, 1999). Figure 5-10 illustrates profile estimates of ground subsidence in several south-central Arizona locations.

In a study performed by the USGS (Carruth et al, 2008) for the Tucson Active Management Area (TAMA), estimates of subsidence for the 18 year period of 1987 to 2005 indicated a range of 0 to 5 inches of subsidence has occurred in the Tucson Basin area. Figure 5-11 is an excerpt from that report showing the mapped areas of subsidence.

There are no documented losses directly attributed to subsidence in Pima County.



Source: USGS (Carpenter, 1999)

Figure 5-10: South-Central Arizona Land Subsidence Profiles

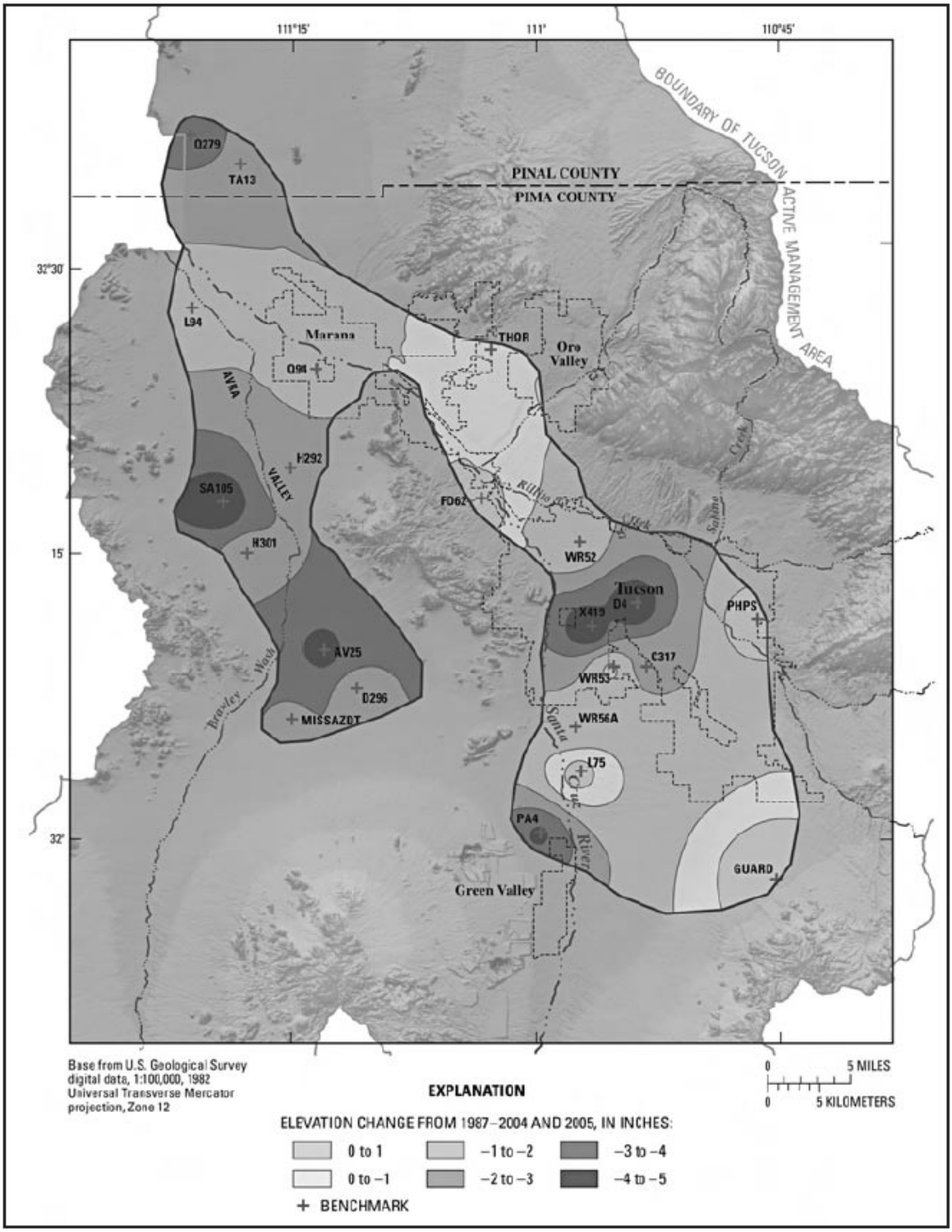


Figure 4. Land-surface elevation change in the Tucson Active Management Area, south-central Arizona, from 1987 to 2004.

Source: USGS (Carruth et al, 2008)

Figure 5-11: Tucson Active Management Area Subsidence Map

Probability and Magnitude

There are no statistical probability estimates for subsidence. The magnitude of land subsidence has been detected over the years using surveying techniques such as differential leveling and high accuracy Global Positioning System (GPS) surveying. In the early 1990's, scientists began to use a satellite based technology called Synthetic Aperture Radar (SAR) and interferometric processing (InSAR) to detect land surface elevation changes. InSAR has been developed into a highly reliable land subsidence monitoring technique that has been utilized by ADWR since 2002. ADWR has identified numerous subsidence features around the State and continues to monitor the extent and rates of these features on an annual basis (ADWR, 2010). In Pima County, ADWR monitors the Green Valley and Tuscon geographical areas using InSAR.

The Planning Team reviewed and chose to use the zones currently being monitored by ADWR to depict the subsidence hazard for the county. Areas defined by ADWR as active subsidence areas were mapped as high hazard zones and all other areas were assigned a low hazard. The high hazard subsidence zones are presented on Maps 5A – 5D.

Vulnerability – CPRI Results

Subsidence CPRI results for each community are summarized in Table 5-31 below.

Table 5-31: CPRI results by jurisdiction for subsidence

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Unlikely	Critical	< 6 hours	> 1 week	2.35
Oro Valley	Possible	Critical	> 24 hours	> 1 week	2.35
Pascua Yaqui Tribe	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Sahuarita	Possible	Limited	< 6 hours	< 24 hours	2.30
Tucson	Possible	Critical	< 6 hours	> 1 week	2.80
Unincorporated Pima County	Possible	Limited	< 6 hours	< 24 hours	2.30
				County-wide average CPRI =	**2.18**

Vulnerability – Loss Estimations

The estimation of potential exposure to high hazard subsidence areas was accomplished by intersecting the human and facility assets with the subsidence high hazard limits depicted on Maps 5A – 5D. No losses are estimated for facilities located within the high hazard subsidence areas due to lack of appropriate loss-to-exposure data. Table 5-32 summarizes the critical facility, population, and residential housing unit exposure to high subsidence hazards.

In summary, $1.12 billion in county-wide critical facilities are exposed to a high hazard subsidence. An additional $7.94 billion in in county-wide Census 2010 residential housing units are estimated to be exposed to a high subsidence hazard. Regarding human vulnerability, a total population of 107,152 people, or 11.04% of the total county-wide population, is potentially exposed to a high hazard levee failure event. It is unlikely that death and injury would result from subsidence, however, secondary impacts related to fissures and flooding may pose additional risk.

Vulnerability – Development Trend Analysis

As ADWR continues its mapping and tracking programs, more data will become available for use in regulating future development. Public awareness of the hazard is a key element to any effective mitigation measure, as well as the need to slow the depletion of groundwater sources. New regional drainage features and structures should always refer to the maps in this plan to determine the need for special design considerations that address subsidence.

Table 5-32: Pima County exposure estimates due to subsidence

SUBSIDENCE HAZARD EXPOSURE / LOSS	Marana	Oro Valley	Pascua Yaqui Tribe	Sahuarita	South Tucson	Tucson	Unincorporated Pima County	Total
Total Critical Facilities	**272**	**68**	**16**	**76**	**19**	**1,625**	**1,302**	**3,378**
Facilities Exposed to High Hazard	0	0	0	6	0	290	66	362
Percentage of Total Facilities	0.00%	0.00%	0.00%	7.89%	0.00%	17.85%	5.07%	10.72%
Estimated Replacement Cost (x $1,000)	$0	$0	$0	$5,770	$0	$1,053,052	$64,252	$1,123,074
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0
Total Population	**34,622**	**40,557**	**3,675**	**25,142**	**5,593**	**520,368**	**340,692**	**970,648**
Population Exposed to High Hazard	0	0	0	2,824	0	96,796	7,532	107,152
Percent Exposed	0.00%	0.00%	0.00%	11.23%	0.00%	18.60%	2.21%	11.04%
Total Residential Building Count	**14,573**	**20,053**	**892**	**10,549**	**2,112**	**230,157**	**159,016**	**437,352**
Estimated Replacement Cost (x $1,000)	**$3,629,307**	**$6,831,456**	**$187,175**	**$2,229,431**	**$452,144**	**$40,805,270**	**$42,706,058**	**$96,840,841**
Structures Exposed to High Hazard	0	0	0	1,768	0	39,520	2,688	43,976
Percentage of Total Facilities	0.00%	0.00%	0.00%	16.76%	0.00%	17.17%	1.69%	10.06%
Estimated Replacement Cost (x $1,000)	$0	$0	$0	$373,700	$0	$6,996,158	$574,644	$7,944,502
Estimated Structure Loss (x $,000)	$0	$0	$0	$0	$0	$0	$0	$0

Vulnerability – EVRI

Table 5-33 summarizes the EVRI assessment for subsidence.

Table 5-33: Environmental Risk and Vulnerability Index (EVRI) scores for subsidence

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Limited	> 6 months	1.45
SOIL	Unlikely	Limited	> 6 months	1.45
			Overall EVRI Score	**1.25**

Vulnerability – Consequences/Impacts

Public – There is little obvious direct impact to public safety and health due to the issue of subsidence. Fissure and flood damage are the most likely indirect/secondary impacts. The lack of proper drainage may result in standing, stagnant water which could become a breeding medium for water and insect borne disease. The ground water supply could become contaminated resulting in a health emergency.

Responders to the Incident – Subsidence is not the type of situation that typically requires an incident response element. It is more likely that a response will be to a safety concern about a fissure or other indirect effects on roads and infrastructure damage.

Continuity of Operations / Delivery of Services – There is little threat to Pima County's ability to continue the functioning of government operations and services.

Environment – Due to the surface elevation drops caused by subsidence, the resulting environmental threat is generally associated with flooding and potential contamination due to entry of floodwaters directly into ground water through fissures. Subsidence can also cause fissures which may render properties and land unsuitable for habitation or agriculture. A long term threat is the elevation dropping and reducing or compressing the aquifer holding capacity permanently for the Pima County area. This could significantly impact sustainability of animal life and vegetation.

Economic / Financial Condition of Jurisdiction – Pima County's economy could be impacted by subsidence by creating new areas prone to flooding, infrastructure damage and fissures. Flooding is an indirect result of subsidence but it is expensive to respond to and recover from. If the aquifer becomes compromised by either contamination or reduction in capacity to replenish itself, there could be a significant impact on business and residential development and investment.

Public Confidence in Jurisdiction's Governance – Pima County has emergency plans which will be implemented to mitigate, prepare for, respond to and recover from subsidence and its indirect/secondary effects. In any emergency or hazardous situation, the public will look to government for assistance and guidance. Pima County has an Emergency Response and Recovery Plan (ERRP) created to work with its community partners and other local governments to minimize the impact on this community and to increase the public's confidence.

Sources

AMEC Earth & Environmental, Inc., 2006, Earth Fissure Risk Zone Investigation Report, Powerline and Vineyard Flood Retarding Structures, Pinal County, AZ, prepared for FCDMC under Contract FCD 2004C503, Work Assignments 1&2.

Arizona Department of Water Resources, 2010, land subsidence website at: http://www.azwater.gov/DWR/Content/Find_by_Program/Hydrology/land-subsidence-in-arizona.htm

Arizona Division of Emergency Management, 2009, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update, DRAFT.

Arizona Land Subsidence Group, 2007. Land subsidence and earth fissures in Arizona: Research and informational needs for effective risk management, white paper, Tempe, AZ, . http://www.azgs.az.gov/Earth%20Fissures/CR-07-C.pdf

Carpenter, M.C., 1999, Land subsidence in the United States, South-Central Arizona: Earth fissures and subsidence complicate development of desert water resources, [Galloway, D., Jones, D.R., and Ingebritson, S.E., editors], USGS Circular 1182.

Carruth, R.L. Pool, D.R., Anderson, C.E., 2008, *Land Subsidence and Aquifer Compaction in the Tucson Active Management Area, South-Central Arizona—1987–2005*, as accessed at the following URL: http://cals.arizona.edu/AZWATER/awr/1ea38059-c0a8-0164-00b5-7927a2dcf093-usgs-supplementjanfeb08-final.pdf#xml=http://ag3.calsnet.arizona.edu/cgi-bin/texis/webinator/search/xml.txt?query=subsidence&pr=azwater&prox=page&rorder=500&rprox=500&rdfreq=500&rwfreq=500&rlead=500&sufs=0&order=r&cq=&id=4e9ad6802

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

Gelt, J., 1992, *Land Subsidence, Earth Fissures Change Arizona's Landscape*, Arroyo Volume 6, No. 2, published by the University of Arizona, Water Resources Research Center, as accessed at the following URL: http://cals.arizona.edu/AZWATER/arroyo/062land.html

Profile Maps

Maps 5A and 5B – County-Wide and Tucson Metro Area Subsidence Hazard Map(s)

Maps 5C and 5D – Jurisdiction Specific Subsidence Hazard Maps for Sahuarita and Tucson.

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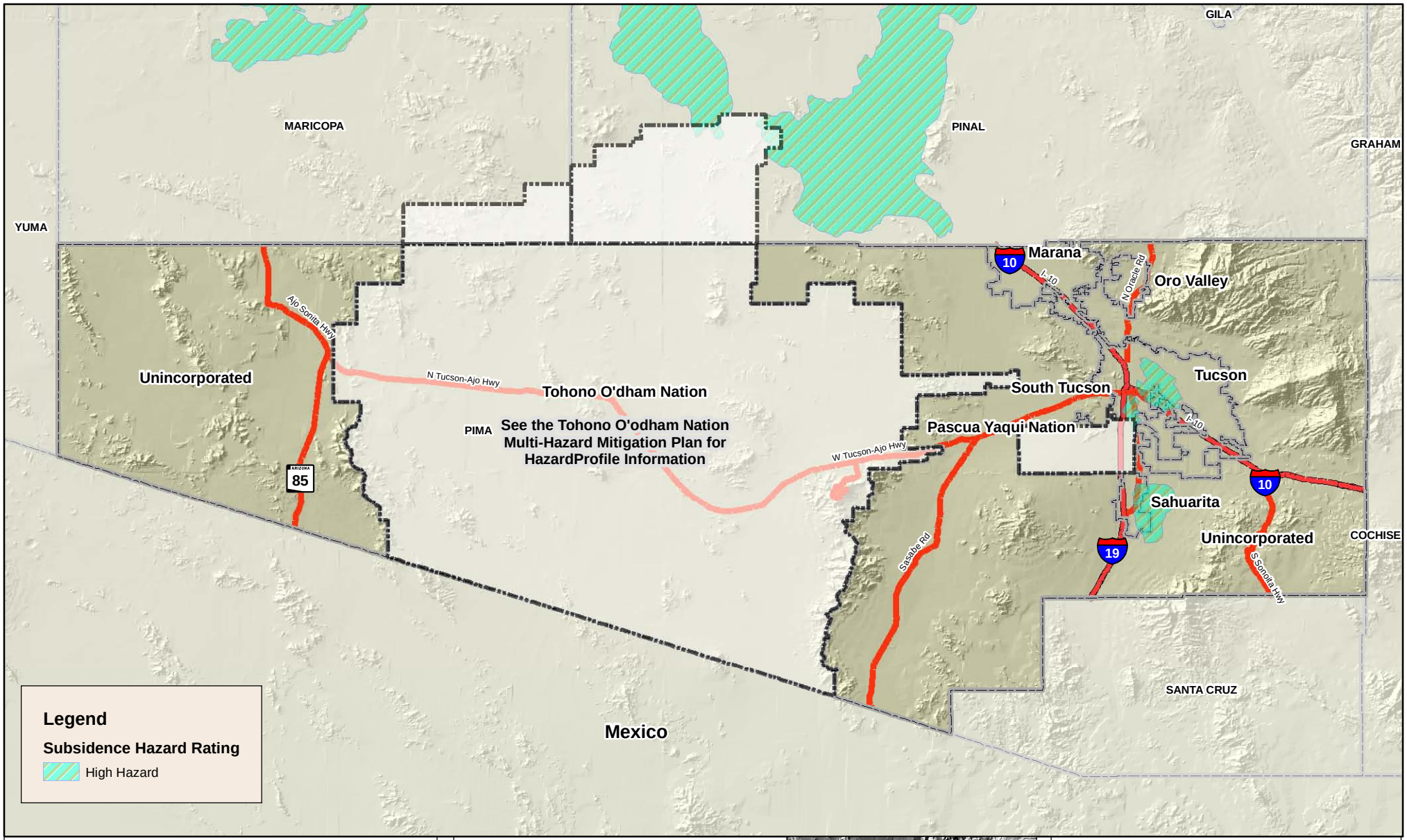


Legend

Community

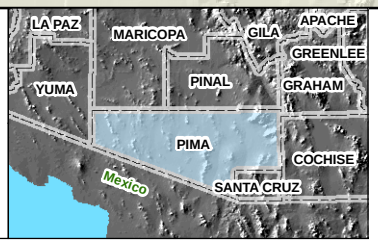
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation

Roads

- Interstates
- Highways

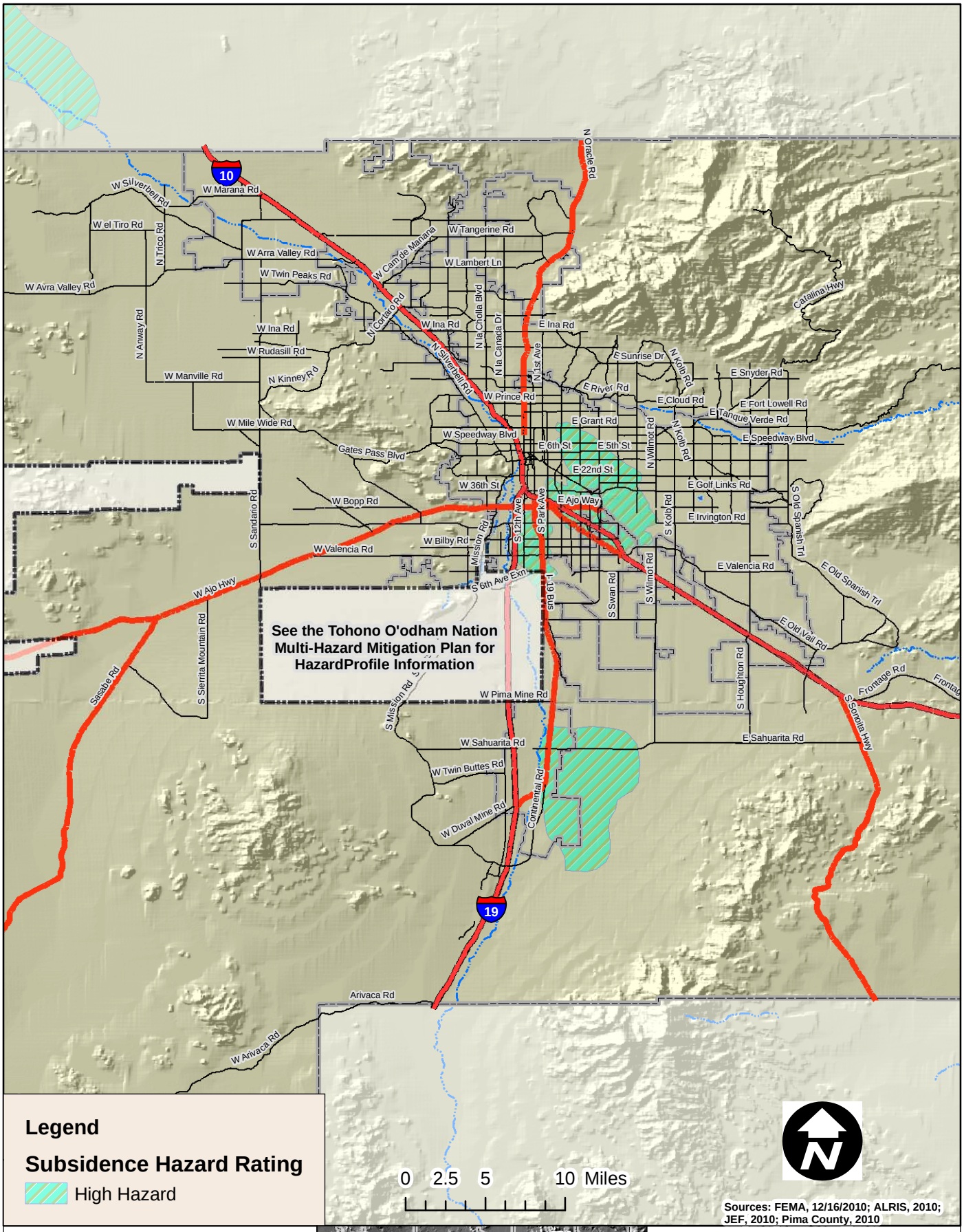
0 5 10 20 Miles

Sources: ASLD, 2010; ALRIS, 2010; JEF, 2010; Pima County, 2010



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 5A
Pima County Subsidence Hazard Map as of May 2011



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Subsidence Hazard Rating

High Hazard

Sources: FEMA, 12/16/2010; ALRIS, 2010; JEF, 2010; Pima County, 2010

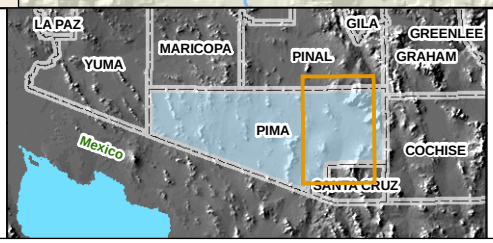
Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Pascua Yaqui Nation
- Unincorporated
- Indian Reservation
- Major Watercourses

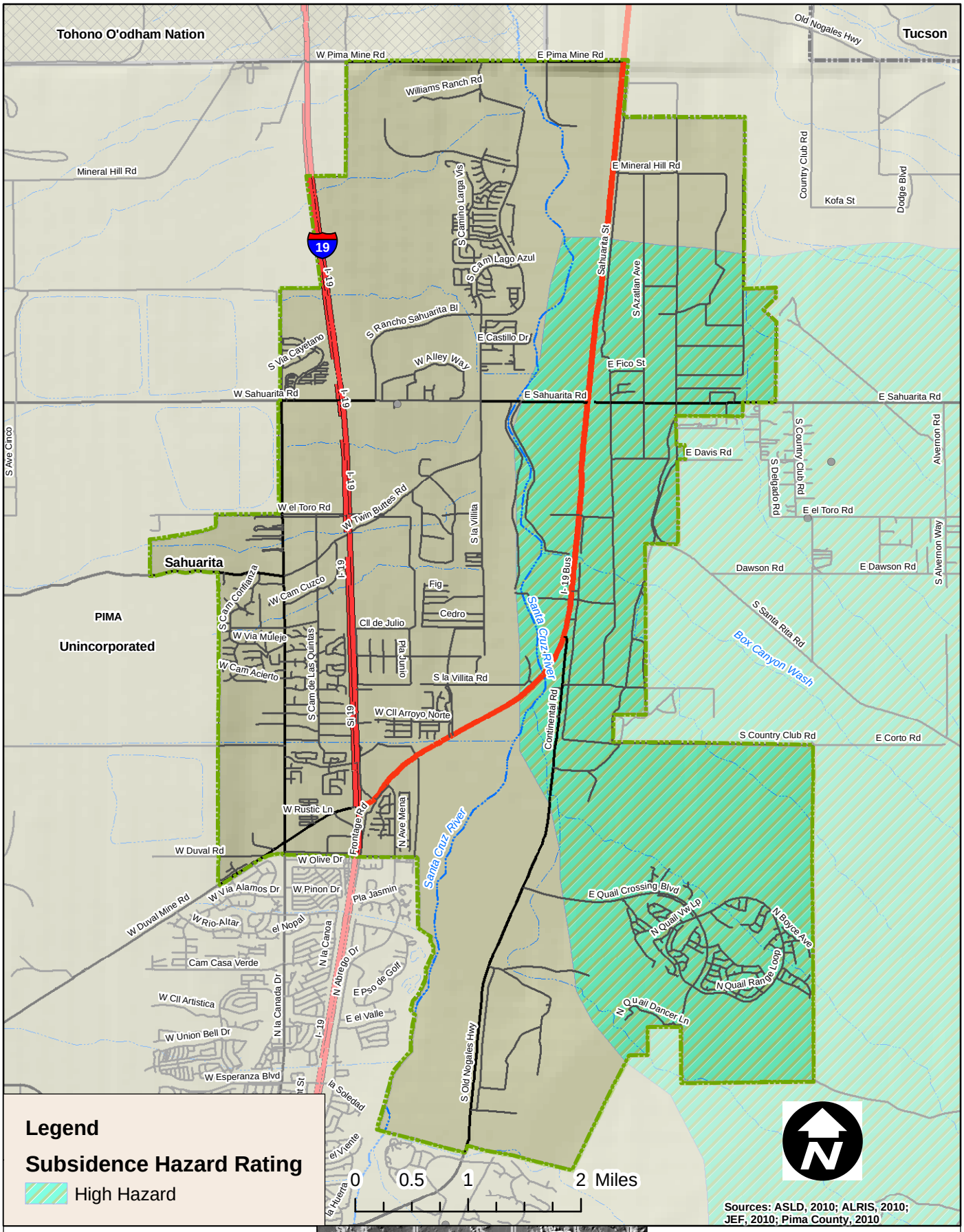
Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 5B
Pima County Subsidence Hazard Map as of May 2011



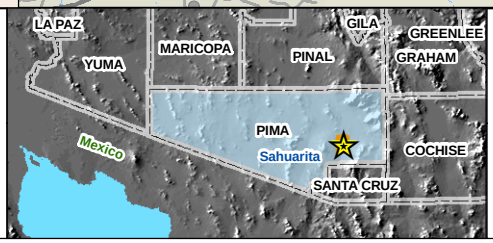
Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Major Watercourses

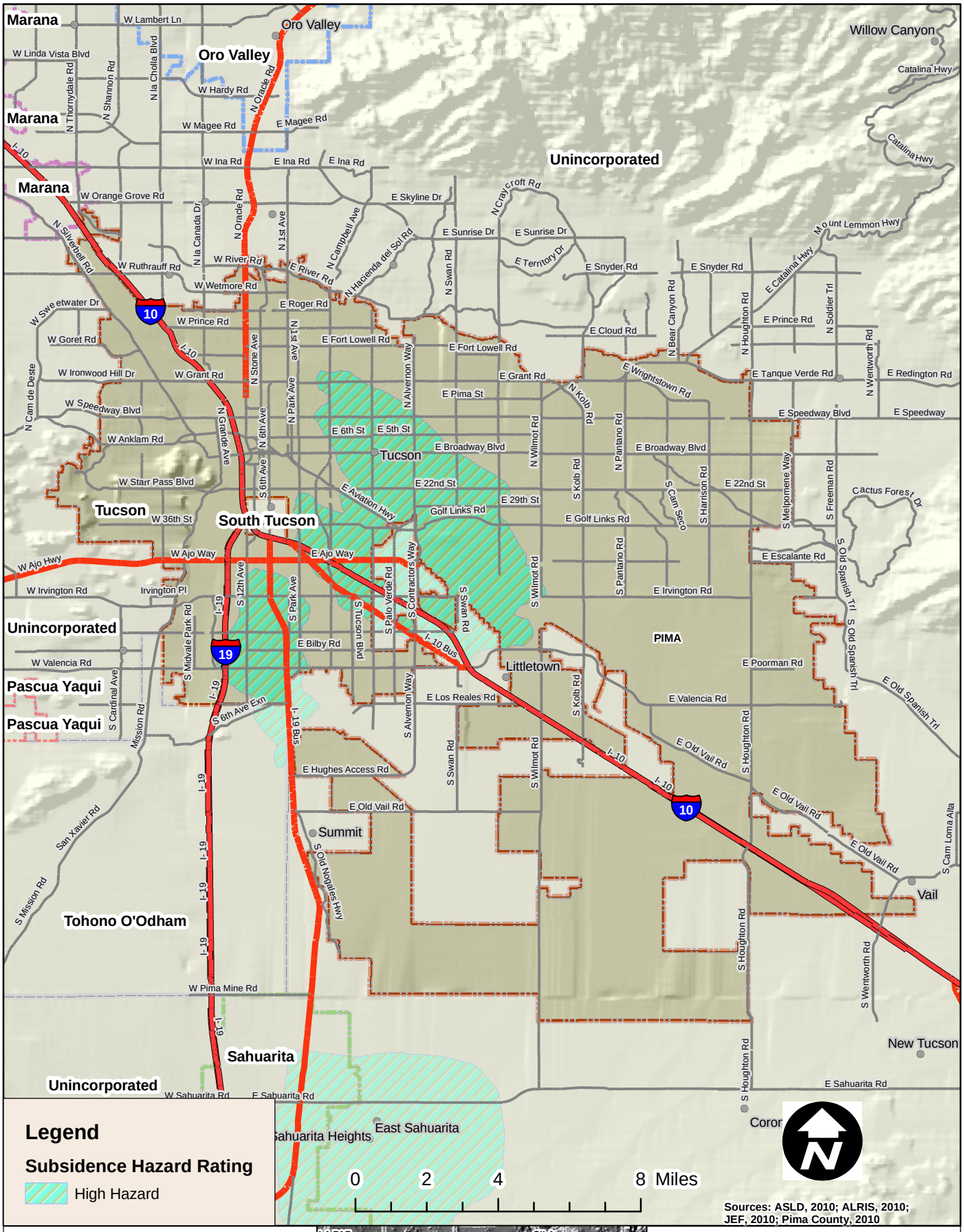
Roads

- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 5C
Town of Sahuarita Subsidence Hazard Map as of May 2011

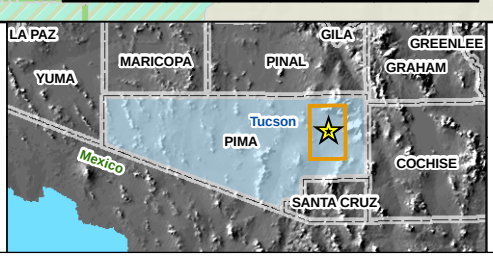


Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation

Roads

- Interstates
- Highways
- Arterials



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 5D
City of Tucson Subsidence Hazard Map as of May 2011

5.3.10 Wildfire

Description

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke. Wildfires can be human-caused through acts such as arson, campfires, or the improper burning of debris, or can be caused by natural events such as lightning. Wildfires can be categorized into four types:

- ***Wildland fires*** occur mainly in areas under federal control, such as national forests and parks, and are fueled primarily by natural vegetation. Generally, development in these areas is nonexistent, except for roads, railroads, power lines, and similar features.
- ***Interface or intermix fires*** occur in areas where both vegetation and structures provide fuel. These are also referred to as urban-wildland interface fires.
- ***Firestorms*** occur during extreme weather (e.g., high temperatures, low humidity, and high winds) with such intensity that fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted.
- ***Prescribed fires and prescribed natural fires*** are intentionally set or natural fires that are allowed to burn for beneficial purposes.

The following three factors contribute significantly to wildfire behavior and, as detailed more fully later, they can be used to identify wildfire hazard areas:

- ***Topography***: As slope increases, the rate of wildfire spread increases. South facing slopes are also subject to greater solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridgetops may mark the end of wildfire spread, since fire spreads more slowly or may even be unable to spread downhill.
- ***Fuel:*** Wildfires spread based on the type and quantity of available flammable material, referred to as the fuel load. The basic characteristics of fuel include size and shape, arrangement and moisture content. Each fuel is assigned a burn index (the estimated amount of potential energy released during a fire), an estimate of the effort required to contain a wildfire, and an expected flame length.
- ***Weather:*** The most variable factor affecting wildfire behavior is weather. Important weather variables are temperature, humidity, wind, and lightning. Weather events ranging in scale from localized thunderstorms to large fronts can have major effects on wildfire occurrence and behavior. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. By contrast, cooling and higher humidity often signals reduced wildfire occurrence and easier containment. Wind has probably the largest impact on a wildfire's behavior, and is also the most unpredictable. Winds supply the fire with additional oxygen, further dry potential fuel, and push fire across the land at a quicker pace.

The frequency and severity of wildfires is also impacted by other hazards, such as lightning, drought, and infestations (e.g., Pine Bark Beetle). In Arizona, these hazards combine with the three other wildfire contributors noted above (topography, fuel, weather) to present an on-going and significant hazard across much of Arizona.

If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives, resources, and destroy improved properties. It is also important to note that in addition to affecting people, wildfires may severely affect livestock and pets. Such events may require the emergency watering/feeding, shelter, evacuation, and increased event-caused deaths and burying of animals.

The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself.

Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased landslide hazards.

History

Wildfires have a prominent history in Pima County. According to Tables 5-2 and 5-3, Pima County has been included in 17 state and/or federal wildfire disaster declarations. For the period of 1980 to 2008, data compiled by the Arizona State Forestry Division for the 2010 State Plan update indicates that at least 164 wildfires greater than 100 acres in size have occurred in all of Pima County. There have been 3 wildfires that have burned more than 10,000 acres in the last ten years, and are described below in chronological order:

- In May of 2002, the Bullock Fire started in Bullock Canyon in the Catalina Mountains on the Coronado National Forest. The fire started on May 21st and continued through June 10th. It was suspected to be human induced. The fire burned 30,563 acres along with 2 cabins and several outbuildings. The residents of Summerhaven were evacuated on May 25th and Catalina Highway closed on May 22nd. The fire also threatened Mt. Bigelow which had several telecommunication towers and 2 telescopes, however, fire fighters were able to contain the fire a half of a mile away. The entire fire fight costs were estimated to be $14.3 million (NWCG, 2010).
- In June of 2003, the Aspen Fire was started by human causes on June 17, 2003 and burned for about a month on Mount Lemmon, which is part of the Santa Catalina Mountains located in the Coronado National Forest north of Tucson, Arizona. The fire burned 84,750 acres of land, and destroyed 333 homes and businesses in the community of Summerhaven. Electric lines, phone lines, water facilities, streets and sewers were also damaged. Total property damages were estimated to exceed $66 million. Fire fight costs were estimated to exceed $17 million, and the Forest Service spent an estimated $2.7 million dollars to prevent soil loss. The losses in terms of timber for future lumber was estimated at $33 million. In 2002, the year before the fire started, Congress had been requested to allocate about $2,000,000 to cover the implementation of fire prevention measures in the Coronado National Forest. However, that allocation was reduced to about $150,000 in the Congressional budget process. A presidential disaster declaration (FEMA-1477-DR) was made on July 14, 2003. (ADEM, 2008; NWCG, 2010 and Wikipedia, 2008 at: http://en.wikipedia.org/wiki/Aspen_Fire).
- In June of 2009, the Elk Horn Fire was started by human causes and an area 26 miles southwest of Three Points, Arizona. The fire started June 11, 2009 and was contained on June 22, 2009. The fire burned a total 23,440 acres with over $1,070,000 in fire suppression costs and 5 reported injuries related to fire fight efforts.

There have been 26 wildfires in excess of 100 acres for the period of 2002 to 2009. Map 6A and 6B provides a graphical depiction of the 100 acre plus wildfires for that period.

The Planning Team recognized that the declared disaster and historic hazard data collected and summarized in Section 5.1 does not adequately reflect the true cost of a wildfire. Particularly, the cost of wildfire suppression efforts to prevent structure and human loss. For example, a realistic damage estimates for the two residences and five outbuildings destroyed by the Bullock Fire would likely be less than $250,000. However, the suppression costs for the Bullock Fire exceeded $14.3 million. Furthermore, the County, State, Forest Service, and other agencies spend millions of dollars every year in wildfire mitigation in fuel treatment projects.

Probability and Magnitude

The probability and magnitude of wildfire incidents for Pima County are influenced by numerous factors including vegetation densities, previous burn history, hydrologic conditions, climatic conditions such as temperature, humidity, and wind, ignition source (human or natural), topographic aspect and slope, and remoteness of area. Wildfire risk for Pima County was mapped based on the data developed for the Pima County Community Wildfire Protection Plan (LSDI, 2011). Pima County and participating jurisdictions and organizations developed the Pima County Community Wildfire

Protection Plan (PCCWPP) to help local governments, fire departments and districts, and residents identify at-risk public and private lands to better protect those lands from a severe wildfire threat.

The PCCWPP identified two models of wildland fuel hazards to represent a typical year of rainfall and an extraordinarily heavy rainfall year to present a range of wildland fuel hazards across the County. Each model divided the fuel hazard into three categories; high, medium and low and accounted for previous burn areas and the major buffelgrass concerns. The extraordinary fuels hazard map from the PCCWPP is shown in Figure 5-12. The high, medium and low fuel hazard risks were adopted by the Planning Team to represent the high, medium, and low wildfire risk in this Plan.

Maps 6A and 6B show the wildfire hazard areas on a county-wide basis and the Tucson Metro area, respectively. Maps 6C through 6H show the wildfire hazard areas for each of the jurisidictions.

Vulnerability – CPRI Results

Wildfire CPRI results for each community are summarized in Table 5-34 below.

Table 5-34: CPRI results by jurisdiction for wildfire

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Critical	< 6 hours	< 1 week	2.70
Oro Valley	Possible	Limited	< 6 hours	< 1 week	2.40
Pascua Yaqui Tribe	Likely	Limited	< 6 hours	< 24 hours	2.75
Sahuarita	Possible	Limited	< 6 hours	< 1 week	2.40
Tucson	Unlikely	Negligible	< 6 hours	< 1 week	1.65
Unincorporated Pima County	Highly Likely	Critical	< 6 hours	< 1 week	3.60
				County-wide average CPRI =	**2.58**

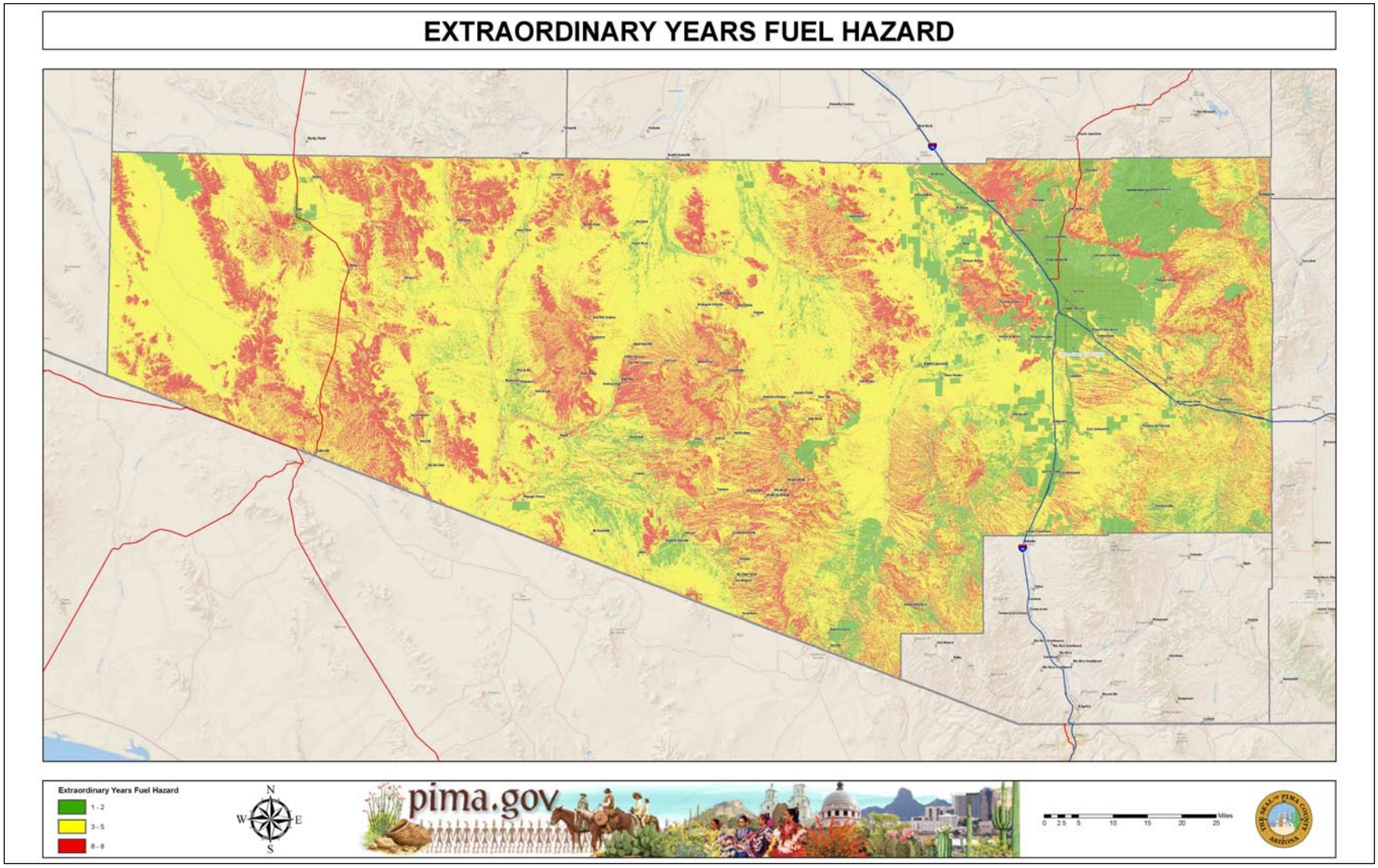
Vulnerability – Loss Estimations

The estimation of potential exposure to high and medium wildfire hazards was accomplished by intersecting the human and facility assets with the wildfire hazard limits depicted on Maps 6A – 6H. Loss to exposure ratios of 0.20 (20%) and 0.05 (5%) were assumed to estimate losses for all facilities located within the high and medium wildfire hazard areas, respectively. Table 5-35 summarizes the critical facility, population, and residential housing unit exposure and loss estimates for high and medium wildfire hazards.

In summary, $0.41 and $1.27 billion in county-wide critical facilities are exposed to a high hazard subsidence, with estimated losses of $82.8 and $63.3 million, respectively. An additional $2.89 and $10.87 billion in county-wide Census 2010 residential housing units are estimated to be exposed to a high and medium wildfire hazard. Census 2010 residential housing unit loss estimates for the high and medium wildfire events are $578 and $543 million. Regarding human vulnerability, a total population of 25,448 people, or 2.62% of the total county-wide population, is potentially exposed to a high hazard wildfire event. Similarly, 112,750 people, or 11.62 percent of the total county-wide population is exposed to a medium wildfire hazard. Typically, deaths and injuries not related to firefighting activities are rare. However, it is feasible to assume that at least one death and/or injury may be plausible. There is also a high probability of population displacement during a wildfire event, and especially in the urban wildland interface areas.

It is noted that these exposure and loss dollar amounts do not include the cost of wildfire suppression which can be substantial. For example, a Type 1 wildfire fighter crew costs about $1 million per day to operate.

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



Source: Pima County CWPP (LSDI, 2011)

Figure 5-12: PCCWPP extraordinary rainfall year fuel hazards map

Table 5-35: Pima County exposure and loss estimates due to wildfire

WILDFIRE HAZARD EXPOSURE / LOSS	Marana	Oro Valley	Pascua Yaqui Tribe	Sahuarita	South Tucson	Tucson	Unincorporated Pima County	Total
Total Critical Facilities	**272**	**132**	**16**	**76**	**19**	**1,625**	**1,302**	**3,442**
Facilities Exposed to High Hazard	34	12	4	0	0	42	129	221
Percentage of Total Facilities	12.50%	9.09%	25.00%	0.00%	0.00%	2.58%	9.91%	6.42%
Estimated Replacement Cost (x $1,000)	$5,729	$7,180	$222,516	$0	$0	$19,696	$165,589	$420,709
Estimated Structure Loss (x $,000)	$1,146	$1,436	$44,503	$0	$0	$3,939	$33,118	$84,142
Facilities Exposed to Medium Hazard	38	27	0	32	0	80	318	495
Percentage of Total Facilities	13.97%	20.45%	0.00%	42.11%	0.00%	4.92%	24.42%	14.38%
Estimated Replacement Cost (x $1,000)	$92,431	$47,007	$0	$157,606	$0	$286,394	$699,599	$1,283,037
Estimated Structure Loss (x $1,000)	$4,622	$2,350	$0	$7,880	$0	$14,320	$34,980	$64,152
Total Population	**34,622**	**40,557**	**3,675**	**25,142**	**5,593**	**520,368**	**340,692**	**970,648**
Population Exposed to High Hazard	4,302	3,464	7	274	0	3,875	13,525	25,448
Percent Exposed	12.43%	8.54%	0.20%	1.09%	0.00%	0.74%	3.97%	2.62%
Population Exposed to Medium Hazard	9,276	5,538	222	18,063	0	24,294	55,356	112,750
Percent Exposed	26.79%	13.65%	6.03%	71.84%	0.00%	4.67%	16.25%	11.62%
Total Residential Building Count	**14,573**	**20,053**	**892**	**10,549**	**2,112**	**230,157**	**159,016**	**437,352**
Estimated Replacement Cost (x $1,000)	**$3,629,307**	**$6,831,456**	**$187,175**	**$2,229,431**	**$452,144**	**$40,805,270**	**$42,706,058**	**$96,840,841**
Structures Exposed to High Hazard	2,026	1,647	2	158	0	1,391	5,943	11,167
Percentage of Total Facilities	13.90%	8.21%	0.22%	1.50%	0.00%	0.60%	3.74%	2.55%
Estimated Replacement Cost (x $1,000)	$504,660	$561,000	$434	$33,494	$0	$246,920	$1,543,609	$2,890,117
Estimated Structure Loss (x $,000)	$100,932	$112,200	$87	$6,699	$0	$49,384	$308,722	$578,024
Structures Exposed to Medium Hazard	3,579	2,635	53	7,072	0	8,815	23,430	45,584
Percentage of Total Facilities	24.56%	13.14%	5.94%	67.04%	0.00%	3.83%	14.73%	10.42%
Estimated Replacement Cost (x $1,000)	$890,877	$897,515	$10,657	$1,494,751	$0	$1,572,964	$6,000,795	$10,867,559
Estimated Structure Loss (x $1,000)	$44,544	$44,876	$533	$74,738	$0	$78,648	$300,040	$543,379

Vulnerability – Development Trend Analysis

By its very definition, the Wildland Urban Interface (WUI) represents the fringe of urban development as it intersects with the natural environment. As previously discussed, wildfire risks are significant for a sizeable portion of the county. Any future development will only increase the WUI areas and expand the potential exposure of structures to wildfire hazards.

Vulnerability – EVRI

Table 5-36 summarizes the EVRI assessment for wildfire.

Table 5-36: Environmental Risk and Vulnerability Index (EVRI) scores for wildfire

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Highly Likely	Catastrophic	3-6 months	3.30
WATER	Highly Likely	Limited	1-3 months	2.60
SOIL	Highly Likely	Critical	3-6 months	3.00
			Overall EVRI Score	**2.97**

Vulnerability – Consequences/Impacts

Public – The impact to the general public from wildfire is usually found in the form of injuries (burns), illness (smoke inhalation and psychological) and death. As populated areas become threatened, evacuations of people, pets and livestock may be necessary which creates the need for shelters to be opened.

Responders to the Incident – The probability and likelihood of injuries to responders is very high. They face the same kinds of threats to their health and safety as the public but to a much greater degree due to their response activities putting them close to the most dangerous areas. Physical and mental exhaustion may become a factor should an event last for an extended period of time.

Continuity of Operations / Delivery of Services – Delivery of services may be interrupted depending upon the magnitude and the duration of a wildfire event. If power, transportation routes or other critical infrastructure are damaged, this could have a significant impact on the ability to deliver and the public's ability to gain access to government and public services. The shifting of priorities by government and public safety agencies could result in delayed response times to calls reporting criminal activity and requests for medical crises. Larger jurisdictions (Pima County and City of Tucson) typically have more resources with which to assist smaller jurisdictions and may be called upon to do so should a jurisdiction require additional assistance.

Environment – Wildfire impact lasts long after the fires are extinguished. Vegetation and trees are no longer present in burn areas to retard the erosion of rain waters or snowmelt and to permit a gradual absorption of the water into the ground and aquifer. Flooding is therefore a predictable hazard with downstream siltation as another consequence. Wildfires and the resulting effects harm wildlife, soil, water and appearance of the land for many years.

Economic / Financial Condition of Jurisdiction – Wildfires are expensive to fight and can create hardships on the entire community. Lives are disrupted, extra expenses are incurred, businesses lose revenue and employees, homes/businesses destroyed, and vital infrastructure is lost or damaged requiring costly rebuilding.

Public Confidence in Jurisdiction's Governance – Prompt, organized and pre-planned response is critical to maintaining the public's confidence. Keeping the public well informed is important as is keeping the media informed of actions taken, situation updates and requested actions to be taken by the public to promote safe evacuations, establishment of shelters and general assistance to facilitate the safe response of public safety workers. After the situation is stabilized, and as recovery begins, it is

still very important to keep the public informed of the extent of damage and status of repairs to both establish reasonable expectations and to aid in planning activities. Effective governance will be demonstrated by taking timely and effective actions and telling the public about it, how it impacts them and what they can expect Pima County government to do about it.

Sources

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update.

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

Logan Simpson Design, Inc., 2011, *Pima County Community Wildfire Protection Plan (DRAFT)*

National Wildfire Coordination Group, 2010, Historical ICS 209 reports at: http://fam.nwcg.gov/fam-web/hist_209/report_list_209

White, Seth, 2004, *Bridging the Worlds of Fire Managers and Researchers: Lessons and Opportunities From the Wildland Fire Workshops,* USDA Forest Service, General Technical Report PNW-GTR-599, March 2004

Profile Maps

Maps 6A and 6B – County-Wide and Tucson Metro Wildfire Hazard Map(s)

Maps 6C through 6H – Jurisdiction Specific Wildfire Hazard Maps

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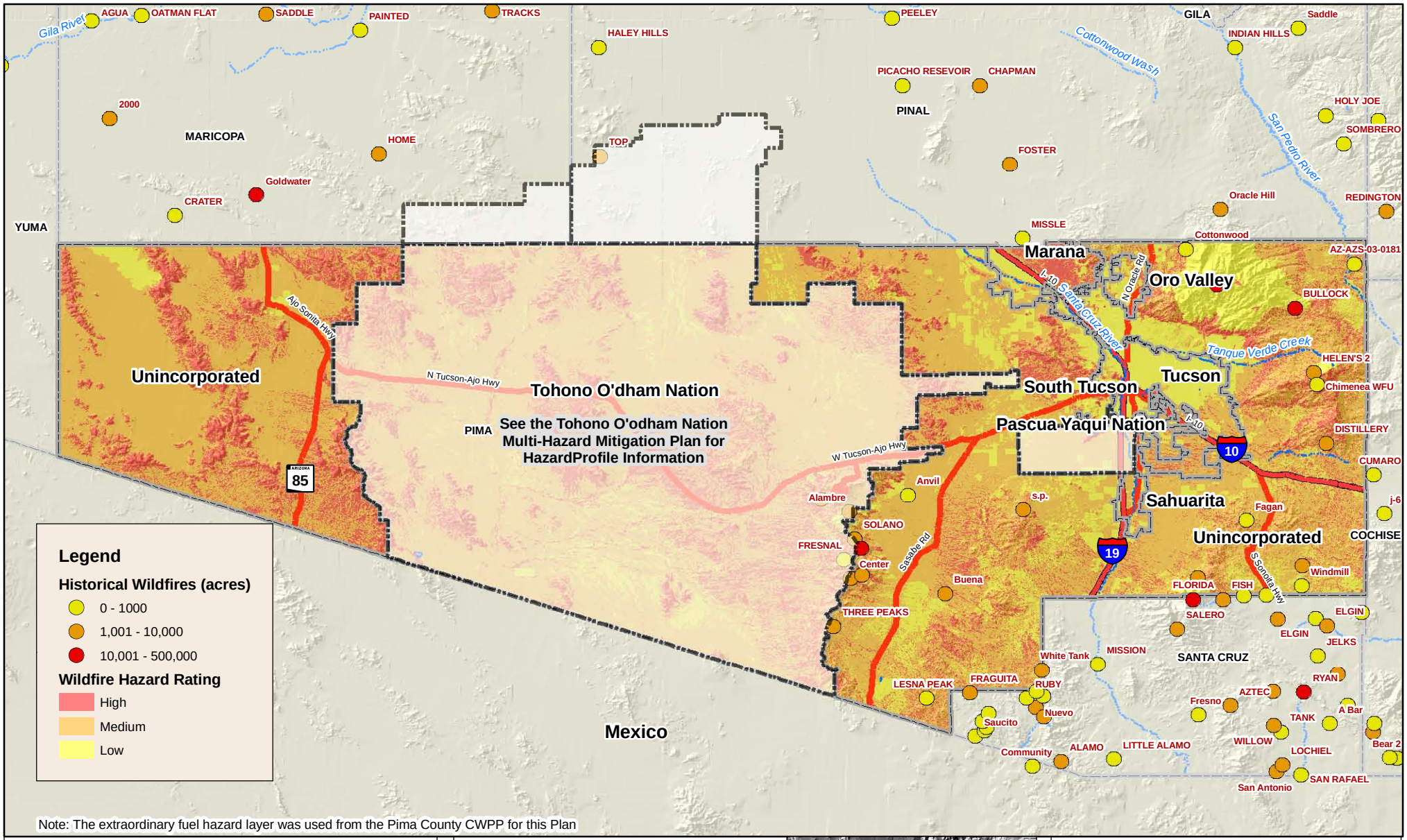

Legend
Historical Wildfires (acres)
0 - 1000
1,001 - 10,000
10,001 - 500,000
Wildfire Hazard Rating
High
Medium
Low
Tohono O'dham Nation
See the Tohono O'odham Nation Multi-Hazard Mitigation Plan for HazardProfile Information
Unincorporated
MARICOPA
PINAL
PIMA
YUMA
GILA
SANTA CRUZ
COCHISE
Mexico
Marana
Oro Valley
South Tucson
Tucson
Pascua Yaqui Nation
Sahuarita
Unincorporated
Gila River
Cottonwood Wash
San Pedro River
Santa Cruz River
Tanque Verde Creek
Ajo Sonita Hwy
N Tucson-Ajo Hwy
W Tucson-Ajo Hwy
Sasabe Rd
N Oracle Rd
S Sonoita Hwy
I-10
I-19
AGUA
OATMAN FLAT
SADDLE
PAINTED
TRACKS
HALEY HILLS
PEELEY
PICACHO RESEVOIR
CHAPMAN
FOSTER
INDIAN HILLS
Saddle
HOLY JOE
SOMBRERO
REDINGTON
Oracle Hill
Cottonwood
AZ-AZS-03-0181
BULLOCK
HELEN'S 2
Chimenea WFU
DISTILLERY
CUMARO
j-6
Fagan
Windmill
FLORIDA
FISH
SALERO
ELGIN
JELKS
RYAN
A Bar
Bear 2
SAN RAFAEL
San Antonio
LOCHIEL
WILLOW
TANK
AZTEC
Fresno
LITTLE ALAMO
ALAMO
Community
Saucito
Nuevo
RUBY
FRAGUITA
LESNA PEAK
White Tank
MISSION
THREE PEAKS
Buena
Center
FRESNAL
SOLANO
Alambre
Anvil
s.p.
MISSLE
2000
HOME
TOP
Goldwater
CRATER
85
10
19
Legend
Community
City of South Tucson
City of Tucson
Town of Marana
Town of Oro Valley
Town of Sahuarita
Unincorporated
Indian Reservation
Major Watercourses
Roads
Interstates
Highways
0 5 10 20 Miles
Sources: ALRIS, 2010; JEF, 2010; GACC, 2010; LSDI, 2011
LA PAZ
MARICOPA
GILA
APACHE
GREENLEE
YUMA
PINAL
GRAHAM
PIMA
COCHISE
SANTA CRUZ
Mexico
Pima County Multi-Jurisdictional Hazard Mitigation Plan
Map 6A
Pima County Wildfire Hazard Map as of May 2011
Note: The extraordinary fuel hazard layer was used from the Pima County CWPP for this Plan

Note: The extraordinary fuel hazards data from the Pima County CWPP was used for this Plan

See the Tohono O'odham Nation Multi-Hazard Mitigation Plan for HazardProfile Information

Legend

Historical Wildfires (acres)

- 0 - 1000
- 1,001 - 10,000
- 10,001 - 500,000

Wildfire Hazard Rating

- High
- Medium
- Low

0 2.5 5 10 Miles

Sources: ALRIS, 2010; JEF, 2010; GACC, 2010; LSDI, 2011

Legend

Community

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Pascua Yaqui Nation
- Unincorporated
- Indian Reservation
- Major Watercourses

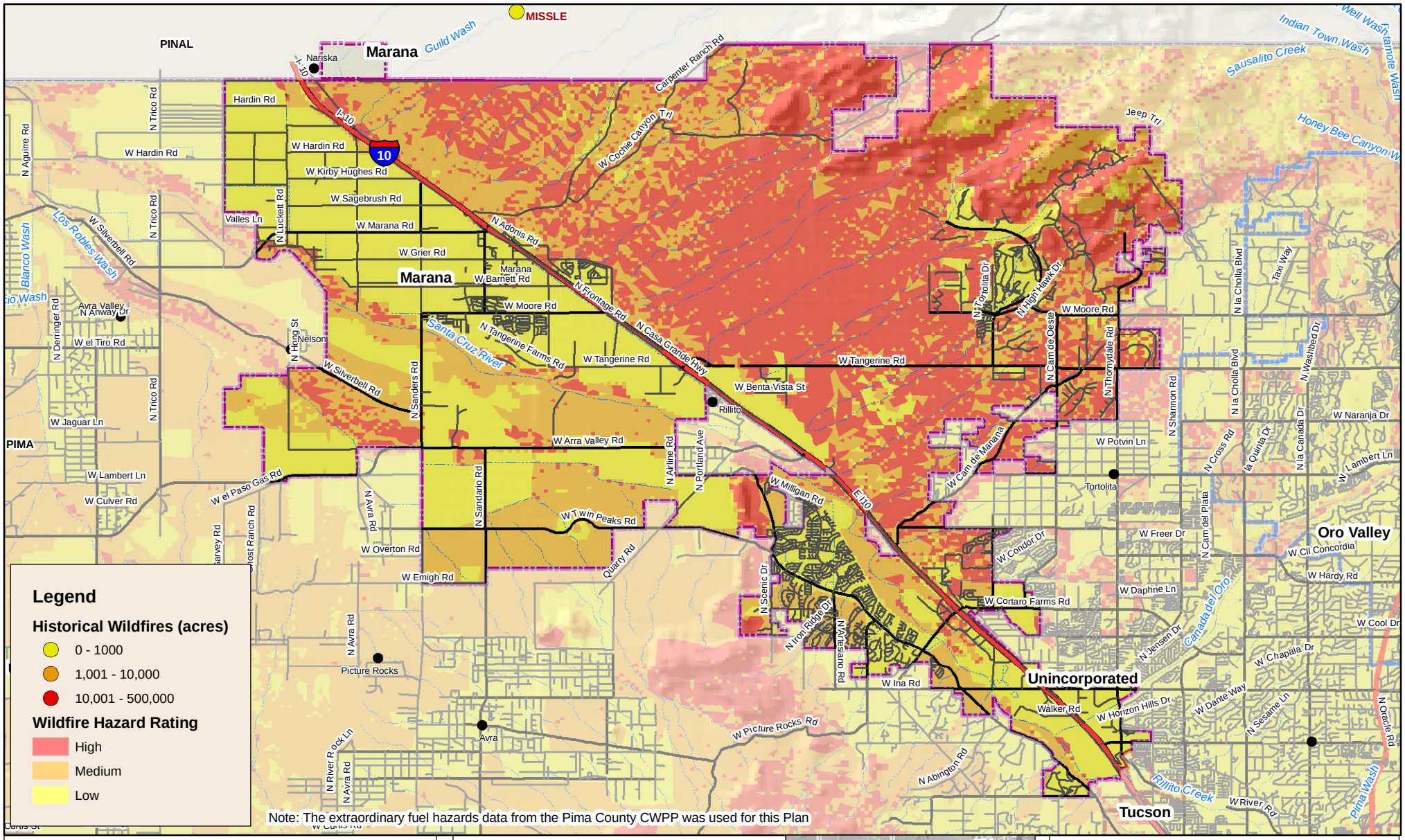
Roads

- Interstates
- Highways
- Arterials

LA PAZ, YUMA, MARICOPA, GILA, GREENLEE, GRAHAM, PINAL, PIMA, COCHISE, SANTA CRUZ, Mexico

Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6B Pima County Wildfire Hazard Map as of May 2011



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6C
Town of Marana
Wildfire Hazard Map
as of April 2011

Note: The extraordinary fuel hazards data from the Pima County CWPP was used for this Plan

Legend

Historical Wildfires (acres)

- 0 - 1000
- 1,001 - 10,000
- 10,001 - 500,000

Wildfire Hazard Rating

- High
- Medium
- Low

0 0.5 1 2 Miles

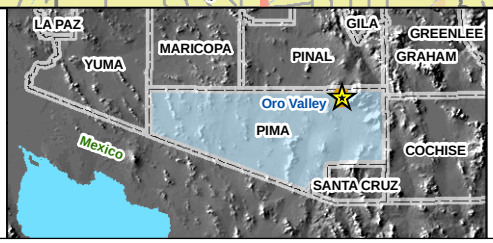
Sources: ALRIS, 2010; JEF, 2010; GACC, 2010; LSDI, 2011

Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

Roads

- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6D
Town of Oro Valley
Wildfire Hazard Map
as of May 2011

Note: The extraordinary fuel hazards data from the Pima County CWPP was used for this Plan

Unincorporated

PIMA

Pascua Yaqui

Legend

Historical Wildfires (acres)

- 0 - 1000
- 1,001 - 10,000
- 10,001 - 500,000

Wildfire Hazard Rating

- High
- Medium
- Low

0 0.25 0.5 1 Miles

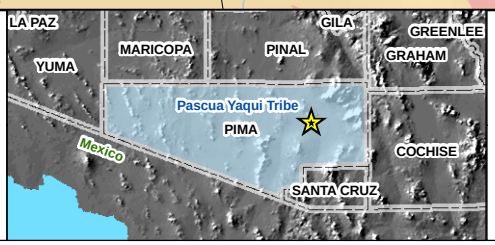
Sources: ALRIS, 2010; JEF, 2010; GACC, 2010; LSDI, 2011

Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

Roads

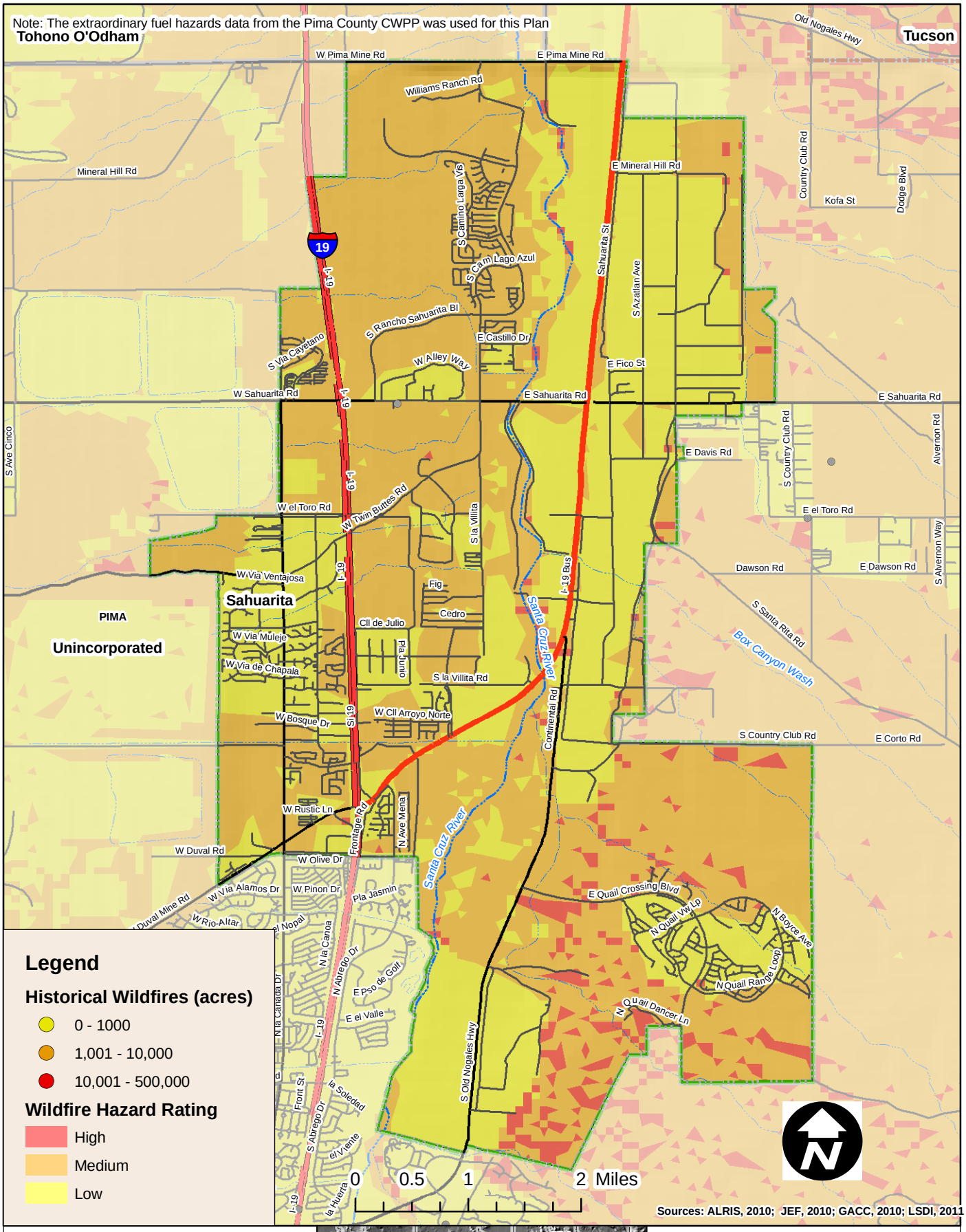
- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6E
Pascua Yaqui Tribe Wildfire Hazard Map as of May 2011

Note: The extraordinary fuel hazards data from the Pima County CWPP was used for this Plan

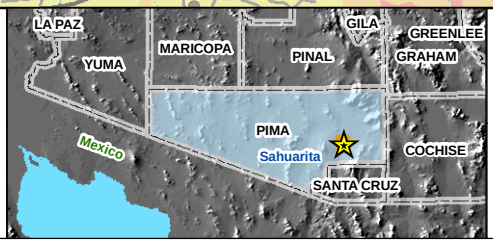


Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

Roads

- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6F
Town of Sahuarita
Wildfire Hazard Map
as of May 2011

Note: The extraordinary fuel hazards data from the Pima County CWPP was used for this Plan

Legend

Historical Wildfires (acres)

- 0 - 1000
- 1,001 - 10,000
- 10,001 - 500,000

Wildfire Hazard Rating

- High
- Medium
- Low

0 0.125 0.25 0.5 Miles

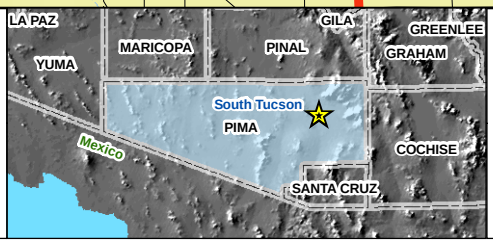
Sources: ALRIS, 2010; JEF, 2010; GACC, 2010; LSDI, 2011

Legend

- Marana
- Oro Valley
- Pascua Yaqui
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Lakes
- Major Watercourses

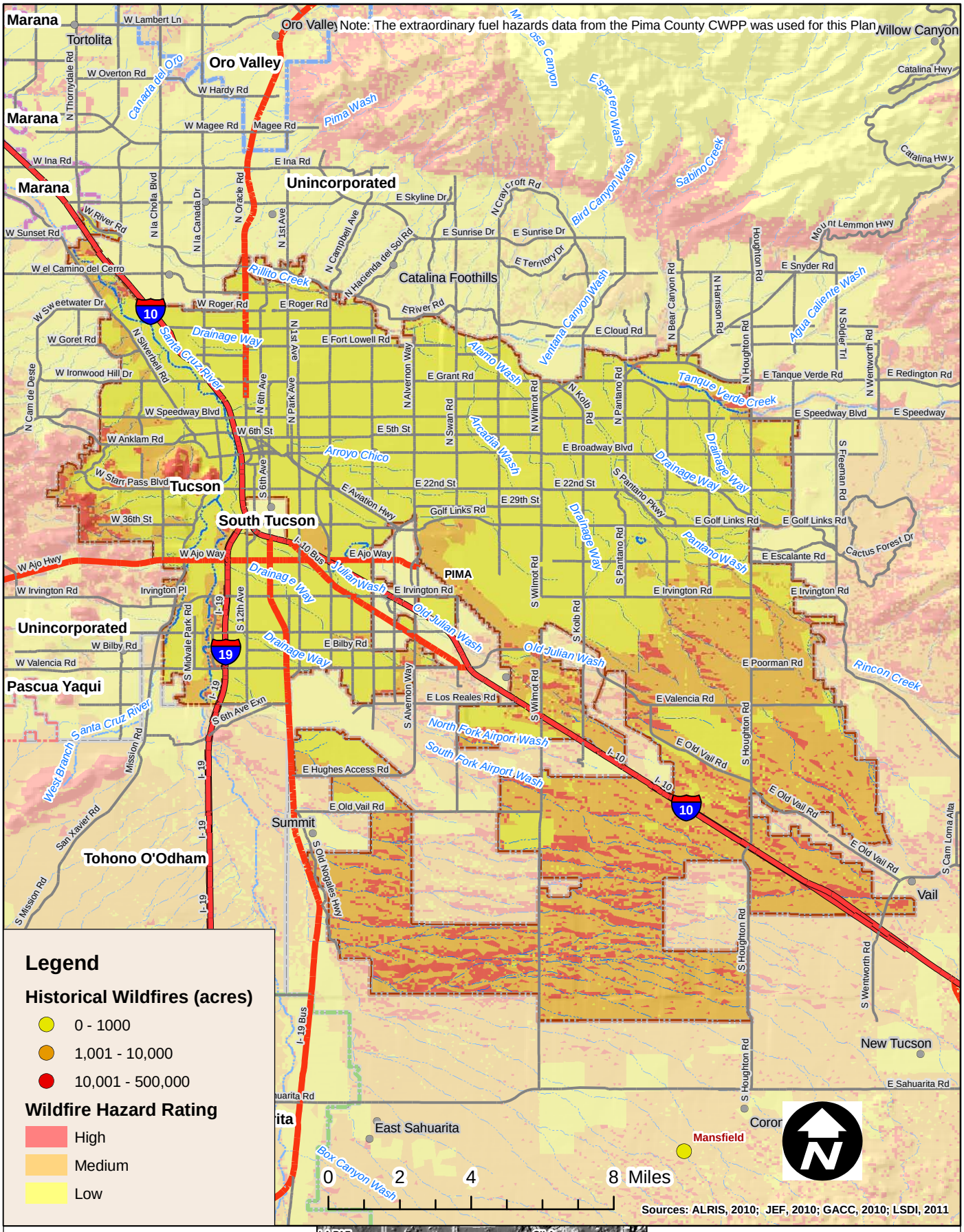
Roads

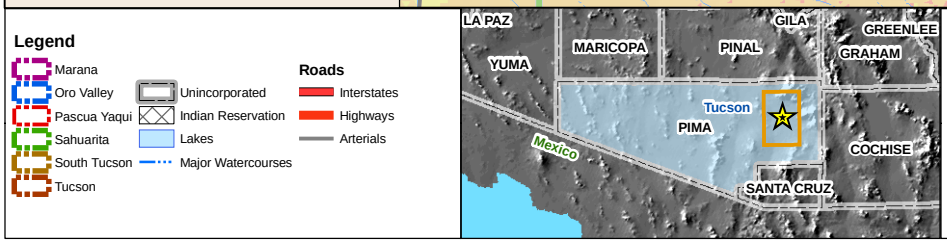
- Interstates
- Highways
- Arterials
- Streets



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6G
City of South Tucson Wildfire Hazard Map as of May 2011





Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 6H
City of Tucson
Wildfire Hazard Map
as of May 2011

5.3.11 Winter Storm

Description

Severe winter storms affect many aspects of life in the county including; transportation, emergency services, utilities, agriculture and the supply of basic subsistence to isolated communities. U.S and state highways have produced numerous fatal multi-car accidents due to heavy winter snowfall and icy road conditions. Heavy snowfalls can also leave motorists stranded in their vehicles with potentially disastrous results like hypothermia and carbon-monoxide poisoning. Significant winter storms can also hinder both ground and air emergency services vehicles from responding to accidents or other emergencies. Remote areas and communities can be easily cut-off from basic resources such as food, water, electricity, and fuel for extended periods during a heavy storm. Extremely heavy snow storms can produce excessive snow loads that can cause structural damage to under-designed buildings. Agricultural livestock can also be vulnerable to exposure and starvation during heavy winter storms.

Freezing Rain is formed as snow falls through a warm zone in the atmosphere completely melting the snow. The melted snow then passes through another zone of cool air "super cooling" the rain below freezing temperature while still in a liquid state. The rain then instantly freezes when it comes in contact with the ground or other solid object. Because freezing rain hits the ground as a rain droplet, it conforms to the shape of the ground, making one thick layer of ice. Sleet is similar to hail in appearance but is formed through atmospheric conditions more like Freezing Rain. The difference is the snowflakes don't completely thaw through the warm zone and then freeze through the cool air zone closer to the ground. Sleet typically bounces as it hits a surface similar to hail. Sleet is also informally used to describe a mixture of rain and snow and is sometimes used to describe the icy coating on trees and powerlines.

Sleet and freezing rain can cause slippery roadway surfaces and poor visibility leading to traffic accidents, and can leave motorists stranded in their vehicles with potentially disastrous results like hypothermia and carbon monoxide poisoning. Heavy sleet or freezing rain can produce excessive ice-loads on powerlines, telecommunication lines and other communication towers, tree limbs, and buildings causing power outages, communication disruptions, and other structural damage to under-designed facilities.

History

For the majority of Pima County, winter snow is unusual and winter storm events are rare. The heaviest winter snows usually occur at the higher elevation areas of the Santa Catalina, Baboquivari, Rincon, Whetstone, and Santa Rita Mountains and foothills. The following are highlights of the more prominent winter storm events impacting Pima County:

- In November 1958, 6.4 inches of snow fell across the Tucson metro area and caused auto accidents, stranded people, dropped power lines, knocked out telephone service, closed highways and paralyzed air travel. Three boy scouts were stranded in snow near Madera Canyon in the Santa Rita Mountains south of Tucson. Their bodies were not found for two weeks. The heavy snow also closed the highway to Mt. Lemmon, marooning about 35 weekend vacationers (NWS Tucson, 2011).
- In December 1971, 6.8 inches of snow blanketed the Tucson metro area after midnight. The heavy snow snarled traffic, closed the airport, downed power lines and damaged or destroyed 3000 trees, some of them 20 years old. Slush on the runway forced the closure of the Tucson International Airport and cancellation of flights between 6 AM and 11 AM. At the time, the airport did not own a snow plow (NWS Tucson, 2011).

Probability and Magnitude

Snow level measurements are recorded daily across the United States and can be used to estimate the probability and frequency of severe winter storms. In Arizona, there is a 5% annual chance that snow depths between zero and 25 centimeters will be exceeded, a snowfall probability that is among the lowest in the nation (ADEM, 2009).

The NCDC has compiled snow climatology statistics for Arizona and the rest of the conterminous 48 states, using historic data from National Weather Service cooperative observer sites for the period of 1948 to 1996 (NOAA/NCDC, 1998). The NCDC used these data sets to develop 1-, 2-, and 3-day, 10-, 25-, 50-, and 100-year recurrence interval snowfall depth estimates for each of the statistically eligible[21] stations. There were six stations for which statistics were calculated in or near Pima County and the results are summarized in Table 5-37. The station locations are shown on Figure 5-3. It is notable that none of the stations are located on Mount Lemmon, which would be expected to have the greatest potential for snowfall depths in the county.

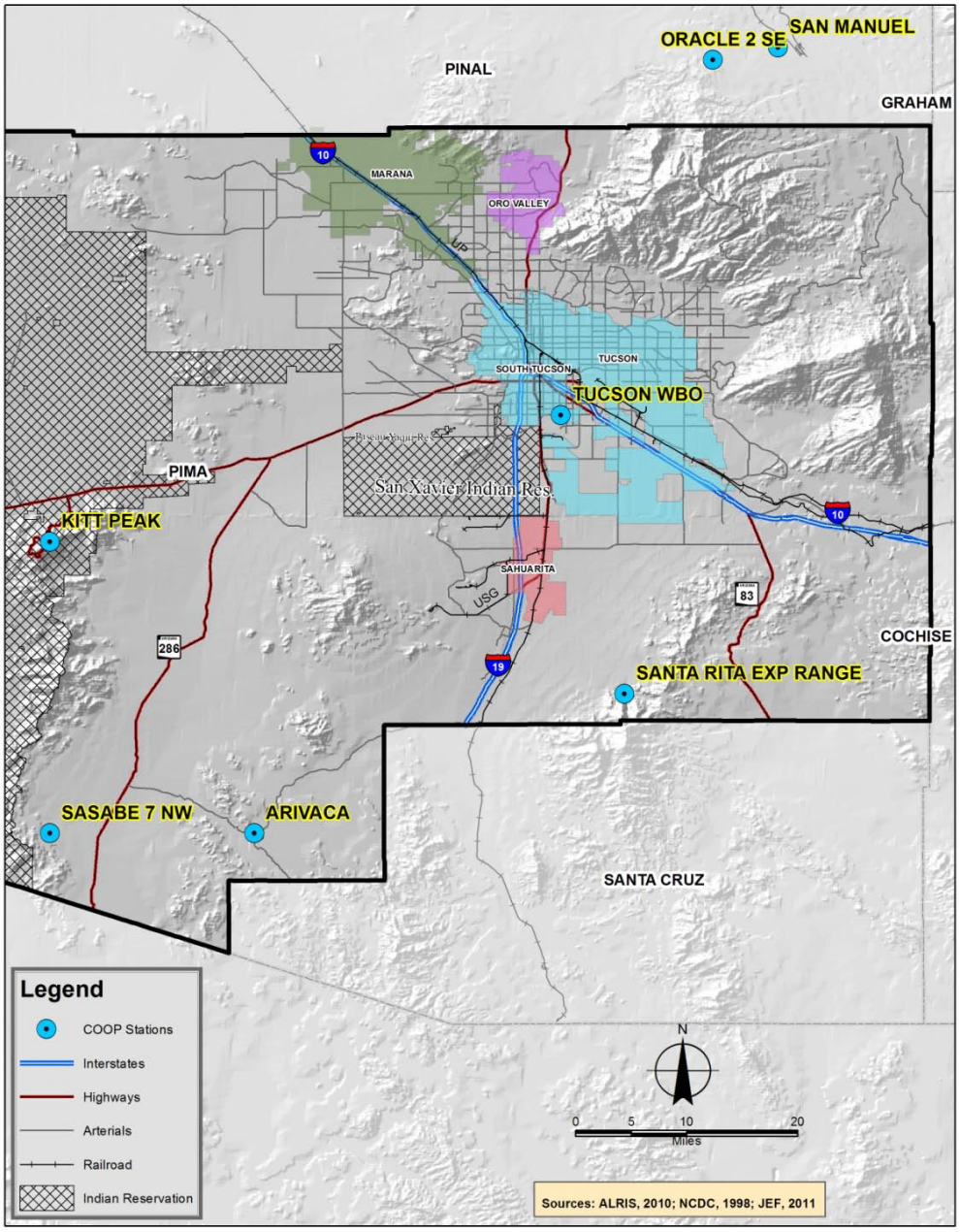


Figure 5-13: Weather stations with snowfall statistics within or near Pima County

[21] Those stations with sufficient continuous data.

Table 5-37: Probability estimates of snowfall depth for various durations and return periods at select weather stations within or near Pima County

Snowfall Duration	Snowfall Amount, in inches					Non-Zero Data	Non-Missing Data
	Return Period				Observed Maximum		
	10-year	25-year	50-year	100-year			
Station: ARIVACA; Elev = 3,620 FT; Period of Record: 1956-1996							
1-day	3.8	5.4	6.8	8.3	6.5	31	41
2-day	4.3	6	7.4	8.9	6.5	31	41
3-day	4.6	6.4	7.9	9.5	6.5	31	41
August-July	7.8	11.2	14.2	17.5	13.3	30	38
Station: KITT PEAK; Elev = 6,790 FT; Period of Record: 1960-1996							
1-day	13.3	16.9	19.5	22	19	35	36
2-day	16.7	21.4	24.9	28.3	25	35	36
3-day	18.5	24.9	30.1	35.7	31.5	35	36
August-July	46.9	61	71.9	83.3	77.5	22	22
Station: SANTA RITA EXP RANGE; Elev = 4,300 FT; Period of Record: 1950-1996							
1-day	4.7	7.8	11	15.1	10	24	46
2-day	4.9	8.2	11.6	16	10	24	46
3-day	5.1	8.7	12.6	17.7	12	24	46
August-July	N/A	N/A	N/A	N/A	24	17	21
Station: SASABE 7 NW; Elev = 3,824 FT; Period of Record: 1950-1996							
1-day	4.6	7.5	10.4	14.1	12	29	46
2-day	4.7	7.6	10.5	14.1	12	29	46
3-day	4.7	7.6	10.5	14.2	12	29	46
August-July	N/A	N/A	N/A	N/A	9	17	27
Station: TUCSON WBO; Elev = 2,584 FT; Period of Record: 1948-1996							
1-day	2.4	4.4	6.7	9.8	6.8	23	49
2-day	2.7	4.9	7.4	10.8	6.8	23	49
3-day	2.7	4.9	7.4	10.8	6.8	23	49
August-July	3.5	6	8.7	12.3	6.8	23	47
Station: ORACLE 2 SE; Elev = 4,510 FT; Period of Record: 1950-1996							
1-day	9.5	12.8	15.3	18	15	38	47
2-day	11.1	15.4	18.9	22.7	18	38	47
3-day	11.6	16.4	20.6	25.2	19	38	47
August-July	22.9	32.3	40.4	49.7	41	30	31

The NCDC also maintains a snow climatology data set that contains maximum 1-day, 2-day, and 3-day duration snow depths at various weather stations across the nation (except Hawaii). The data reflects the maximum depth of snowfall recorded as of 2006. Maps 7A and 7B represent a county-wide and Tucson Metro graphical depiction of zones of historically maximum 1-day duration snowfall depths. Maps 8A and 8B are similar, only depicting zones for the historically maximum 3-day duration snowfall depths. Bordering gage stations in California, Nevada, Utah, Colorado, and New Mexico were also used to ensure that no boundary effects were created.

Vulnerability – CPRI Results

Winter storm CPRI results for each community are summarized in Table 5-38 below.

Table 5-38: CPRI results by jurisdiction for winter storm

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Marana	Possible	Critical	12 to 24 hours	< 1 week	2.40
Oro Valley	Likely	Limited	6 to 12 hours	< 1 week	2.70
Pascua Yaqui Tribe	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Sahuarita	Unlikely	Negligible	> 24 hours	< 6 hours	1.00
Tucson	Unlikely	Negligible	12-24 hours	< 1 week	1.65
Unincorporated Pima County	Highly Likely	Critical	< 6 hours	< 1 week	3.60
				County-wide average CPRI =	**2.06**

Vulnerability – Loss Estimations

There are no standardized methods for estimating losses associated with winter storm events and none are made for this Plan. From a historical perspective, both human and infrastructure losses could be expected with any major winter storm event, and especially regarding traffic accidents and human exposure. This is especially true in Pima County since significant snowfall events are rare and the population in general are likely not going to be prepared for such an event.

Vulnerability – Development Trend Analysis

Winter Storm effects as they relate to snow and ice, will not pose much of a risk to most future development within Pima County. Development of areas above 6,000 feet are at greatest risk, but those areas are well outside of the urban core of the Tucson metro area. Enforcement and/or implementation of modern building codes to regulate new developments in conjunction with public education on how to respond to hazardous winter conditions is probably the best way to mitigate against such losses.

Vulnerability – EVRI

Table 5-39 summarizes the EVRI assessment for winter storm.

Table 5-39: Environmental Risk and Vulnerability Index (EVRI) scores for winter storm

Environmental Element	EVRI Category			EVRI Score
	Probability of Impact	Magnitude / Severity	Duration of Impact / Damage	
AIR	Unlikely	Negligible	< 1 month	0.85
WATER	Unlikely	Negligible	< 1 month	0.85
SOIL	Unlikely	Negligible	> 6 months	1.15
			Overall EVRI Score	**0.95**

Vulnerability – Consequences/Impacts

Public – Winter storms bring snow, rain, ice and freezing temperatures which are uncharacteristic for the region. Some parts of Pima County may be more affected, such as, Mount Lemmon and some rural areas at higher elevation, and therefore may become isolated because of transportation routes being closed. This impacts public health and safety as responders may have access difficulties. On the other

hand, the public may not be able to leave to seek services. In this situation, the public's capacity to shelter in place is very important thus permitting responders to prioritize rescues and life saving activities rather than providing daily sustenance and support.

Responders to the Incident – Responders face the same hazards as does the general public. They must, however, drive emergency vehicles in dangerous driving conditions and work in extreme environmental conditions while conducting rescues and providing other services. Exposure, hypothermia and fall injuries may occur as well as exhaustion if the event lasts for an extended period of time. Road closures may force different modes of patient transport to be employed and may also interfere with responder access to patients or victims.

Continuity of Operations / Delivery of Services – Delivery of services may be interrupted depending upon the magnitude and the duration of a winter storm event. If power, transportation routes or other critical infrastructure are affected, this could have a significant impact on the ability to deliver and the public's ability to gain access to government and public services. The shifting of priorities by government and public safety agencies could result in delayed response times to calls reporting criminal activity and requests for medical crises. Larger jurisdictions (Pima County and City of Tucson) typically have more resources with which to assist smaller jurisdictions and may be called upon to do so should a jurisdiction require additional assistance.

Environment – There is minimal risk of damage to the soil, air and water related to winter storms. Some flooding may occur as a result of snow melt if the accumulation is great enough.

Economic / Financial Condition of Jurisdiction – There is little negative economic impact due to winter storms. Chemicals to spray on roadway surfaces to deter the formation of ice, is an expense borne by local jurisdictions.

Public Confidence in Jurisdiction's Governance – Prompt, organized and pre-planned response is critical to maintaining the public's confidence. Keeping the public well informed is important as is keeping the media informed of actions taken, situation updates and requested actions to be taken by the public to promote safe evacuations, establishment of shelters and general assistance to facilitate the safe response of public safety workers. After the situation is stabilized, and as recovery begins, it is still very important to keep the public informed of the extent of damage and status of repairs to both establish reasonable expectations and to aid in planning activities. Effective governance will be demonstrated by taking timely and effective actions and telling the public about it, how it impacts them and what they can expect Pima County government to do about it.

Sources

Arizona Division of Emergency Management, 2010, State of Arizona Multi-Hazard Mitigation Plan, 2010 Update.

National Weather Service, Flagstaff Forecast Office, 2011, web information accessed at the following URL: http://www.wrh.noaa.gov/fgz/safety/criteria.php?wfo=fgz

NOAA/National Climatic Data Center, 1998, *United States Snow Climatology*, TD-9641

U.S. Dept of Commerce, National Climatic Data Center, 2010, Storm Events Database, accessed via the following URL: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

U.S. Dept of Commerce, National Climatic Data Center, 2010, U.S. Snow Climatology Project, accessed via the following URL: http://www.ncdc.noaa.gov/ussc/USSCAppController?action=map

Profile Maps

Maps 7A and 7B – County-Wide and Tucson Metro Maximum 1-Day Snow Depths

Maps 8A and 8B – County-Wide and Tucson Metro Maximum 3-Day Snow Depths

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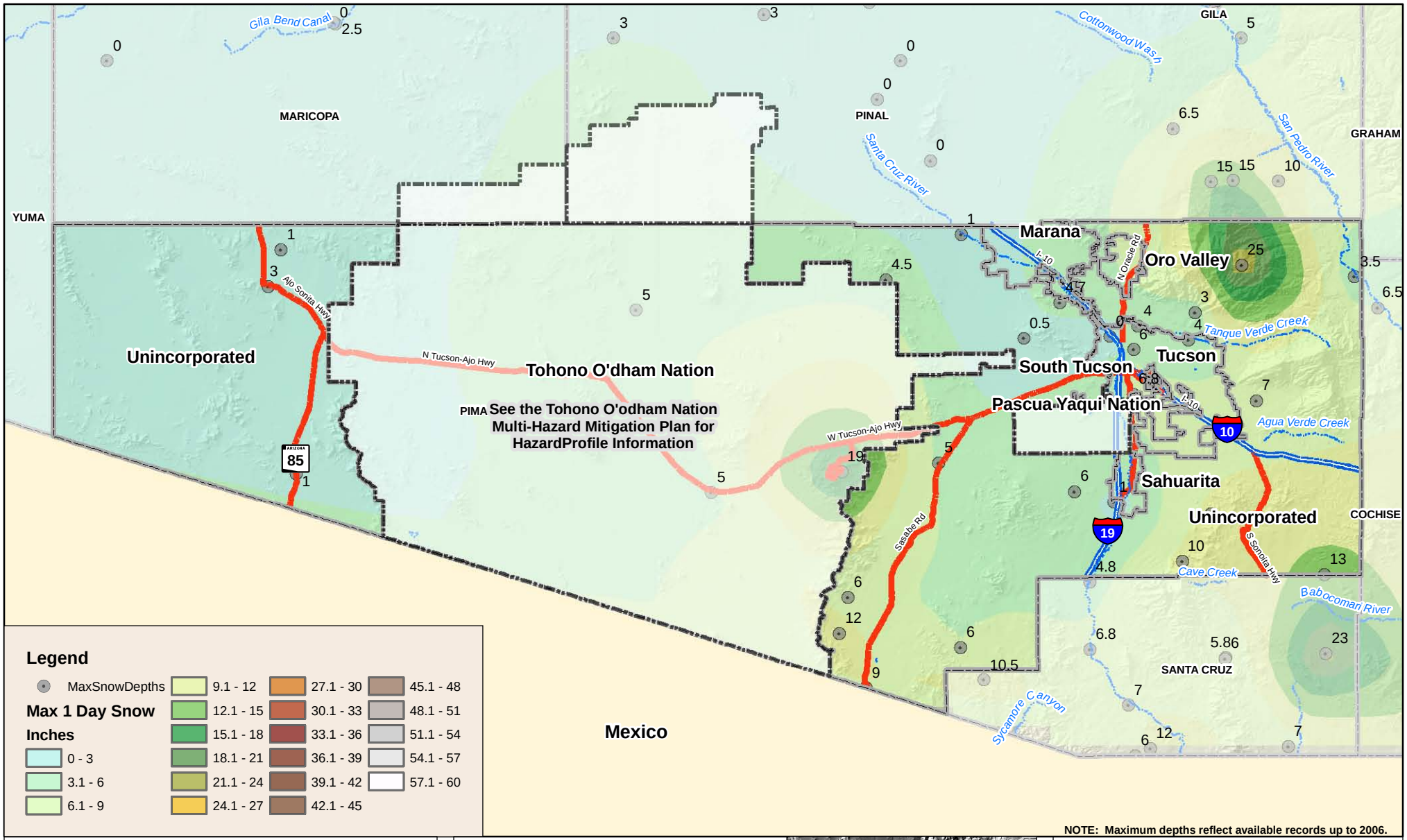


NOTE: Maximum depths reflect available records up to 2006.

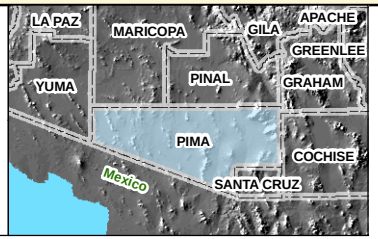
Legend

Community
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Major Watercourses

Roads
- Interstates
- Highways

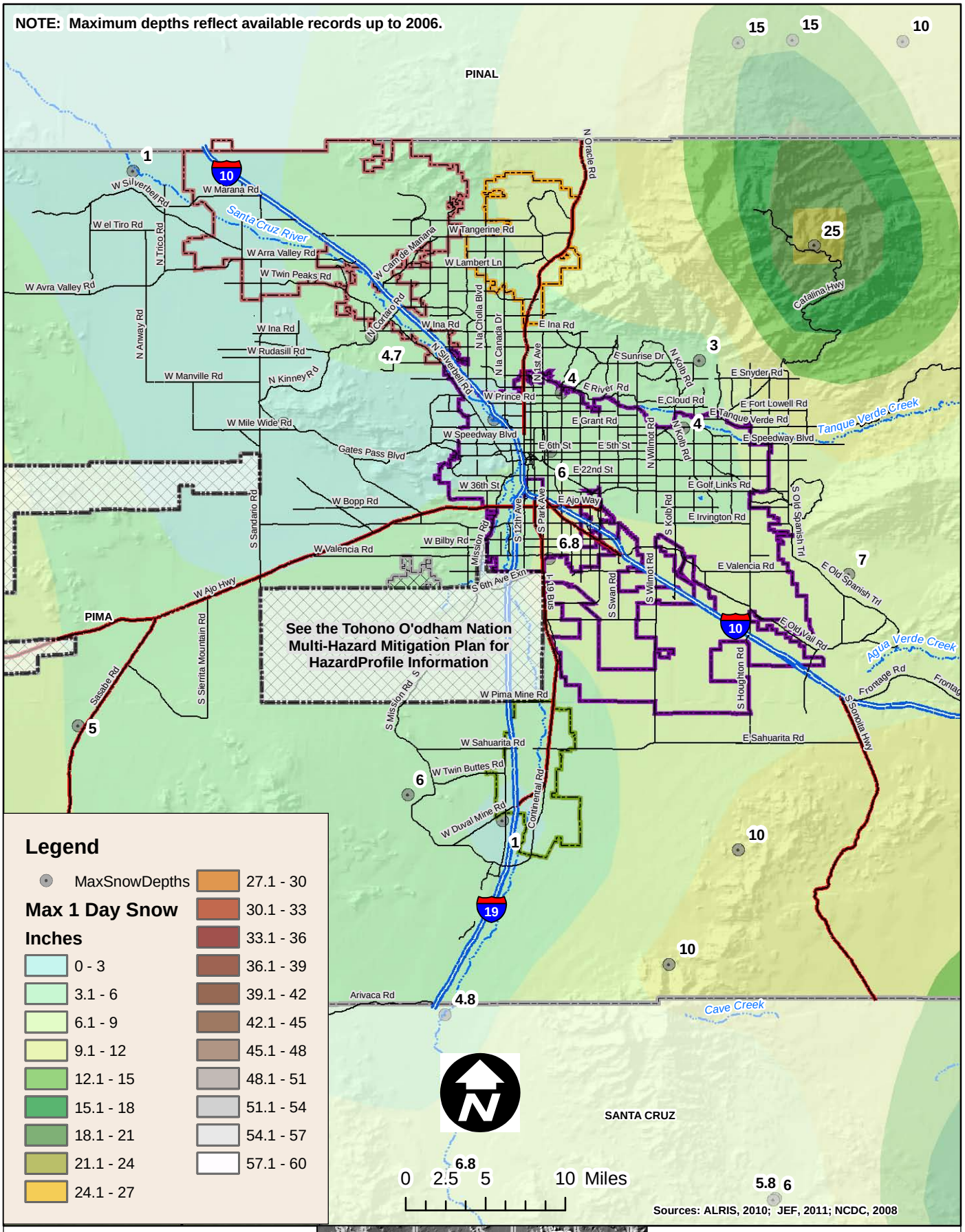
0 5 10 20 Miles

Sources: ALRIS, 2010; JEF, 2011; NCDC, 2008



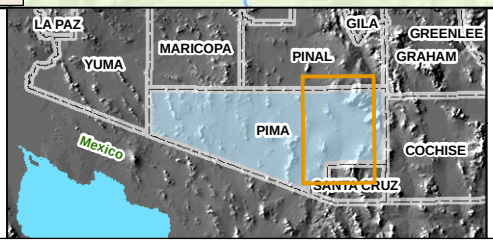
Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 7A
Pima County
Winter Storm
1 Day Maximum
Snow Depth Map



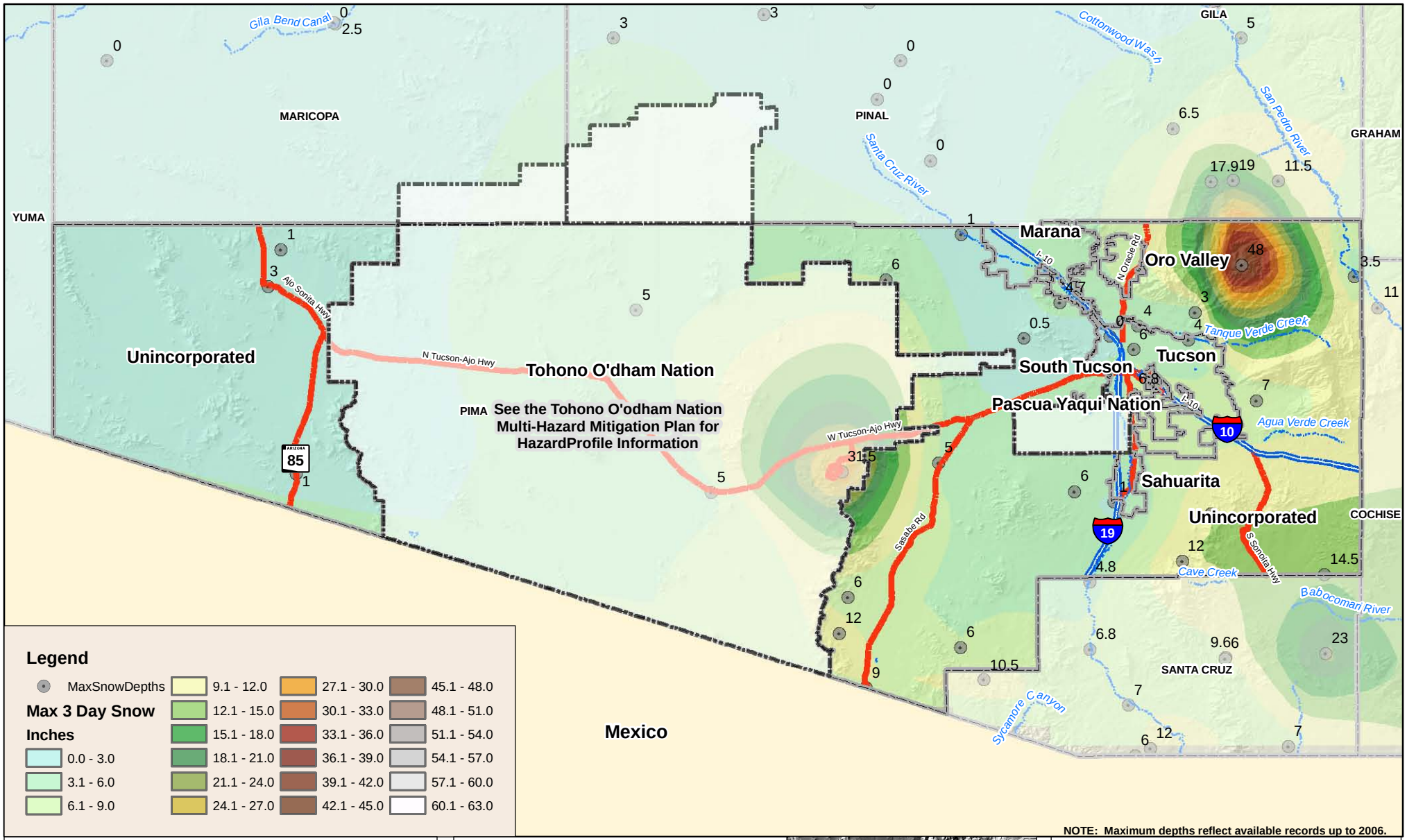
Legend

- Marana
- Oro Valley
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Interstates
- Highways
- Arterials
- Major Watercourses



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 7B
Pima County Winter Storm 1 Day Maximum Snow Depth Map



NOTE: Maximum depths reflect available records up to 2006.

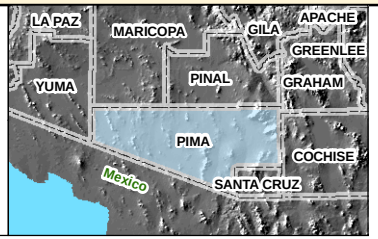
Legend

Community
- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- Unincorporated
- Indian Reservation
- Major Watercourses

Roads
- Interstates
- Highways

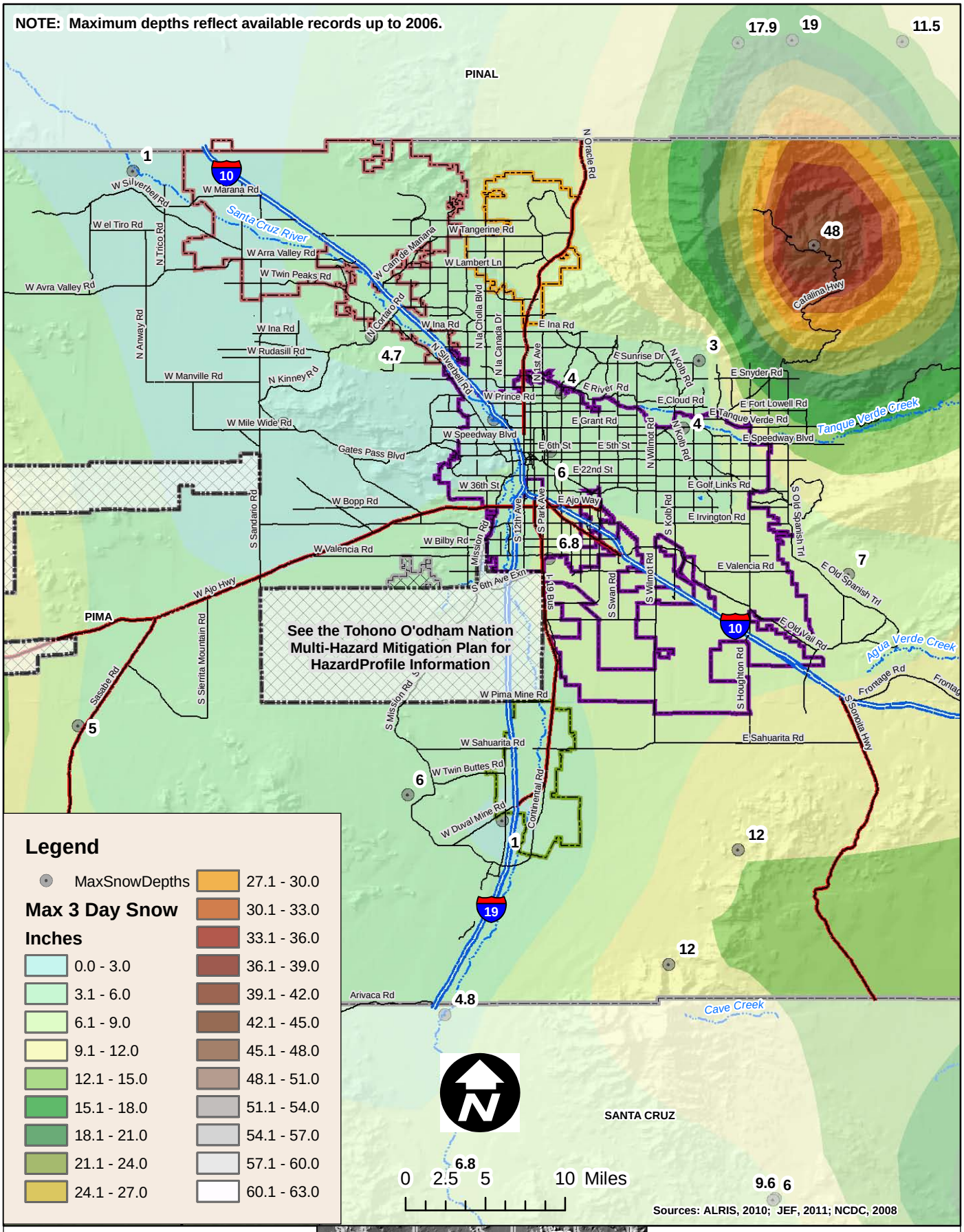
0 5 10 20 Miles

Sources: ALRIS, 2010; JEF, 2011; NCDC, 2008



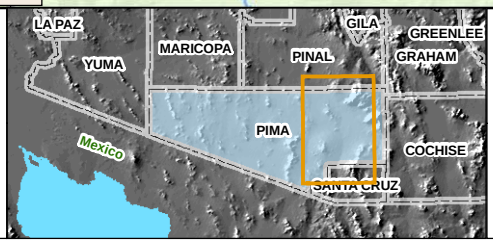
Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 8A
Pima County Winter Storm 3 Day Maximum Snow Depth Map



Legend

- Marana
- Oro Valley
- Sahuarita
- South Tucson
- Tucson
- Unincorporated
- Indian Reservation
- Interstates
- Highways
- Arterials
- Major Watercourses



Pima County Multi-Jurisdictional Hazard Mitigation Plan

Map 8B
Pima County Winter Storm 3 Day Maximum Snow Depth Map

5.4 Risk Assessment Summary

The jurisdictional variability of risk associated with each hazard assessed in Section 5.3 is demonstrated by the various CPRI and loss estimation results. Accordingly, each jurisdiction has varying levels of need regarding the hazards to be mitigated, and may not consider all of the hazards as posing a great risk to their individual communities. Table 5-40 summarizes the hazards selected for mitigation by each jurisdiction and will be the basis for each jurisdictions mitigation strategy.

Table 5-40: Summary of hazards to be mitigated by each participating jurisdiction

Jurisdiction	Disease	Drought	Earthquake	Extreme Temperature	Flood	HAZMAT	Levee Failure	Severe Wind	Subsidence	Wildfire	Winter Storm
Unincorporated Pima County	x				x		x				
Marana					x	x				x	
Oro Valley	x	x		x	x	x				x	x
Pascua Yaqui Tribe	x	x	x		x			x		x	
Sahuarita	x			x	x	x				x	
South Tucson	No Data Provided by Jurisdiction										
Tohono O'odham Nation	See the *Tohono O'odham Nation Multi-Hazard Mitigation Plan*										
Tucson		x	x		x			x	x		

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SECTION 6: MITIGATION STRATEGY

§201.6(c)(3): *[The plan shall include…] (3) A* ***mitigation strategy*** *that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:*
(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
(ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.
(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

The mitigation strategy provides the "what, when, and how" of actions that will reduce or possibly remove the community's exposure to hazard risks. According to DMA 2000, the primary components of the mitigation strategy are generally categorized into the following:

Goals and Objectives

Capability Assessment

Mitigation Actions/Projects and Implementation Strategy

The entire 2007 Plan mitigation strategy was reviewed and updated by the Planning Team, including a major re-organization of the mitigation strategy elements into this multi-jurisdictional plan format. Specifics of the changes and updates are discussed in the subsections below.

6.1 Hazard Mitigation Goals and Objectives

The 2007 Plan goals and objectives were developed using the 2004 State Plan[22] goals and objectives as a starting point. Each jurisdiction then edited and modified those goals and objectives to fit the mitigation planning vision for their community. An assessment of those goals and objectives by the Planning Team and the Local Planning Team for each jurisdiction was made with consideration of the following[23]:

- Do the goals and objectives identified in the 2007 Plan reflect the updated risk assessment?
- Did the goals and objectives identified in the 2007 Plan lead to mitigation projects and/or changes to policy that helped the jurisdiction(s) to reduce vulnerability?
- Do the goals and objectives identified in the 2007 Plan support any changes in mitigation priorities?
- Are the goals and objectives identified in the 2007 Plan reflective of current State goals?

A copy of the 2010 State Plan goals and objectives was made available to the Planning Team for use during the assessment. During the review/discussion of the 2007 Plan goals and objectives at the planning team meeting, the following comments were noted:

- Several jurisdictions noted that many of the 2007 Plan goals and objectives were either irrelevant to hazard mitigation or extremely unclear and vague.
- It was noted that a lot of time and energy was expended identifying all of the goals and objectives and subsequent actions, many of which never made it to implementation. In general, the effort was perceived as wasted.

[22] State of Arizona, 2004, *State of Arizona All Hazard Mitigation Plan*, prepared by URS.

[23] FEMA, 2008, *Local Multi-Hazard Mitigation Planning Guidance*

- The planning team liked the relative simplicity and flexibility of the 2010 State Plan goal and objectives, and liked the idea of investing time and energy only in identifying mitigation actions/projects that have a likely potential of being implemented over the next cycle of the Plan.

As a conclusion to the discussions, the Planning Team chose to completely drop the current list of goals and objectives in favor of preparing a multi-jurisdictional template of goals and objectives that are closely based on the 2010 State Plan. Accordingly, one goal and four clear objectives were established and will be used by all participating jurisdictions, as follows:

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

6.2 Capability Assessment

While not required by DMA 2000, an important component of the Mitigation Strategy is a review of each participating jurisdiction's resources in order to identify, evaluate, and enhance the capacity of local resources to mitigate the effects of hazards. The capability assessment is comprised of several components:

- ✓ Legal and Regulatory Review – a review of the legal and regulatory capabilities, including ordinances, codes, plans, manuals, guidelines, and technical reports that address hazard mitigation activities.
- ✓ Technical Staff and Personnel – this assessment evaluated and describes the administrative and technical capacity of the jurisdiction's staff and personnel resources.
- ✓ Fiscal Capability – this element summarizes each jurisdiction's fiscal capability to provide the financial resources to implement the mitigation strategy.
- ✓ National Flood Insurance Program (NFIP) Participation – the NFIP contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments, but the program is promoted by FEMA as a basic first step for implementing and sustaining an effective flood hazard mitigation program, and is a key indicator for measuring local capability as part of this assessment.
- ✓ Prior Mitigation Actions – the final part of the capability assessment is a summary review of prior mitigation actions and/or projects that have been completed over the last five or so years.

The Planning Team reviewed the information provided in Section 6.1 of the 2007 Plan, and specifically Tables 6-1 through 6-24. The Planning Team chose to generally keep the format of the tables summarizing the administrative, technical, and fiscal capabilities. A new table was developed to summarize the legal and regulatory capabilities by better summarizing and identifying the codes, ordinances, plans, and studies/reports used by a jurisdiction, as well as identify the appropriate agency/department with responsibility for maintaining and updating those documents.

6.2.1 Jurisdictional Capabilities

Tables 6-1-1 through 6-1-6 summarize the legal and regulatory mitigation capability for each participating jurisdiction. Information provided includes a brief listing of current codes, mitigation relevant ordinances, plans, and studies/reports. Tables 6-2-1 through 6-2-6 summarize the staff and personnel resources employed by each jurisdiction that serve as a resource for hazard mitigation. Tables 6-3-1 through 6-3-6 summarize the fiscal capability and budgetary tools available to each participating jurisdiction. Each of these three tables are listed below by jurisdiction. No tables are provided for South Tucson or the Tohono O'odham Nation.

Table 6-1-1: Legal and regulatory capabilities for Pima County

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	• 2006 International Building Code • 2006 International Property Maintenance Code • 2006 International Fuel Gas Code • 2006 International Plumbing Code • 2006 International Mechanical Code • 2005 National Electrical Code • 2006 International Energy Conservation Code • 2006 International Residential Code • 2006 International Wildland-Urban Interface Code	• Development Services • Facilities Management • Department of Environmental Quality • Natural Resources, Parks & Recreation

ORDINANCES	• Pima County Code of Ordinances
	  • Title 7, Environmental Quality
	  • Title 8, Health & Safety
	  • Title 9, Public Peace, Morals & Welfare
	  • Title 15, Buildings & Construction
	  • Title 16, Floodplain and Erosion Hazard Management Ordinance (2010)
	  • Title 17, Air Quality Control
	  • Title 18, Zoning
		• Facilities Management
		• Wastewater Management
		• Department of Environmental Quality
		• Regional Flood Control District
		• Health Department

PLANS, MANUALS, and/or GUIDELINES	• Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007)
	• Stormwater Detention/Retention Manual (1984)
	• Drainage and Channel Design Standards for Local Drainage Manual (1984)
	• Technical Policies (Interpretation of the Title 16 and Other Regulatory Documents – see below):
	  • 001 Completion of elevation Certification-Qualification (2006)
	  • 002 Erosion Hazard Setback Reductions to <25 feet (2006)
	  • 003 Minimum Construction
		• Development Services
		• Regional Flood Control District

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	Standards for MHs (2010) • 004 Design of Flood Venting (2006) • 005 Minimum Requirements for Walls and Fences (2007) • 006 Erosion Protection for Fill Pads (2007) • 007 Applicability of the Detention/Retention Requirements (2006) • 008 Minimum Standards for Security Barriers (2006) • 009 Design of Landscaping in Basins and Channels (2006) • 010 Rainfall Input for Hydrologic Modeling (2007) • 011 Permitting for Accessory Structures (2009) • 012 Permitting of Existing Improvements (pending) • 013 Regulation of Shaded Zone X Classifications (2009) • 014 Erosion Protection of Stem Wall foundations (2009) • 015 Hydrologic Model Selection for Peak Discharge Determination (2007) • 016 Hydraulic Model Selection for Floodplain Delineation (2007) • 017 Acceptable Methods for Channel Design and Scour Calculations (pending) • 018 Acceptable Model Parameterization for Determining Peak Discharges (2011) • 019 Standards for Floodplain Hydraulic Modeling (pending) • 020 Anchoring Requirements for Sheds and Tanks (pending) • 021 Use of Flood Resistant Materials Below the RFE (2008) • 022 Allowable Uses of Enclosed Areas with Flood Openings (2009) • 023 Allowable Uses of Enclosed Areas with Flood Openings (2009) • 024 Avoiding Riparian Habitat-Requirement pending)	

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	• 025 Sand and Gravel Permitting Guidelines (pending) • 026 Interim Regulated Riparian Habitat Mitigation Standards and Implementation Guidelines (2010) • 027 Protective Measures for Private Vehicular Access (pending) • 028 Pre-Ordinance Agricultural Berms, Channels and Stock Ponds (pending) • 029 Electrical Facilities That Are Considered "Critical Facilities" (2010) • Sonoran Conservation Plan • Pima County Sustainability Program • Pima County Comprehensive Plan	
STUDIES	• 1999 Flood Insurance Study, Pima County, Arizona, Unincorporated Areas • FEMA DFIRM Maps (FEMA, Effective date of June 2011) • Special Floodplain Studies (see below) • 1983 Special Study 02 – Critical Watershed Management Plan Ruthrauff Road Area • 1986 Special Study 03 – Flecha Caida Flood Improvement Study • 1986 Special Study 04 – Tucson Mountain Basin Study • 1986 Special Study 05 - Highlands Wash Basin Management Plan Report • 1987 Special Study 06 - Riverside Terrace Basin Management Plan • 1988 Special Study 07 - Ventana Canyon Estates, Erosion Setback Limits • 1988 Special Study 08 - Millstone Manor No. 6 • 1988 Special Study 09 - Sutherland Wash, H&H Report • 2009 Special Study 10 - Lee Moore Wash Basin Management Study • 1989 Special Study 11 - Green Valley Drainageway No.9	• Regional Flood Control District

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	• 1989 Special Study 12 - Valley View Wash, Flecha Caida Flood Phase 2 • 1990 Special Study 13 - Holladay Street & Forrest Avenue Watershed Study • 1990 Special Study 14 - Southwest Basin Management Study • 1990 Special Study 15 - Black Wash Drainage Analysis • 2004 Special Study 16 - [Upper] Canada Del Oro Wash Letter of Map Revision Study • 1992 Special Study 17 - Fortyniner's Interior Drainage Improvements • 2010 Special Study 18 - Soldier Wash and its Tributary • 1992 Special Study 19 - Tortolita Mountains Geomorphic Assessment • 1993 Special Study 20 - Valencia Wash Basin Management Study • 1992 Special Study 21 - Upper Carmack, South Branch, Sub-Basin Management Study • 1992 Special Study 22 - 27 Mile Wash Flood Plain Delineation Study • 1993 Special Study 23 - TanqueVerde Creek Management Study • 1993 Special Study 24 - Tortolita Area Basin Management Plan • 1993 Special Study 25 - Mt. Lemmon Culvert Study • 1994 Special Study 26 - Southwest Basin Management Study Ph. II Part A • 1995 Special Study 27 - New Tucson, Units 21, 22, 23, 24 & 27, Erosion-Hazard Setback Analysis for Unit 23 • 1994 Special Study 28 - Hydrology/Hydraulics Report for Demetrie Wash • 1989 Special Study 29 - San Joaquin Estates Floodplain	

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	Status Hydrology Report for San Joaquin Estates • 1994 Special Study 30 - Hydrologic/Hydraulic Report for Palo Verde Ranch • 1996 Special Study 31 - Brawley Wash Floodplain Study • 1996 Special Study 32 - New Tucson Units 26, 28, 29 & 30 • 1995 Special Study 34 - 49ers Country Club Lots 315 to 324 • 1999 Special Study 35 - Earp Wash • 2009 Special Study 36 - Camino Real Wash Letter of Map Revision • 1999 Special Study 37 - Camino de Oeste Wash • 2000 Special Study 38 - Sahuarita Basin Management Study • 2000 Special Study 39 - HEC-1 and FLO 2-D Models for Finger Rock Wash • Special Study 40 - Mission Wash Study for FEMA • 1999 Special Study 42 - Brawley Wash Primary Flood Corridor Study • 1995 Special Study 43 - Idle Hour Wash Letter of Map Revision • 1983 Special Study 44 - Central Arizona Project (CAP) Tucson Aqueduct • 2003 Special Study 45 - Summerhaven Hydrologic and Hydraulic Analysis • 2007 Special Study 46 - Sheet Flood Mapping for Unincorporated Pima County • 2003 Special Study 47 - Silverbell Trails Estates • 2008 Special Study 48 - Hacienda Sol Wash Floodplain Analysis • 2007 Special Study 49 - Diamond Bell Ranch Hydrology • 2008 Special Study 50 - Floodplain Study for Flecha Caida Ranch Estates #9	

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	• 2008 Special Study 51 - Floodplain Analysis for Tanuri Wash • 2004 Special Study 52 - Emergency Evaluation Study Report on the July 29, 2003, Flooding in Ajo, Arizona • 2010 Special Study 53 - Floodplain Mapping of the Woodland Wash and its Tributaries • 2010 Special Study 54 - Floodplain Mapping of the Geronimo Wash and its Tributary • 2010 Special Study 55 - Flecha Caida LOMR Technical Data Notebook • 2010 Special Study 56 - Craycroft Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping of the Craycroft Wash and its Tributary • 2010 Special Study 57 - Old Grandad Tank Technical Data Notebook for Hydrologic and Hydraulic Mapping of the Old Grandad Tank Wash and its Tributary • 2010 Special Study 58 - Wentworth Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping of Wentworth Wash and its Tributary • 2010 Special Study 59 - Castle Rock Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping of Castle Rock Wash and its Tributary • 2010 Special Study 60 - Trails End Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping of Trails End Wash and its Tributary • 2011 Special Study 61 - Picture Rocks Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 62 - West	

Table 6-1-1: Legal and regulatory capabilities for Pima County		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	Speedway Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 63 - Camino de Oeste Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 64 - Del Cerro Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 65 - Roger Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 66 - Sweetwater Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 67 - Unnamed Wash 1 Technical Data Notebook for Hydrologic and Hydraulic Mapping • 2010 Special Study 68 - Ventana Canyon Wash and Esperero Wash Technical Data Notebook for Hydrologic and Hydraulic Mapping	

Table 6-2-1: Technical staff and personnel capabilities for Pima County		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Development Services, DOT, RFCD, Wastewater, Solid Waste, Natural Resources and Parks
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Development Services/ DOT / Wastewater
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Development Services / DOT / RFCD / Wastewater, Natural Resources and Parks, Health Department
Floodplain Manager	☑	RFCD / Dev Services
Surveyors	☑	DOT/ RFCD / Natural Resources and Parks
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Dev Services, DOT, Facilities Management, Health, Comm Services, Sheriff, Natural Res/Parks, Risk Mgmt / RFCD
Personnel skilled in GIS and/or HAZUS	☑	Development Services, DOT, RFCD, Wastewater, Facilities Management. Sheriff, Natural Resources/Parks
Scientists familiar with the hazards of the community	☑	Health Department, Wastewater, Medical Examiner, Sheriff
Emergency manager	☑	OEM, Sheriff
Grant writer(s)	☑	OEM, Dev Services, Health Department, Cultural Resources

Table 6-3-1: Fiscal capabilities for Pima County		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	

Table 6-1-2: Legal and regulatory capabilities for Marana		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
CODES	• Marana Town Code • Land Development Code • 2006 International Building Code with amendments additional IBC Amendments • 2006 International Residential Code with amendments additional IRC Amendments • 2006 International Mechanical Code with amendments • 2006 International Plumbing Code with amendments (adopted 07/01/2007) • 2006 International Energy Conservation Code with amendments • 2006 International Property Maintenance Code with amendments • 2005 National Electrical Code with amendments • 2006 International Fire Code with amendments (adopted 08/21/2007)	• Planning • Engineering • Fire
ORDINANCES, RESOLUTIONS	• Resolution 2003-141 – IGA with Pima County: Assist with Review & Update of Marana's Emergency Operations Plan • Resolution 2006-12 – Adopting of Emergency Operations Plan • Resolution 2006- 174 – Approving & Authorizing Pima County Multi-Jurisdictional Hazard Mitigation Plan • Resolution 2010- 99 – Subgrantee for funding – 2010 State Homeland Security Program (references emergency operations in the 3rd paragraph) • Ordinance 85.05 – Enacting the Emergency Operations/Disaster Plan for the Town of Marana	• Police • Council • Town Manager
PLANS, MANUALS, and/or GUIDELINES	• Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007) • Town of Marana Emergency Operations Plan 2006	• Police
STUDIES	•	•

Table 6-2-2: Technical staff and personnel capabilities for Marana		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Dept of Public Works, Subdivision Engineering Dept.
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Dept. of Public Works, Manager Construction Mgmt. Div.
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Dept. of Public Works, Manager Environmental Engineering Div.
Floodplain Manager	☑	Dept of Public Works, Subdivision Engineering Dept.
Surveyors	☑	GIS Dept
Staff with education or expertise to assess the community's vulnerability to hazards		
Personnel skilled in GIS and/or HAZUS	☑	GIS Dept./GIS Manager and Staff
Scientists familiar with the hazards of the community		
Emergency Management Coordinator	☑	Police Department
Grant writer(s)	☑	Community Development

Table 6-3-2: Fiscal capabilities for Marana		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	Fees for water
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	

Table 6-1-3: Legal and regulatory capabilities for Oro Valley		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
CODES	• International Building Code (2006) • International Residential Code (2006) • International Plumbing Code (2006) • International Mechanical Code (2006) • International Energy Conservation Code (2006) • International Property Maintenance Code (2006) • International Fire Code (2006) • International Fuel Gas Code (2006) • National Electrical Code (2005) • Americans with Disabilities Act Accessible Guidelines (1998) • Oro Valley Zoning Code, Revised (2011) • Oro Valley Town Code, Chapters 6, 7, 15 & 17	• Development and Infrastructure Services (DIS)
ORDINANCES	• Town of Oro Valley Floodplain and Erosion Hazard Management Ordinance (2005) • Town of Oro Valley Storm Water Management and Discharge Control Ordinance, Article 15-24 (2008) • Environmental Sensitive Lands Regulations, 27.10 (2011) • Zoning Code adopted by Ordinance includes: Hillside Development Zone, 24.2; and Airport Environs Zone, 24.8 (2011)	• Golder Ranch Fire District • DIS
PLANS, MANUALS, and/or GUIDELINES	• US Army Corps of Engineers, Federal Highway Administration, "State Standard 7-98 Watercourse Bank Stabilization" • Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007) • Pima County DOT Stormwater Detention/Retention Manual • Town of Oro Valley General Plan (2005) • Capital Investment Plan (2010) • Town of Oro Valley Subdivision Street Standards • Pima County – City of Tucson Standard Specifications and Details for Public Improvement Projects (2006) • City of Tucson Standards Manual for Drainage Design and Floodplain Management • City of Tucson Design Manual • Storm Water Ready Plan • Drainage Criteria Manual (2010) • Drought Management Plan • Catalina Community Wildfire Protection Plan (2007) • Pima County Navigable Waters and Flood	• Pima County Regional Flood Control District • City of Tucson • Golder Ranch • DIS • Finance • Water Utility

Table 6-1-3: Legal and regulatory capabilities for Oro Valley		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
	Plains • Town Water Utility Drought Policy • Town Water Utility Emergency Response Plans	
STUDIES	• FEMA Flood Plain Maps (2011) • FEMA Flood Delineation Studies (1999) • Town of Oro Valley Town Wide Drainage Study (2008) • Pima County Flood Control District Flood Plain Studies • Canyon del Oro Wash LOMR (2008) • Lomas De Oro Wash (2008) • El Conquistador LOMR (2010) • Big Wash (OV marketplace LOMR) (2010) • Local Pima County Wash studies a) Arroyo Grande, 2009 b) Linda Vista/Logan's Crossing, 2010 c) Highlands Wash, 2011 • Evaluation of emergency routes	• FEMA • Pima County Regional Flood Control District • DIS

Table 6-2-3: Technical staff and personnel capabilities for Oro Valley		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Development and Infrastructure Services
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Development and Infrastructure Services
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Development and Infrastructure Services Oro Valley Police Department Water Utility
Floodplain Manager	☑	Development and Infrastructure Services
Surveyors		
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Development and Infrastructure Services Oro Valley Police Department Water Utility
Personnel skilled in GIS and/or HAZUS	☑	Development and Infrastructure Services
Scientists familiar with the hazards of the community		
Emergency manager	☑	Oro Valley Police Department
Grant writer(s)	☑	Various departments
Others	☑	Town staff trained in NIMS and ICS

Table 6-3-3: Fiscal capabilities for Oro Valley		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, electric service, and stormwater	Yes	
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	

Table 6-1-4: Legal and regulatory capabilities for Pascua Yaqui Tribe		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
CODES	• IBC 2006 • IFC 2009 • NFPA Standards 2009	• Fire Department • Facilities and Housing Department
ORDINANCES	• Zoning Ordinance (similar to Pima County) • Reference county and state ordinances	• Land Department/ Development Services
PLANS, MANUALS, and/or GUIDELINES	• Salt River Wildland Fire Management Plan (2011) • Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007)	• Fire Department • Land Department/ Development Services
STUDIES	• Environmental and Floodplain Studies for new facilities. • Endangered Species List study	• Land Department/ Development Services

Table 6-2-4: Technical staff and personnel capabilities for Pascua Yaqui Tribe		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Land Department/Development Services – Director Procurement Department – Construction Manager
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Facilities and Housing Department – Director, Inspectors Procurement Department – Construction Manager
Planner(s) or engineer(s) with an understanding of natural and/or human-caused hazards	☑	Fire Department – Fire Chief
Floodplain Manager		
Surveyors		
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Health Department – Risk Manager
Personnel skilled in GIS and/or HAZUS	☑	Land Department/Development Services – GIS Analyst
Scientists familiar with the hazards of the community		
Emergency manager	☑	Police Department – Police Chief
Grant writer(s)	☑	Tribal Grants/Contracts

Staff resources in several PYT departments and programs, working under the auspices of the tribal council, collectively provide hazard mitigation for the Tribe. The PYT also, when necessary, hires consultants or works with outside public agencies to conduct the necessary technical studies and analyses to determine both risk and mitigation alternatives.

Table 6-3-4: Fiscal capabilities for Pascua Yaqui Tribe		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	Developed based on availability of funds. Rolling 5-year basis.
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	No	PYT does not have the legal capability to impose fees. These fees are all imposed by non-Tribal utility providers. The Tribe would have the authority to tax these utility service fees, but currently does not.
Impact fees for homebuyers or new developments/homes	No	PYT has the legal capability to impose fees but currently does not.
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	The Tribe has this capability, but the taxes collected by the Tribe are probably not sufficient, and never will be sufficient, to support bonds based upon those possible tax streams.
Other: Grants, Inter-governmental Agreements and Specific Planning and Project Grants	Yes	

Current and past financial sources available to the Tribe for hazard mitigation planning and projects include potential disaster and mitigation funds through FEMA (Public Assistance, HMGP, and PDM funds), programs established through the Indian Self Determination Act (Public Law 93-638), casino and tribal enterprise revenues, and various departmental operation budgets. Other potential sources of funds may include the U.S. Department of Interior (Bureau of Reclamation, Bureau of Indian Affairs, U.S. Geological Survey, Bureau of Land Management), U.S. Army Corps of Engineers, U.S. Housing and Urban Development, U.S. Department of Health and Human Services (Indian Health Service), and the U.S. Department of Agriculture (U.S. Forest Service, Natural Resources Conservation Service), State of Arizona (Governor's Office of Economic Development, Arizona Department of Transportation, Arizona Department of Housing, Arizona Department of Health Services), Pima Association of Governments, and other federal, state and local sources.

Table 6-1-5: Legal and regulatory capabilities for Sahuarita		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
CODES	• Sahuarita Town Code - current through Ordinance 2011-051, passed March 28, 2011 • 2006 Series of International Codes (Chapter 15.05 of the Town Code) as amended • 2005 National Electric Code as amended	• Planning & Building Safety • Police • Public Works • Green Valley Fire District • Rural Metro Fire District
ORDINANCES	• Floodplain Management Ordinance (Chapter 14.05 of Town Code – Ord Nos. 2006-09 § 3, 2006-15 § 1, 2006-15 § 2, and 2006-15 § 3) • Aquifer Protection permit #103602	• Public Works • Water Reclamation

PLANS, MANUALS, and/or GUIDELINES	• Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007)
	• Town of Sahuarita General Plan (2003)
	• Specific Plans
	  • Madera Highland (2003)
	  • Quail Creek (Amended 2000)
	  • Rancho Sahuarita (Revised 2010)
	• Sahuarita Town Center and Santa Cruz River Corridor Sub Area Plan (2008)
	• Strategic Plan for Economic Development (2009)
	• Capital Improvement Plan (5-Year Rolling Plan Updated Annually)
	• Strategic Plan for Emergency Preparedness 2011
		• Planning & Building Safety
		• Public Works
		• Police Department

STUDIES	• None	• None

Table 6-2-5: Technical staff and personnel capabilities for Sahuarita		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Public Works Director, Planning Director, Building Official
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Public Works Director, Building Official
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Public Works Director, Planning Director, Building Official, Emergency Planner
Floodplain Manager	☑	Public Works Director
Surveyors	☑	Contract firm, Public Works Director
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Public Works Director, Planning and Building Safety Director, Emergency Planner
Personnel skilled in GIS and/or HAZUS	☑	Contract Firm for Planning and Public Works Department

Table 6-2-5: Technical staff and personnel capabilities for Sahuarita		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Scientists familiar with the hazards of the community	☑	Public Works Director
Emergency manager	☑	Emergency Response Planner
Grant writer(s)	☑	Police Department, Public Works, Parks and Recreation Department, Office of the Town Manager

Table 6-3-5: Fiscal capabilities for Sahuarita		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	Multi-year CIP Program to include Sahuarita Road redevelopment including pedestrian underpass
Authority to levy taxes for specific purposes	No	None
Fees for water, sewer, gas, or electric service	Yes	Sewer connection/hook-up fees, no other for Town
Impact fees for homebuyers or new developments/homes	No	None, see "other" below
Incur debt through general obligation bonds	Yes	Only when necessary
Incur debt through special tax bonds	No	None
Other/Construction Sales Tax	Yes	Levied for each new home built in community

Table 6-1-6: Legal and regulatory capabilities for Tucson		
Regulatory Tools for Hazard Mitigation	**Description**	**Responsible Department/Agency**
CODES	• 2006 IBC with local amendments (w/la) • 2006 Tucson Building Code (w/la) • 2003 ICC/ANSI A 117.1 (w/la) • 2006 IRC (w/la) • 2006 IEBS (w/la) • 2006 IECC (w/la) • 2006 IMC (w/la) • 2006 IFGC (w/la) • 2006 IFC (w/la) • 2006 IPC (w/la) • 2005 National Electrical Code/NFPA-70 (w/la) • 2006 IPC (w/la) • Tucson Land Use Code	• Development and Planning Services
ORDINANCES	• Tucson Code of Ordinance	• City Manager
PLANS, MANUALS, and/or GUIDELINES	• Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007) • 2001 Tucson General Plan (beginning revision) • 2007 City of Tucson Emergency Operations Plan (currently being updated) • 2004 Design Standards Manual for Water • National Flood Insurance Program (NFIP) Regulations • 2005 Supplement to the PAG Uniform Standard • Third-party Plan Review Policies and Standards	• City Manager • COT Office of Emergency Mgt. & Homeland Security • Pima County / COTOEMHS • Tucson Water • Tucson Fire • Pima Association of Gov'ts. • Various Departments
STUDIES	• FEMA DFIRM Maps • Dam Safety Studies and Emergency Action Plans • Flood Insurance Studies (FIS)	• Development & Planning Services • Parks & Recreation • Development & Planning Services

Table 6-2-6: Technical staff and personnel capabilities for Tucson		
Staff/Personnel Resources	☑	**Department/Agency - Position**
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Planning Dept. – Principal Planner, Planner II, Planner III Water Services – Superintendents, Project Engineers, Civil Engineers, Project Coordinators, Principal Engineering Technicians, Principal Planners
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Street Transportation Dept. - Civil Engineers Water Services – Superintendents, Civil Engineers, Project Coordinators, Principal Engineering Technicians
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Planning Dept. – Principal Planner, Planner II, Planner III Water Services – Superintendents, Civil Engineers, Principal Engineering Technician, Hydrologist
Floodplain Manager	☑	Street Transportation Dept. - Civil Engineer III
Surveyors	☑	Street Transportation Dept. – Survey Teams
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Water Services – Environmental Programs Coordinator, Civil Engineers, Water Quality Inspectors
Personnel skilled in GIS and/or HAZUS	☑	Information Technology Services – Info Tech Analyst/Programmers and Info Tech Specialists Fire Dept. – Fire Protection Engineer Police Dept. – Senior User Technology Specialist Street Transportation Dept. - Info Tech Analyst/ Programmer II and Senior GIS Technician Water Services Dept. – GIS and Senior GIS Technicians
Scientists familiar with the hazards of the community	☑	Office of Environmental Programs – Environmental Quality Specialists Water Services – Chemists, Environmental Quality Specialist, Laboratory Technician, Environmental Programs Coordinator
Emergency manager	☑	Tucson Office of Emergency Management
Grant writer(s)	☑	Fire Dept. – Fire Captains and Grant Manager Planning Dept. – Principal Planner, Planner II, Planner III Police Dept. – Police Research Analysts Public Transit, Division of Transportation

Table 6-3-6: Fiscal capabilities for Tucson		
Financial Resources	**Accessible or Eligible to Use (Yes, No, Don't Know)**	**Comments**
Community Development Block Grants	Yes	Housing, Community Services, and Water Services projects
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	Water and Solid Waste Fees
Impact fees for homebuyers or new developments/homes	Yes	For new developments inside impact fee areas-zones only. The Impact Fees are charged to new developments.
Incur debt through general obligation bonds	Yes	This excludes the Water Department
Incur debt through special tax bonds	Yes	Excise (sales) taxes

6.2.2 Tribal Pre- and Post Disaster Hazard Management

In addition to Tables 6-1-4, 6-2-4, and 6-3-4, the Pascua Yaqui Tribe is required to summarize and evaluate pre- and post-disaster hazard management to satisfy the §201.7 Tribal Planning capability assessment requirements. Accordingly, Table 6-4 summarizes hazard mitigation and pre- and post-disaster hazard management practices and roles that are currently accomplished through several Pascua Yaqui Tribe departments and programs.

Table 6-4: Departments or entities with hazard mitigation, pre-disaster hazard management, and/or post-disaster hazard management responsibilities for the Pascua Yaqui Tribe

Department or Agency	Hazard Mitigation and/or Disaster Management Activities
Office of the Chairman	• General emergency oversight • General development oversight
Tribal Council	• Final approval for all pre-disaster planning, projects and funding allocation for pre- and post-disaster hazard management activities.
Land Department	• Regulates land use and development including zoning and flood management. • Lead planning department for all tribal development including flood control, transportation, and other physical improvements on the reservation.
Fire Department	• Shared emergency management role with Police Department • Emergency response and mitigation responsibilities regarding fire and HAZMAT. • HAZMAT awareness and operations, but not technical response for removal or clean-up. • Wildland fire awareness and operations • CERT Team collaboration • Part of the AZ Mutual Aid Compact (AZMAC) • (Pima County Fire Chiefs mutual aid agreement.pending)
Health Department	• Control of disease and outbreak incidents • Dispensing of medication and anti-viral vaccines through points of distribution and points of dispensing. • Public awareness and public service announcements in collaboration with the local radio station. • Conduct training for hazard related issues and incidents • CERT Team collaboration
Police Department	• Shared emergency management role with Fire Department • Response and mitigation for many of the human-caused hazards related to the civil population and terrorism • Enforcement of tribal law • Participates in a regional SWAT team
Facilities Management	• Maintain and operate heavy equipment for response to disaster related needs • Maintain electricians on staff • Responsibility for emergency shut-off of water mains • Maintain a 24/7 on-call capability
Procurement Department	• Emergency and other purchases • Maintenance of emergency generators
Indian Health Services – Office of Engineering and Environmental Health	• Emergency response and post-disaster needs assessments for mitigation and recovery.
BIA	• Mutual aid cooperative agreement with PYT for fire response and financial assistance.

The Pascua Yaqui Tribe has several programs and policies in-place to provide for effective hazard mitigation, as is summarized in Tables 6-1-4, 6-2-4, 6-3-4 and 6-4. The Tribal Planning Team performed an evaluation/assessment of the information summarized in Tables 6-1-4, 6-2-4, 6-3-4 and 6-4, and noted the following regarding successes, gaps, opportunities and changes over the last plan cycle:

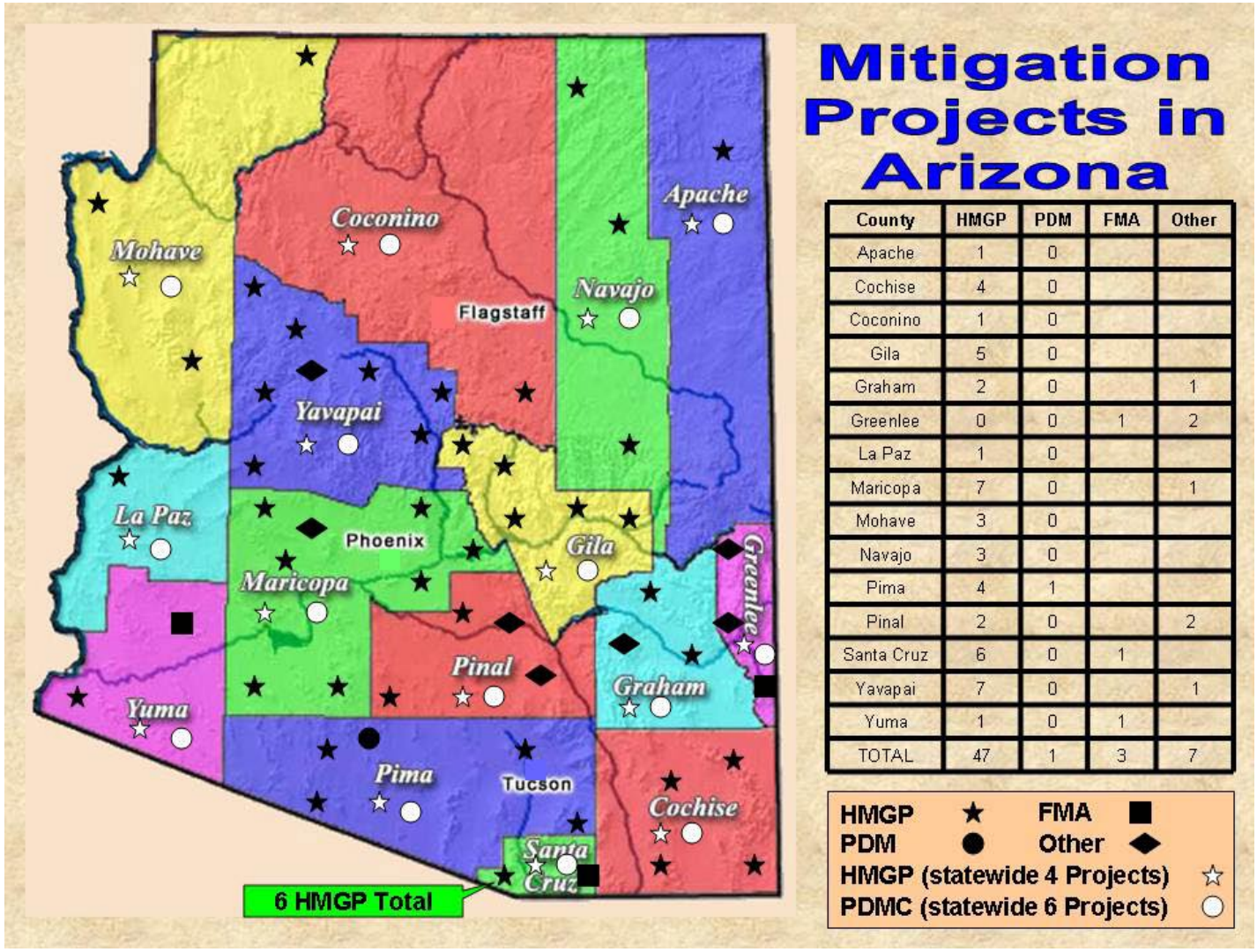
- Regarding pre- and post-disaster hazard management policies, programs, and capabilities, the tribal planning team:
    - Identified a need for the development of an emergency response plan.
    - Identified a need for additional resources to adequately respond to a human-caused incident at the AVA entertainment facility and casino.
    - Found that the current mutual aid agreements were proving effective in providing additional response capacity
    - The management of flood related hazards is by far the most prominent hazard mitigation need for the Tribe due to the reservation being wholly situated within a 100-year floodplain and subject to regular flooding. There is a serious need for flood control related funding and projects.
- There has been no significant change in the Tribe's policies related to development in hazard prone areas over the 2007 Plan cycle other than to regulate to the 100-year floodplain using the data and recommendations of the Master Drainage Study summarized in Table 7-1 (See Section 7.3 of this Plan).
- Specific hazard management capabilities of the tribe that have changed since approval of the previous plan include:
    - New BIA, Pima Fire Chiefs, and SWAT cooperative/mutual aid agreements have been developed.
    - The Master Drainage Plan summarized in Table 7-1 was completed and became available for flood management use.
    - CERT teams newly were organized in 2008

Upon receipt of a presidential disaster declaration, the Tribe will work with FEMA to develop two post-disaster hazard management tools: 1) a Public Assistance Administration Plan, and; 2) a Hazard Mitigation Grant Program Administration Plan. Both plans will be used by the Tribe to identify the roles and responsibilities of the Tribe in administering the FEMA Public Assistance (PA) and Hazard Mitigation Grant Programs (HMGP), and to outline staffing requirements and the policies and procedures to be used. A result of developing these plans, as well as preparing this Plan, will be to further focus Tribal resources on the importance of hazard management and mitigation planning.

6.2.3 Previous Mitigation Activities

During the last planning cycle many mitigation activities have been accomplished by the jurisdictions within Pima County. Table 6-5 provides an updated summary, by jurisdiction, of recent mitigation activities performed over the last planning cycle or generally within the last five to ten years. Table 6-6 identifies projects within Pima County that used federal mitigation grant funding for past projects.

Figure 6-1 is a graphical depiction of past federally funded mitigation projects in the State tracked by ADEM.



County	HMGP	PDM	FMA	Other
Apache	1	0		
Cochise	4	0		
Coconino	1	0		
Gila	5	0		
Graham	2	0		1
Greenlee	0	0	1	2
La Paz	1	0		
Maricopa	7	0		1
Mohave	3	0		
Navajo	3	0		
Pima	4	1		
Pinal	2	0		2
Santa Cruz	6	0	1	
Yavapai	7	0		1
Yuma	1	0	1	
TOTAL	47	1	3	7

Source: ADEM, 2010

Figure 6-1: Past Mitigation Projects in Arizona

Table 6-5: Previous mitigation activities for Pima County jurisdictions

Jurisdiction	Project Name	Project Description	Project Cost	Funding Source	Responsible Department	Completion Date
Pima County	Floodprone Land Acquisition Program	This program is utilized to purchase flood- and erosion-prone land. By acquiring floodprone land, the District reduces future losses on these parcels and eliminates the need for structural flood control improvements. During the period 2006-2010, 58 parcels (1,291 acres) were purchased.	$9,800,000	General Obligation Bonds and Tax Levy	Pima County Regional Flood Control District	Ongoing
Pima County	Arroyo Chico Multi-Use Project – Phase 2A (Cherry Field Detention Basin)	Pima County in cooperation with the U.S. Army Corps of Engineers (ACOE), has undertaken a multi-phase project to reduce frequent flooding of residential, commercial and industrial areas along Arroyo Chico. At completion of all phases, 1,048 structures will be removed from the 100 year floodplain.	$20,000,000	ACOE and Tax Levy	Pima County Regional Flood Control District	December 2008
Pima County	Mission View Detention Basin	A regional detention basin was constructed to collect and concentrate sheet flow in an area of limited conveyance. This was done to reduce repeated residential and street flooding. Approximately 44 homes are protected from flooding.	$8,900,000	97 General Obligation Bonds	Pima County Regional Flood Control District	June 2010
Pima County	Earp Wash Detention Basin	A detention basin was built along Earp Wash to mitigate residential and commercial flooding problems. The project attenuates downstream peak flows and improves drainage conveyance.	$2,400,000	97 General Obligation Bonds	Pima County Regional Flood Control District	April 2008
Pima County	Ajo Curley Detention Basin	A detention basin was built on a tributary to Gibson Arroyo in Ajo, Arizona. The detention basin eliminates flood flows onto Curley School property and attenuates peak flows downstream on Gibson Arroyo.	$1,400,000	04 General Obligation Bonds	Pima County Regional Flood Control District	April 2008
Marana	Silverbell Road from Cortraro to Ina	Constructed 5 new lanes of roadway, sewer mainline, waterline replacement and major drainage improvements	$23.5 Million	Transportation 2008 Series Bonds	Public Works	
Marana	Twin Peaks Improvements	Construction of a traffic interchange, road improvements (that included major drainage elements) from Linda Vista to the town limits, and the Twin Peaks bridge	$81 Million	RTA, South Benefit Impact Fees, PAG, General Funds	Public Works, ADOT	2010
Marana	Cortaro Road from UPRR to Star Grass Road	Roadway and corresponding flood control improvements	$8.2 Million	Grants, PAG, Transportation Funds	Public Works	
Marana	San Lucas Flood Wall	Construction of a flood wall	$6,000	Utility Operating Funds	Developer	2011
Marana	Thornydale Road from Orange Grove to Santa Cruz River	Roadway and corresponding flood control improvements	$20.2 Million	General Fund, Transportation Fund, Help Loan	Public Works	
Marana	Lon Adams Drainage	Project to address parking lot drainage	$3,000	General Fund	Operations & Maintenance	
Marana	Northwest Fire Drainage Repair	Drainage ditch repair of a small and overgrown channel. The concrete channel on the north and west edge of the property takes the flow from under the I-10 and surrounding properties.	$165,000	N/A	N/A	

Marana	Picture Rocks Reservoir		$260,000	Utility Impact Fees	Utility Department	
Marana	1422-8, Berry Acres	Land Acquisition	$426,111.00	HMGP	Public Works Department	2003
Oro Valley	Linda Vista West Drainage Improvements	Install Gabion Rock bank protection to divert water from flooding the road and houses down gradient	$120,000	PCRFCD	DIS	June 2011
Oro Valley	Lomas De Oro Channel Stabilization Project	Install 3000 feet of Rock Gabion Bank Protection; Install all weather box culverts crossing on Lucero Road.	$1,550,000	FEMA, ADEM, PCRFCD	DIS	June 2011
Oro Valley	Lambert Lane All Weather Crossing at Highland Wash	Install all weather con arch crossing on Lambert Lane	$975,000	PCRFCD	DIS	Dec 2007
Oro Valley	La Canada Road Bridge	Install Bridge over the CDO Wash at La Canada Road	$3,250,000	PCRFCD	DIS	Sep 1984
Oro Valley	Widen La Canada Road Bridge	Widen the Bridge over the CDO Wash at La Canada Road	$3,500,000	Town CIP	DIS	Apr 2005
Oro Valley	First Avenue Bridge	Install Bridge over the CDO Wash at First Avenue	$3,920,000	PCRFCD	DIS	Sep 1985
Oro Valley	Widen First Av Bridge	Widen the Bridge over the CDO Wash at First Avenue	$2,500,000	Town CIP	DIS	Nov 2006
Oro Valley	Poinsettia Road Drainage Improvements	Installed culverts, drainage channels and diversion berm to eliminate roadway flooding and debris issue.	$130,000	Stormwater Utility Fee	DIS	Mar 2011
Oro Valley	Naranja Road All Weather Crossing at Highland Wash	Installed box culverts to eliminate a dip crossing and road flooding hazard.	$800,000	Private Funds	DIS	Mar 2006
Oro Valley	Tangerine Road All Weather Crossings from La Canada to 1st Avenue	Installed several box culverts to eliminate dip crossings and road flooding hazards when road was widened.	$2,500,000	Town CIP	DIS	May 2004
Oro Valley	Improve Drainage in Oro Valley Estates	Constructed and expanded several drainage ways throughout this subdivision to eliminate road flooding issues.	$460,000	PCRFCD	DIS	May 2010
Oro Valley	CDO Bank Stabilization	Constructed a soil cement levee from Oracle Road to La Canada Drive.	$8,520,000	PCRFCD	DIS	Dec 1987
Oro Valley	Bank Protection Oracle Road Bridge over CDO	Stabilized the bridge banks at the CDO wash.	$8,520,000	PCRFCD	DIS	Dec 1987
Oro Valley	Pusch View Bridge	Install Bridge over the CDO Wash at Pusch View Lane	$8,460,000	Town CIP	DIS	Nov 2006
Oro Valley	Rancho Vistoso Bridge	Install Bridge over the Big Wash at Rancho Vistoso Blvd	$2,600,000	PCRFCD	DIS	Dec 1993
Oro Valley	Big Wash Bank Stabilization	Constructed a soil cement levee from Tangerine Road north on Big Wash approximately 1000 feet.	$1,500,000	Private Funds	DIS	May 2004
Sahuarita	Pig Weed Project	Annual project for the past three years to mitigate the potential for fire hazard at town Park, near Quail Creek. Pig weed is removed annually.	$3240.00	Town General Fund	Parks and Recreations Dept.	June 2011
Sahuarita	Floodplain Efforts	General Plan for Town has included policies related to discouraging development within identified floodplain areas to mitigate damages in event of a flood.	None	None	Planning and Building Safety	May 2009
Sahuarita	Extreme Heat Mitigation effort	Landscape standards of Zoning Code was changed to include landscaping standards to requiring shade provision to reduce local heat island effect	None	None	Planning and Building Safety	May 2009

Sahuarita	Floodplain Efforts	Construction of drainage channel. Drainage channel routes water away from the park. The recharge basins & park were also elevated to bring the area out of the floodplain limits.	$3 million	Wastewater fund	Public Works	June 2008
Sahuarita	Flash Flooding Efforts	An area of town has experienced flash flooding in the past from a breakaway wash. Town build up a berm along the north end and built walls around structures.	None	None	Public Works	Aug 2008
Sahuarita	Chemical Storage	The SWRF currently has the ability to store 4 chemicals on-site for the treatment process. Each chemical has a specific storage area and procedures in order to protect the staff. Staff is trained in chemicals handling and MSDS sheets for chemicals are on file at the wastewater plant and are located on the Town's server	$9,000	General fund	Public Works	July 2009
City of Tucson	Milagrosa Hills	Restore Waterline	$217,371	HMPG	Water	June 2007
City of Tucson	Avra Valley N Simpson Farm		$ 41,000	HMPG	Water	June 2007
City of Tucson	Alamo Wash	Re-bank	$854,533	HMPG	Transportation	June 2007
City of Tucson	Seneca@Rainbow Vista	Bank Gabion	$289,870	HMPG	Transportation	June 2007
City of Tucson	Alamo Wash N of 5th, W of Ruston	Bank Gabion	$181,631	HMPG	Transportation	June 2007
City of Tucson	Houghton – Speedway to Broadway	Replace concrete; grade control structure	$781,847	HMPG	Transportation	June 2007

Table 6-6: Previous projects in Pima County jurisdictions receiving federal mitigation grant funding

Applicant	Project Title	Project Type	Year Begun	Year Ended	Total Cost (x $1,000)	Federal Cost Share (x $1,000)	Non-Federal Cost Share (x $1,000)	Program
Pima County	977-11, Emergency Rapid Response	EOC upgrade	1997	2000	$47,000.00	$35,250.00	$11,750.00	HMGP
Pima County	977-15, Video Down Link (5%)	Down link from airborne source to EOC	1998	2001	$130,000.00	$97,500.00	$32,500.00	HMGP
Pima County	977-24, Mitigation Plan (5%)	Mitigation Plan	1998	2001	$134,000.00	$100,500.00	$33,500.00	HMGP
Town of Marana	1422-8, Berry Acres	Property Acquisition	2002	2003	$426,111.00	$319,583.25	$106,527.75	HMGP

6.2.4 National Flood Insurance Program Participation

Participation in the NFIP is a key element of any community's local floodplain management and flood mitigation strategy. Pima County and the 6 other incorporated jurisdictions participate in the NFIP. Joining the NFIP requires the adoption of a floodplain management ordinance that requires jurisdictions to follow established minimum standards set forth by FEMA and the State of Arizona, when developing in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by the 100-year flood, and that new floodplain development will not aggravate existing flood problems or increase damage to other properties. As a participant in the NFIP, communities also benefit from having Flood Insurance Rate Maps (FIRM) that map identified flood hazard areas and can be used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are also an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community. Table 6-7 summarizes the NFIP status and statistics for each of the jurisdictions participating in this Plan.

Table 6-7: Summary of NFIP status and statistics for Pima County and participating jurisdictions as of August 31, 2011

Jurisdiction	Community ID	NFIP Entry Date	Current Effective Map Date	Number of Policies	Amount of Coverage (x $1,000)	Floodplain Management Role
Pima County	040073	2/15/1983	6/16/2011	2,546	$579,900	Managed through PCRFCD
Marana	040118	8/1/1984	6/16/2011	325	$85,073	Provides floodplain management for the town
Oro Valley	040109	12/4/1979	6/16/2011	90	$27,187	Provides floodplain management for the town
Pascua Yaqui Tribe	---	---	---	---	---	Not a Participant in the NFIP
Sahuarita	040137	6/30/1997	6/16/2011	30	$8,450	Provides floodplain management for the town
South Tucson	040075	1/31/1979	6/16/2011	1	$175	City defers floodplain management to PCRFCD
Tucson	040076	8/2/1982	6/16/2011	2,052	$423,498	Provides floodplain management for the city

Source: http://bsa.nfipstat.com/reports/1011.htm (8/31/2011); FEMA Community Status Report in NFIP (2/16/2011)

6.3 Mitigation Actions/Projects and Implementation Strategy

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

The process for defining the list of mitigation A/Ps for the Plan was accomplished in three steps. First, an assessment of the actions and projects specified in Section 6.4 of the 2007 Plan was performed, wherein each jurisdiction reviewed and evaluated their jurisdiction's specific list. Second, a new list of A/Ps for the Plan was developed by combining the carry forward results from the assessment with new A/Ps. Third, an implementation strategy for the combined list of A/Ps was formulated. Details of each step and the results of the process are summarized in the following sections.

6.3.1 Previous Mitigation Actions/Projects Assessment

The Planning Team and Local Planning Team for each jurisdiction reviewed and assessed the actions and projects listed in Tables 6-27 through 6-33 of the 2007 Plan. The assessment included evaluating and classifying each of the previously identified A/Ps based on the following criteria:

STATUS		***DISPOSITION***	
Classification	Explanation Requirement:	Classification	Explanation Requirement:
"***No Action***"	Reason for no progress	***"Keep"***	None required
"***In Progress***"	What progress has been made	***"Revise"***	Revised components
"***Complete***"	Date of completion and final cost of project (if applicable)	***"Delete"***	Reason(s) for exclusion.

Any A/P with a disposition classification of "Keep" or "Revise" was carried forward to become part of the A/P list for the Plan. All A/Ps identified as "Delete" were removed and are not carried forward in this Plan. The results of the assessment for each of the 2007 Plan A/Ps is summarized by jurisdiction in Tables 6-8-1 through 6-8-6. It is noted that there are no Tables 6-8-xx provided for South Tucson or the Tohono O'odham Nation.

Table 6-8-1
Pima County assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
1	3.B.2	Develop a Shelter in Place educational program.	• Office of Emergency Management • Staff time • 12 months, ongoing	In progress	Keep	Web site is being developed and this information will be shared from this site
2	3.B.1	Develop a Mass evacuation strategy	• Transportation Department • Staff time • 18 months	Complete	Delete	PCOEM completed an evacuation plan in July of 2008
3	1.A.1	Review & Modify Pima County Comprehensive Plan & Sonoran Desert Conservation Plan.	• Development Services Department • Staff time • 24 months	No Action	Delete	Pima County Comprehensive Plan update has been rescheduled to 2015. No really mitigation related and will be deleted.
4	5.A.7	Enforce Flood & Erosion Hazard Ordinances	• Pima Regional Flood Control District • Staff time • Ongoing	In Progress	Keep	The ordinance has been modified to enhance the compliance enforcement process by including civil penalties. Ambiguous portions of the ordinance have been clarified to better assess if compliance has been achieved.
5	5.B.1	Participate in Community Rating System to reduce Insurance premiums	• Pima Regional Flood Control District • Staff time • Ongoing	In Progress	Keep	Annual reports are submitted to FEMA to certify flood mitigation activities. Our score has improved during the 5-year cycle. The current CRS rating is Class 5 which provides up to a 30% reduction in flood insurance rates.
6	12.B.2	Provide leadership role to hospital preparedness	• Office of Emergency Management • Staff time • Ongoing	Complete	Delete	Pima County OEM has built a hospital preparedness committee and meetings are monthly. On going
7	12.C.2	Maintain a Disaster Medical Assistance Team (DMAT) to support disaster operations	• Office of Emergency Management • Staff and Volunteer time • Ongoing	Complete	Delete	Pima County has the Az1 DMAT team in place. On going

Table 6-8-1
Pima County assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
8	9.B.2	Develop & implement multi-agency exercises & drills related to outbreaks of communicable illnesses & vector control.	• Health Department • Staff and Volunteers time • 2.5 months, ongoing	In Progress	Keep	Pima County Health Department conducts a variety of exercises and drills related to outbreaks. This is an on-going activity.
9	4.B.1	Identify exercises for community needs.	• Office of Emergency Management • Staff and Volunteer time • 40 hours	Complete	Delete	PCOEM has a multi year planning calendar in place and updates it annually. On going
10	4.B.2	Develop exercises for community needs.	• Office of Emergency Management • Staff and Volunteer time • 2 months per exercise	Complete	Delete	PCOEM builds and conducts exercises as needed. This will be on-going
11	4.B.3	Train agencies and community groups involved in exercises.	• Office of Emergency Management • Staff and Volunteer time • 3 days per exercise	Complete	Delete	PCOEM builds and conducts exercises as needed. This is on-going
12	4.B.4	Conduct exercises in the community.	• Office of Emergency Management • Staff and Volunteer time • 1-3 days per exercise	Complete	Delete	PCOEM builds and conducts exercises as needed. This is on-going

Table 6-8-2
Marana's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
1	1.C.2	Provide training to the applicable Town of Marana departments on the adopted hazard mitigation plan and its requirements.	• Town of Marana • None provided • Ongoing	In-Progress	Keep	The town adopted plan was provided to all departments for review.
2	2.B	Provide public outreach to increase awareness of hazards and opportunities for mitigation actions.	• Town of Marana • None provided • Ongoing when funding is available	In-Progress	Revise	Berry Acres residents were advised of the potential for flooding in their area and of the opportunity for land purchase to mitigate the problem
3	3.B.1	Develop a mass evacuation strategy for the Town of Marana	• Town of Marana • None provided • 12 months	In-progress	Keep	Will be part of the current revision of the Town Emergency Operation Plan
4	5.A.4	The Town of Marana will continue to plan for, design, and construct appropriate flood control structures for public safety and damage reduction.	• Town of Marana • $133,330,000.00 • Ongoing	In-progress	Keep	Flood, Road realignment, culverts, drainage repair, flood channel, new overpass, drainage etc.
5	5.A.5	Encourage bridge or culvert construction where roads are susceptible to flooding.	• SEE #4 ABOVE	In-progress	Keep	SEE #4 ABOVE
6	5.B.1	The Town of Marana will continue to participate in the National Flood Insurance Program.	• Town of Marana • None provided • Ongoing	In-progress	Revise	Action/project will be revised to be more specific.
7	5.C.1	The Town of Marana will continue to participate in the Flood Prone Land Acquisition Program so we acquire properties located in flood hazard areas.	• Town of Marana/Pima County • $426,111.00 • Ongoing	In-progress	Keep	Berry Acres: Where possible and financially feasible in coordination with Pima County. SEE # 2 ABOVE
8	6.A.1	Establish intergovernmental agreement between the Town of Marana and the Fire Management Division of the State Land Department for assistance in the provision of emergency services within each other's jurisdictions.	• Town of Marana • None provided • 6 months	Completed	Keep	We have an agreement with NW Fire to provide the Town with fire service. They have and agreement with State Fire department for wild land fires along with other fire districts.

Table 6-8-2
Marana's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
9	11.A.1	Continue to ensure the involvement of industry, Fire Districts, Law Enforcement and other key stakeholders in the Town of Marana Local Emergency Planning Committee.	• Town of Marana • None provided • Ongoing	In-progress	Keep	Town of Marana is involved in the LEPC thru MPD and Northwest Fire District. The PD is the lead Department and over sees the LEPC. NW Fire is a member of the Planning Committee
10	11.B.1	Work with Regional Partners to develop and maintain a database of schools, hospitals, and other key facilities within a one-mile radius of HAZMAT facilities and make that database available to responders.	• Town of Marana • None provided • 12 months then ongoing	In-progress	Delete	This is currently available thru CAMEO

Table 6-8-3
Oro Valley's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
1	1.A.1	Review existing Oro Valley General Plan and zoning code to determine how these documents help limit development in hazardous areas. Modify with additional guidelines, regulations, and land use techniques as necessary within the limits of state statues, while also respecting private property rights.	• Planning and Zoning Administrator • None provided • Ongoing	In progress	Keep	The General Plan is reviewed on an annual basis, with significant changes made only once a year. The next General Plan update is due in 2015. Zoning codes regulate development on hazardous slopes and hillsides, and floodplain ordinances limit. These codes and ordinances are updated regularly.
2	1.C.2	Oro Valley Local Emergency Planning Committee will provide training to applicable Oro Valley Planning and Development department staff of the adopted hazard mitigation plan and its requirements	• Police Department LEPC Representative • None provided • 1 month, ongoing	In progress	Revise	Oro Valley does not have a Local Emergency Planning Committee but does have a representative on the regional Local Emergency Planning Committee. They attend regular meetings and applicable trainings.

Table 6-8-3
Oro Valley's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
3	3.B.1	Develop a mass evacuation strategy for Oro Valley	• Police Department Emergency Management Coordinator • None provided • 12 months, ongoing	In progress	Revise	Town developing mass evacuation strategies that correlate with existing Pima County and State evacuation plans.
4	3.B.2	Develop a Shelter in Place educational program	• Police Department Emergency Management Coordinator • None provided • 6 months, ongoing	In progress	Revise	Town developing a shelter-in-place program that correlates with existing Pima County and State plans.
5	5.A.2	Town of Oro Valley Department of Development and Infrastructure Services will continue to work with and through Pima County Regional Flood Control District (PCRFCD) to acquire property located in the FEMA 100 year flood plain	• Town Engineer • None provided • Ongoing	In progress	Revise	Implementation and progress of this mitigation action is tied to securing funding first. It is dependent on the Pima County Regional Flood Control District bonds. Appraisal of the property and budget limitations will determine the time table for purchasing of property.
6	7.A.2	Support the under grounding of new transmission line construction and use of metal power utility poles as replacements for existing wooden poles or when above ground installation is required	• Planning and Zoning Administrator, Building Official & Town Engineer • None provided • Ongoing	No action	Revise	Implementation and progress of this mitigation action is tied to securing funding first. This project is currently on hold waiting a future funding source.
7	12.A.1	Offer, through the Department of Emergency Management, basic weapons of mass destruction (WMD) courses to Town employees and the public	• Police Department Emergency Management Coordinator • None provided • Ongoing	Complete	Delete	Training to Police Department personnel and other Town personnel is ongoing.

Table 6-8-4
Pascua Yaqui Tribe's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
1	1.B.1	Review existing building codes to determine adequate protection from new development in hazard areas. Where feasible and necessary, modify codes to help mitigate hazards imposed on such development within the limits of the Pascua Yaqui Reservation, while also respecting private property rights adjacent to the Reservation.	• Tribal Council • None provided • 18 months, ongoing	In Progress	Keep	A resolution with an option to adopt the latest codes as they are available, was approved in 1997. Accordingly, the Tribe maintains the most current series of codes.
2	1.D.1	Continued coordination between Pascua Yaqui Tribe, Pima County departments, municipalities, Pima Association of Governments, and other agencies in the development and maintenance of accurate geographic information system information for those hazard areas identified in the adopted hazard mitigation plan.	• Transportation Director • None provided • Ongoing	In Progress	Keep	Coordination has been maintained with those departments on a regular basis.
3	2.A.1	Pro-actively seek availability of Pre Disaster Mitigation and Hazard Mitigation Grant Program funds.	• Fire Department – Fire Chief • None provided • Ongoing	No Action	Delete	Will do this on a project specific basis, as appropriate
4	3.B.1	Develop a Mass Evacuation strategy for Pascua Yaqui Tribe.	• Fire Department – Fire Chief • None provided • 12 months	In Progress	Revise	Procurement and Development has been doing this on an incremental, facility-by-facility basis. Revise to develop a formalized document and plan.
5	6.A.1	Continue the existing intergovernmental agreement between the Tribe and the State Forestry Department for assistance in the provision of emergency services within each other's jurisdictions.	• Fire Department – Fire Chief • None provided • Ongoing	In Progress	Keep	PYT currently does not have an IGA with State Forestry Division, but has communicated with State Forestry Divsion to investigate opportunities.
6	7.B.1	Perform periodic assessments to identify infrastructure vulnerabilities to severe weather.	• Fire Department – Fire Chief • None provided • Ongoing	In Progress	Delete	Project is too vague and needs more detail. Will completely reformulate action/project as appropriate.

Table 6-8-4
Pascua Yaqui Tribe's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
7	9.B.1	Conduct and enhance environmental and epidemiological surveillance activities in those areas identified as being of high public health importance and related to environmental factors such as;, food safety and protection and vector control activities. Surveillance activities must include the identification of vulnerabilities and environmental factors that may contribute to the transmission of the communicable diseases associated with the operation and presence of these facilities in the Pascua Yaqui Tribe, as well as the implementation of preventative action which may be applied to reduce or eliminate the potential for transmission of communicable illnesses. Develop and improve the system of coordination and communication of these findings, trends and observations with other federal, state and local agencies that have similar or related interest.	• Epidemiology Center Director • None provided • 6 months, ongoing	In progress	Keep	PYT PHEP Program currently has an IGA with ADHS for PHEP (Public Health Emergency Preparedness) for epidemiological surveillance activities high risk of communicable diseases and investigation opportunities of outbreaks. With Indian Health Service we have our environmental factors such as; food safety and protection of the environment on the PYT reservation. The PYT PHEP Program has a strong collaboration and communication with ADEM (Arizona Department of Emergency Management), ADHS (Arizona Department of Health Services), Pima County Health Department and the Tucson I.H.S. (Indian Health Services).
8	11.A.4	Promote development of Tribal Emergency Response Committee (TERC) to develop plans and coordination of resources.	• Fire Department – Fire Chief • None provided • 18 months, ongoing	No Action	Delete	No anticipated activity.
9	12.C.1	Obtain Department of Homeland Security (DHS) funding to purchase necessary equipment.	• Fire Department – Fire Chief • None provided • Ongoing	In Progress	Keep	Over the last Plan cycle, PYT has received approximately 5 DHS grants totaling over a half million dollars, for various needs such as barricades, EOC upgrades, communications and records management systems, and others.

Table 6-8-5
Sahuarita's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
1	12.A.3	Promote Child Drowning Prevention programs throughout the Town.	• Police Department • $30,000 plus Staff time • 0.25 FTE for 24 months, ongoing	No Action	Keep	Changes in staffing and budgets restricted a focused effort. Will continue to seek implementation with Fire Department
2	3.A	Improve upon existing capabilities to warn the public of emergency situations by initiating a system to test the ability of local emergency managers to activate the Emergency Alert System (EAS).	• Police Department • Staff time • 0.25 FTE for 6 months	Completed	Revised	Moved over to conduct same effort but using the AENS systems. New system implemented and regularly tested in community
3	2.A	Educate the public to increase awareness of hazards, and potential opportunities for mitigation actions. Make Pima County's public information material sheets, websites, mitigation brochures, and media outlets available.	• Police Department • Staff time • 0.25 FTE for 24 months	Completed	Keep	Brochures and other Pima County public information material distributed annually at Fiesta Sahuarita information booth, and through community/Neighborhood Watch meetings and will continue
4	11.D.2	Sponsor, under LEPC guidance, an annual exercise simulating response to a large-scale HAZMAT incident.	• Police Department • Staff time • 0.25 FTE for 2 days	Completed	Keep	Semi-Annual simulated exercise conducted with all members of PD through training effort. Will continue.
5	10.B.1	Continue to cooperate with the Arizona Department of Transportation in their assessment of existing Town-owned bridges for their susceptibility to geo-hazards.	• Public Works Department • $100,000 plus Staff time • 0.25 FTE for 12 months	Completed	Delete	Program in place with Public Works Streets Department consistently working with ADOT for continual assessment of town-owned and newly built bridges.
6	11.D.1	Provide Emergency Response Guidebooks to all Fire and Law Enforcement vehicles.	• Police Department • $10,000 plus Staff time • 20FTE for 2 hours	Completed	Delete	Received free Emergency Response Guidebooks from Pima County at every new printing, last one 2009 and distributed to all vehicles.
7	1.D.1	Continued coordination between Sahuarita's departments, regional municipalities, Pima Association of Governments, and other agencies in the development and maintenance of accurate geographic information system. Information for hazardous areas is to be identified in the adopted hazard mitigation plan.	• GIS Manager • $50,000 plus Staff time • 0.25 FTE for 48 months	No Action	Delete	Budgetary considerations have caused the elimination of GIS Manager and no backfill of position. All GIS efforts stopped indefinitely

Table 6-8-5
Sahuarita's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
8	8.B.3	Explore policies to ensure reclaimed water lines are installed to provide reclaimed water to common areas for all new development plans.	• Public Works Department • $20,000 • 9 months	No Action	Delete	Studied in jurisdiction and committee recommended as “Not financially beneficial to community”.
9	8.B.1	Use reclaimed water where feasible and utilize other alternative water sources such as passive and active harvesting where appropriate.	• Public Works Department • $10,000 • Ongoing	Completed	Delete	Parks all use water reclamation processes and Town Wastewater plant improved by $1m to use reclaimed water
10	8.A.1	Mandate where appropriate, the use of desert landscaping and Best Management Practices for irrigation for all Town facilities and projects.	• Public Works Department • Staff time • 0.25 FTE for 3 months	Completed	Delete	Both Town code and Town General Plan mandate best management irrigation for all Town facilities.

Table 6-8-6
Tucson's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
1	5.A.1	Identify funding source and construct two bridges and 50 box culverts with 380 back-up power units for signalized intersections at high flood hazard crossings in City of Tucson limits in accord with the COT Department of Transportation 5-year plan. If a box culvert cannot be constructed an automated warning device, consisting of a barricade, signs and flashing lights would be installed.	• Department of Transportation • $70,000,000 • 18 months	No Action	Keep	Unable to do any construction due to lack of funding.

Table 6-8-6
Tucson's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• Lead Agency • Proposed Cost • Proposed Comp Date	Status	Disposition	Explanation
2	3.B.1	Develop a mass evacuation strategy for the City of Tucson to include installing back-up battery power at all 380 signaled intersections in the City of Tucson (e.g. The units would allow the signals to fully function for 4 hours and provide all-way flashing red lights for an additional 6 hours. This would eliminate the need for officers at each intersection).	• Public Works Department • $10,000,000 • 18 months, ongoing	Completed	Delete	Evacuation plan written by in-house staff. Signal back-ups denied by State 3 years in row.
3	12.A.6	Tucson Water, a division of the Utility Services Department, will secure its assets and facilities by implementing actions, in phases, as identified in the Federally mandated Water System Vulnerability Assessment completed in October 2002.	• Utility Services Department • $91,727,000 • 1-4 years	In Progress	Keep	The project is approximately 15% complete and the City has installed approximately $3 million in security measures, upgrades and monitoring equipment.
4	1.C.3	Promote disaster-resistant water delivery system by constructing redundant water transmission lines (e.g. The Utility and the community will be less susceptible to loss of water delivery due to natural or man-made disasters).	• Tucson Water Employees • $26,960,000 • 1-3 years	In Progress	Keep	Department funding the entire project, which is about 1/3 done.
5	8.B.1	Promote the use of effluent and reclaimed (gray) water harvesting for appropriate applications (e.g. Reduce the possibility of damage and losses due to a drought on the Colorado River by completion of the following capital projects: Norris/Main Avenue Reclaimed Transmission Main, Broadway/Columbus Reclaimed Transmission Main, La Paloma Reservoir, Houghton Road Booster).	• Tucson Water Employees • $7,903,000 • 1-3 years	In Progress	Delete	Project is approximately 80% complete with approximately $5 million expended. Projects are completed as money is available. City chose to no longer carry project in the Plan.

Table 6-8-6
Tucson's assessment of previous plan cycle mitigation actions/projects

ID	Name	Description	• **Lead Agency** • **Proposed Cost** • **Proposed Comp Date**	Status	Disposition	Explanation
6	10.A.1	Work with the Arizona Geological Society and U.S. Geological Survey on projects that mitigate geo-hazards (e.g. Continue the feasibility study with the AZ Geological and U.S. Geological Surveys Water Plan 2000-2050.Construct second recharge facility to be known as the Southern Avra Valley Recharge and Recovery Project (SAVSARP). The utility could then use its entire allotment of Central Arizona Project water and provide capacity for recharging additional water supplies. Construction will take 5 years).	• Tucson Water Staff • $51,180,000 • 5 years	In Progress	Keep	Department in partnership with the Arizona Geological Survey, CAP currently constructing facility.
7	12.B.1	Continue assessing vulnerability of potential terrorist targets and share information among law enforcement agencies. (e.g. The following capital projects will reduce the possibility of such damage and losses. / Facility Access & Security Project, La Entrada Building Improvements, SCADA Communications upgrade and SCADA System Improvements).	• Tucson Water Staff • $5,684,000 • 18 months, ongoing	Complete	Delete	Study completed in 2011 at a cost of $500,000. Identified approximately $23 million in retrofits. Looking at funding for 2014 to start.

6.3.2 New Mitigation Actions / Projects and Implementation Strategy

Upon completion of the assessment summarized in Section 6.3.1, each jurisdiction's Local Planning Team developed new A/Ps using the goals and objectives, results of the vulnerability analysis and capability assessment, and the planning team's institutional knowledge of hazard mitigation needs in the community. The A/Ps can be generally classified as either structural or non-structural. Structural A/Ps typify a traditional "bricks and mortar" approach where physical improvements are provided to effect the mitigation goals. Examples may include forest thinning, channels, culverts, bridges, detention basins, dams, emergency structures, and structural augmentations of existing facilities. Non-structural A/Ps deal more with policy, ordinance, regulation and administrative actions or changes, buy-out programs, and legislative actions. For each A/P, the following elements were identified:

- **Description** – a brief description of the A/P including a supporting statement that tells the "what" and "why" reason for the A/P.
- **Hazard(s) Mitigated** – a list of the hazard or hazards mitigated by the A/P.
- **Community Assets Mitigated** – a brief descriptor to qualify the type of assets (existing, new, or both) that the proposed mitigation A/P addresses.
- **Estimated Costs** – concept level cost estimates that may be a dollar amount or estimated as staff time.

Once the full list of A/Ps was completed to the satisfaction of the Local Planning Team, the team then developed the implementation strategy for those A/Ps. The implementation strategy addresses the *"priority, how, when, and by whom?"* questions related to the execution and completion of an identified A/P. Specific elements identified as a part of the implementation strategy included:

- **Priority Ranking** – each A/P was assigned a priority ranking of either "High", "Medium", or "Low". The assignments were subjectively made using a simple process that assessed how well the A/P satisfied the following considerations:
  - A favorable benefit versus cost evaluation, wherein the perceived direct and indirect benefits outweighed the project cost.
  - A direct beneficial impact on the ability to protect life and/or property from natural hazards.
  - A mitigation solution with a long-term effectiveness
- **Planning Mechanism(s) for Implementation** – where applicable, a list of current planning mechanisms or processes under which the A/P will be implemented. Examples could include CIPs, General Plans, Area Drainage Master Plans, etc.
- **Anticipated Completion Date** – a realistic and general timeframe for completing the A/P. Examples may include a specific target date, a timeframe contingent upon other processes, or recurring timeframes.
- **Primary Agency and Job Title Responsible for Implementation** –the agency, department, office, or other entity and corresponding job title that will have responsibility for the A/P and its implementation.
- **Funding Source** – the source or sources of anticipated funding for the A/P.

Tables 6-9-1 through 6-9-6 summarize the current mitigation A/P and implementation strategy for each participating Plan jurisdiction. Projects listed in *italics font* are recognized as being more response and recovery oriented, but are considered to be a significant part of the overall hazard management goals of the community. No Tables 6-9-xx are provided for South Tucson or the Tohono O'odham Nation.

Table 6-9-1: Mitigation actions and projects and implementation strategy for Pima County

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Enforce Flood & Erosion Hazard Ordinance in accordance with the NFIP.	Flood	Both	$1.2 million	High	Regulatory	On going	RFCD / Floodplain Management Division	Flood Control tax Levy
Implement NFIP tasks such as LOMR submittals, maintaining a county-wide map repository, performing master drainage studies, and coordinating to insure the digital map is correct.	Flood	Both	$600,000	High	Regulatory	On going	RFCD / Planning & Development Division	Flood Control Tax Levy
Arroyo Chico Multi-Use Project – Phase 2B (Basins 1, 2 & 3)	Flood	Both	$13.3 million	High	CIP	September, 2013	RFCD / Engineering Division	Flood Control Tax Levy & USACOE
Inspection and preventative maintenance on levees as needed.	Levee Failure	Both	$50,000	High	Levee Operation & Maintenance Manual	On going	RFCD / Infrastructure Management Division	Flood Control Tax Levy
Develop and implement multi-agency exercises and drills related to outbreaks of communicable illnesses and vector control.	*Disease (Response)*	*(Response)*	*Staff Time*	*High*	*Departmental Plans*	*12 months*	*Health Department, Director*	*Grant Funds*
Develop a Shelter in Place Plan (appendix to Pima County Emergency Operations Plan).	*All (Response)*	*(Response)*	*Staff Time*	*High*	*Departmental Plans*	*24 months*	*Pima County Office of Emergency Management and Homeland Security, Director*	*Grant Funds (as available)*
Participate in Community Rating System to reduce insurance premiums.	Flood	Both	$50,000	Medium	N/A	On going	RFCD / Planning & Development Division	Flood Control Tax Levy

Table 6-9-2: Mitigation actions and projects and implementation strategy for Marana

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Provide training to the applicable Town of Marana departments on the adopted hazard mitigation plan and its requirements.	All	Both	$500	High	(None identified)	2012	Emergency Management Coordinator	General Fund
Conduct a public education campaign to increase awareness of natural hazards by distributing ADEM and Pima County mitigation flyers at community events and public gathering opportunities, as appropriate. This will be accomplished semi-annually by Community Services.	All	Both	$500	High	(None identified)	2014	Community Development Director	General Fund
The Town of Marana will continue to plan for, design, and construct appropriate flood control structures for public safety and damage reduction.	Flood	Both	$133M	High	CIP	2018	Development Services/ General Manager	Grants, Transportation General Fund, Bonds, etc
Encourage bridge or culvert construction where roads are susceptible to flooding. This will be accomplished as part of the Planning Process when Developers apply to build in Marana.	Flood	Both	Staff Time	High	(None identified)	2016	Development Services/ General Manager	General Fund
The Town of Marana will continue to participate in the National Flood Insurance Program by reviewing applications for buildings, ensuring they are properly designed.	Flood	Both	Staff Time	High	(None identified)	2016	Development Services/ General Manager	General Fund
Rattlesnake Pass from Saguaro Springs to Twin Peaks Road.	Flood	Existing	$29.8 Million	High	CIP	2018	Public Works / Director	Transportation Fund, General Fund
Barnett Linear Park and Flood Control – Construct a 3-mile channel along Barnett Road to mitigate the drainage and flood hazard from the Santa Cruz River	Flood	New	$16.5 Million	High	CIP	2016	Public Works / Director	General Fund, Future MMPC Bonds

Table 6-9-2: Mitigation actions and projects and implementation strategy for Marana

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Ina Road Bridge – Remove and replace the Ina Road bridge that crosses the Santa Cruz River	Flood	New	$17.5 Million	High	CIP	2016	Development Services / Director	Transportation Fund, HURF Bonds, General Fund
Ina Road Improvements from Silverbell Road to I-10 – widening of Ina Road to 4-lane section with raised median, sidewalks, and drainage improvements	Flood	New	$16.5 Million	High	(None identified)	2016	Public Works/Director	Transportation Fund, Federal Grants
Tangerine Road Corridor - provide a minimum of 4 lanes with raised medians, drainage improvements, sidewalks, ADA facilities, multi-use path and lanes, Traffic Signals, Right-of-Way acquisitions, Utility relocations, Marana Water line extensions, and sewer modifications and additions.	Flood	New	$95.5 Million	High	CIP	2019	Public Works / Director	RTA, Future Bond Money
Ina Road TI – lower I-10 and construct a new overpass that will span both I-10 and the UPRR tracks. Project will mitigate flood issues and also improve access that will reduce accidents and HAZMAT incidents	Flood, HAZMAT, Traffic Accidents	Existing	$65.0 Million	High	ADOT 5-Year Plan and RTA Plan	2018	Public Works / Director in coordination with ADOT	ADOT, RTA
UPRR and Tangerine Road	Wildfire, HAZMAT	New	$133,200	Medium	(None identified)	N/A	Utility Department / Director	Grant Funding
The Town of Marana will continue to participate in the Flood Prone Land Acquisition Program so we acquire properties located in flood hazard areas.	Flood	Existing	Staff	Medium	NFIP Compliance	2016	Development Services/ General Manager	Grants, Partnership w/ Pima County

Table 6-9-3: Mitigation actions and projects and implementation strategy for Oro Valley

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Develop, implement, and update a mass evacuation strategy for Oro Valley (including training and exercising).	*All (Response)*	*(Response)*	*Staff Time*	*High*	*Town wide emergency management program*	*Annually, ongoing*	*Emergency Management and DIS*	*General Fund and grant*
Develop, implement, and regularly update a Shelter in Place educational program (including training and exercising).	*All (Response)*	*(Response)*	*Staff Time*	*High*	*Town-wide emergency management program*	*Annually, ongoing*	*Emergency Management*	*General Fund and grant*
West Nile Virus Program Continued testing of mosquitoes for West Nile Virus. If a positive result, the area is sprayed.	Disease	Both	$5,000	High	IGA with Pima County Health Dept.	Annually, ongoing	Stormwater Utility	Pima County Health Dept.; Stormwater Utility, and Arizona Dept. of Health Zoonotic Diseases
Buffelgrass Program actively educates and removes buffelgrass in public areas across the Town.	Wildfire	Both	Staff and Volunteer Time	High	Buffelgrass Eradication Plan	Annual, ongoing	DIS	General Fund, grant, and volunteer time
Regularly update wildland-urban interface plans and educate communities about fire hazards.	Wildfire	Both	Staff Time	High	Wildland Urban Interface	Annual, ongoing	Golder Ranch Fire District	Golder Ranch
Widening of Lambert Lane between Pusch View Lane Bridge and La Canada Dr. will include drainage improvements to eliminate roadway flooding and debris.	Flood	Both	$8M	High	DIS Engineering	Sept. 2013	DIS	Pima Association Governments
Public education and outreach about protecting pipes and irrigation systems from freezes.	Extreme Temperature, Winter Storms	Both	Staff Time	High		Annual, ongoing	Oro Valley Water Utility	Water Utility Fees
Applicable Hazmat training and exercising for first responders; as well as participation in multi-agency regional hazmat and decontamination teams.	HAZMAT	Both	Staff Time and Training Costs	High		Annual, ongoing	Oro Valley Police Department and Golder Ranch	General Fund and Grant Funds

Table 6-9-3: Mitigation actions and projects and implementation strategy for Oro Valley

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Town Cistern Project includes the addition of cisterns across the Town campus, water collected will be used for Town landscaping. Landscaping will be planned around the xeriscaping concept.	Drought	Both	$12,000	High	TOV Conservation and Sustainability Program	Annual, ongoing	DIS, Water, and Parks	General Fund and Private Funds
Continue to develop, expand, and implement a Drought Response Plan to address potential or long-term drought conditions.	Drought	Both	Staff Time	High	Water Utilty Drought Response Plan (currently in draft form)	Annual, ongoing	Water Utility	General Fund
Town of Oro Valley Stormwater Utility will continue to Manage Public Information Activities. • Monitor and maintain elevation certificates • Provide FEMA map information service • Conduct outreach projects to increase public awareness of flooding hazard promote flood insurance in general • Provide Flood protection information	Flood	Both	Staff Time and SW Utility Fees	Medium	NFIP CRS* Criteria and Guidelines	Annually ongoing	Storm Water Utility, EM, Permitting Div., TOV Library	Storm Water Utility Fees
Conduct Floodplain Mapping and Regulatory Activities. • Manage/prepare LOMCs* for FEMA designated floodplains • Generate and collect additional (local) floodplain maps and information • Promote and enforce open space preservation • Enforce and augment regulatory floodplain standards • Manage town wide floodplain data • Oversee stormwater management program	Flood	Both	Staff Time and SW Utility Fees	Medium	NFIP CRS, ESLO	Annually ongoing	Storm Water Utility	Storm Water Utility Fees
Conduct Flood Damage Reduction Activities • Organize floodplain management planning doc. • Investigate acquisition and relocation of flood prone properties • Conduct and manage drainage system maintenance	Flood	Both	Staff Time and SW Utility Fees	Medium	NFIP CRS, SW Maintenance SOP	Annually ongoing	Storm Water Utility	Storm Water Utility Fees

Table 6-9-3: Mitigation actions and projects and implementation strategy for Oro Valley

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Conduct Flood Preparedness Activities • Coordinate flood warning program w/PCRFCD • Monitor levee safety for OV's certified levee	Flood	Both	Staff Time	Medium	NFIP CRS	Annually ongoing	Storm Water Utility	Storm Water Utility Fees
Oro Valley Emergency Management will provide training to applicable Town staff on the adopted hazard mitigation plan and its requirements.	All	Both	Staff Time	Medium	Town-wide emergency management program	Annually, ongoing	All Town Departments and Emergency Management	General Fund and grant
Review existing Oro Valley General Plan and zoning code to determine how these documents help limit development in hazardous areas. Modify with additional guidelines, regulations, and land use techniques as necessary within the limits of state statues, while also respecting private property rights.	All	Both	Staff Time	Low (due to annual review)	Town procedures	Annually, ongoing	DIS	General Fund

Table 6-9-4: Mitigation actions and projects and implementation strategy for Pascua Yaqui Tribe

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Review existing building codes to determine adequate protection for new development in hazard areas. Where feasible and necessary, modify codes to help mitigate hazards imposed on such development within the limits of the Pascua Yaqui Reservation, while also respecting private property rights adjacent to the Reservation.	Drought, Earthquake, Flood, Severe Wind	Both	Staff	High	Follow community development plan	Ongoing and Continuous	*Land Development *Tribal Council	General Fund
Continued coordination between Pascua Yaqui Tribe, Pima County departments, municipalities, Pima Association of Governments, and other agencies in the development and maintenance of accurate geographic information system information for those hazard areas identified in the adopted hazard mitigation plan.	All	Both	Staff	High	Follow community development plan	Ongoing and Continuous	*Land Development *Tribal Council	General Fund
Develop a Mass Evacuation strategy for Pascua Yaqui Tribe and formalize in a published document	*All*	*Both*	*Staff time*	*High*	*In cooperation with ADEM Tribal Liaison will conduct a public education campaign to increase awareness of natural hazards by distributing ADEM mitigation flyers at public events*	*Continuing*	**Fire & Police Departments *Land and Procurement Departments*	*General Fund*
Continue the existing intergovernmental agreement between the Tribe and the State Forestry Department for assistance in the provision of emergency services within each other's jurisdictions.	*Wildfire*	*Both*	*Staff time*	*High*	*Annual Review*	*Continuing*	**Fire Department *Attorney General's Office *Tribal Council*	*General Fund*

Table 6-9-4: Mitigation actions and projects and implementation strategy for Pascua Yaqui Tribe

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Conduct and enhance environmental and epidemiological surveillance activities in those areas identified as being of high public health importance and related to environmental factors such as;, food safety and protection and vector control activities. Surveillance activities must include the identification of vulnerabilities and environmental factors that may contribute to the transmission of the communicable diseases associated with the operation and presence of these facilities in the Pascua Yaqui Tribe, as well as the implementation of preventative action which may be applied to reduce or eliminate the potential for transmission of communicable illnesses. Develop and improve the system of coordination and communication of these findings, trends and observations with other federal, state and local agencies that have similar or related interest.	Disease	Both	N/A	High	PYT PHEP Program currently has an IGA with ADHS for PHEP (Public Health Emergency Preparedness) for epidemiological surveillance activities high risk of communicable diseases and investigation opportunities of outbreaks. With Indian Health Service we have our environmental factors such as; food safety and protection of the environment on the PYT reservation. The PYT PHEP Program has a strong collaboration and communication with ADEM, ADHS, Pima County Health Department and the Tucson I.H.S.(Indian Health Services).	Ongoing	*Epidemiology Center Director	General Fund

Table 6-9-5: Mitigation actions and projects and implementation strategy for Sahuarita

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Promote Child Drowning Prevention programs throughout the Town.	Drowning	Both	$3,000 and staff time	High	N/A	May 2012	Police Communications	Open
Continued adherence to AAC R18-9 for reductions in pollutant discharge at Town Aquifer.	HAZMAT	Existing	$15,000	High	Waste Water	March 2012	Public Works	Waste Water Fund
Updating of Waste Water Department contingency and emergency plans	HAZMAT	Both	Staff time	High	Waste Water	March 2012	Public Works	None
Continue annual updating of Town Storm water/Flooding Pollution Prevention Plan	Flood	Existing	Staff Time	High	Water Master Plan	January 2013	Public Works	None
Continue use of permit process from Corp of Engineers to streamline maintenance and bank stabilization efforts when needed	Flood	Existing	Staff Time	High	Army Corp	On going	Public Works	HERF Funds
Southern Arizona Buffelgrass removal mapping	Wildfire	Both	Staff Time	High	NA	May 2012	Public Works	T.O. Nation Grant
Implement Vector Borne Illness prevention program through mosquito abatement	Disease (Pandemic)	Both	$10,000	High	NA	September 2012	Public Works Parks and Rec	General Fund
Updating of riparian ordinance to protect various species that reduces erosion to mitigate flooding potentials and also reduces development in flood prone areas	Flood	Existing	$300 and staff time	Medium	NA	December 2011	Planning and Zoning	General Fund

Table 6-9-5: Mitigation actions and projects and implementation strategy for Sahuarita

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Continued Controlled Burns on Town Property	Wildfire	Exiting	$2,000 and staff time	Medium	Green Valley Fire	January 2012	Fire Department Public Works	General Fund
Review, Update and Modify NFIP requirement and make appropriate modifications to Flood Plain Ordinance	Flood	Both	Staff Time	Medium	FEMA PCRFC	January 2013	Public Works	None
Educate the public to increase awareness of hazards, and potential opportunities for mitigation actions. Make Pima County's public information material sheets, websites, mitigation brochures, and media outlets available.	All	Both	Staff Time	Medium	Emergency Preparedness Strategic Plan	July 2012	Emergency Management	None
Landscape code amendment requiring vegetation adjustment in developed areas to reduce the heat island effect	Extreme Temperatures	Existing	$300 and staff time	Medium	None	December 2011	Planning and Zoning	General Fund
Develop and Implement internal emergency response procedure	*All (Response)*	*(Response)*	*Staff Time*	*Medium*	*NA*	*May 2012*	*Public Works*	*None*
Improve upon existing capabilities to warn the public of emergency situations by initiating a system to test the ability of local emergency managers to activate the AENS systems.	*All (Response)*	*(Response)*	*$5,000*	*Medium*	*Emergency Management Committee*	*January 2013*	*Emergency Management*	*General Fund*
Develop and Implement an interoperable communications between all emergency-related departments	*All (Response)*	*(Response)*	*Staff Time*	*Medium*	*N/A*	*January 2013*	*Emergency Management, Local Fire District*	*None*

Table 6-9-6: Mitigation actions and projects and implementation strategy for Tucson

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Identify funding source and construct two bridges and 50 box culverts with 380 back-up power units for signalized intersections at high flood hazard crossings in City of Tucson limits in accord with the COT Department of Transportation 5-year plan. If a box culvert cannot be constructed an automated warning device, consisting of a barricade, signs and flashing lights would be installed.	Flood, Severe Wind	Both	$100 million, Staff Time	High	CIP	Ongoing effort with long-term horizon. Schedule dependent upon funding	Department of Transportation / Streets Administrator and Streets Chief Engineer	Grant Funds
Tucson Water, a division of the Utility Services Department, will secure its assets and facilities by implementing actions, in phases, as identified in the Federally mandated Water System Vulnerability Assessment completed in October 2002.	Terrorism, Vandalism	Existing	$20 million	High	Water System Vulnerability Assessment	On-going with full completion by 2020	Water Department / Water Engineer & Operations	Operations Budget
Promote disaster-resistant water delivery system by constructing redundant water transmission lines (e.g. The Utility and the community will be less susceptible to loss of water delivery due to natural or man-made disasters).	All	Both	$7.9 million	High		On-going with full completion by 2020	Water Department / Water Administrator Maintenance & Operations	Operations Budget
Work with the Arizona Geological Society and U.S. Geological Survey on projects that mitigate geo-hazards (e.g. Continue the feasibility study with the AZ Geological and U.S. Geological Surveys Water Plan 2000-2050.Construct second recharge facility to be known as the Southern Avra Valley Recharge and Recovery Project (SAVSARP). The utility could then use its entire allotment of Central Arizona Project water and provide capacity for recharging additional water supplies. Construction will take 5 years).	Drought, Earthquake, Subsidence, other geo-hazards.	Both	$51.2 million	High		Ongoing effort with long-term horizon. Schedule dependent upon funding	Water Department / Staff	Operations Budget

Table 6-9-6: Mitigation actions and projects and implementation strategy for Tucson

GOAL: Reduce or eliminate the risk to people and property from natural and human caused hazards.

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

Mitigation Action/Project				Implementation Strategy				
Description	**Hazard(s) Mitigated**	**Community Assets Mitigated (Ex/New)**	**Estimated Cost**	**Priority Ranking**	**Planning Mechanism(s) for Implementation**	**Anticipated Completion Date**	**Primary Agency / Job Title Responsible for Implementation**	**Funding Source(s)**
Re-direct drainage canal at Barrio Viego to prevent continued repetitive losses.	Flood	Both	$425,000	High		2013	Transportation Dept / Project Administrator	Grant Funds, General Fund, PCRFCD
In compliance with the NFIP, the City of Tucson will continue to require the preparation and submittal of a CLOMR or CLOMR-F for all proposed development within FEMA delineated Special Flood Hazard Areas	Flood	Both	Staff Time	High	Floodplain Ordinance	Annual - Ongoing	Development and Planning Services Department / Director	Department Budget and Fees for Developers
The Town of Tucson will maintain compliance with NFIP regulations by enforcement of the current floodplain management ordinance through review of new development located in the floodplain and issuance of floodplain use permits.	Flood	Both	Staff Time	High	Floodplain Ordinance	Annual - Ongoing	Development and Planning Services Department / Director	Department Budget
Improve floodplain administration under the NFIP program by sending inspectors into the field when we receive a flood warning from the National Weather Service, to assess bridges, washes and other critical infrastructures within the City of Tucson.	Flood	Both	Staff Time	High	Best Practices	Annual-Ongoing	Development and Planning Services Department / Director	Department Budget and Information

SECTION 7: PLAN MAINTENANCE PROCEDURES

> ***§201.6(c)(4):*** *[The plan shall include…] (4) A* ***plan maintenance process*** *that includes:*
> *(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*
> *(ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*
> *(iii) Discussion on how the community will continue public participation in the plan maintenance process.*
>
> ***§201.6(d)(3):*** *Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years in order to continue to be eligible for HMGP project grant funding.*

According to the DMA 2000 requirements, each plan must define and document processes or mechanisms for maintaining and updating the hazard mitigation plan within the established five-year planning cycle. Elements of this plan maintenance section include:

Monitoring and Evaluating the Plan

Updating the Plan

Implementing the Plan by Incorporation into Other Agency or Jurisdictional Planning Mechanisms

Continued Public Participation

Pima County and the participating jurisdictions recognize that this hazard mitigation plan is intended to be a "living" document with regularly scheduled monitoring, evaluation, and updating.

Section 7 of the 2007 Plan outlined specific steps for plan maintenance. A poll of the Planning Team indicated that few formal reviews or maintenance occurred over the past five years. The 2007 Plan was referenced / reviewed by the county for the identification and development of mitigation grant applications during the 2006 flooding disaster declaration and again in 2010 for buffelgrass mitigation actions/projects. The Town of Oro Valley also reviewed the 2007 Plan as a regular part of their own HMGP application investigations. Reasons for the otherwise lack of formal review were discussed by the Planning Team, and included:

- Lack of funding and staff time available to allocate to the task
- Perceived lack of practicality and or usefulness beyond keeping eligible for grants.
- Lack of a Plan champion within each community
- Staffing changes / turnover wherein the maintenance requirements and even existence of the Plan was not communicated
- Lack of Plan awareness by departments outside of the emergency management community.

Recognizing the need for improvement, the Planning Team discussed ways to make sure that the Plan review and maintenance process will occur over the next five years. The results of those discussions are outlined in the following sections and the plan maintenance strategy.

7.1 Monitoring and Evaluation

7.1.1 General Planning Team Monitoring and Evaluation

Switching to a true multi-jurisdictional plan will aide in the Plan monitoring and evaluation by the consolidation of information for all county jurisdictions into one document. The Planning Team has established the following monitoring and evaluation procedures:

- **Schedule** – The Plan shall be reviewed on at least an annual basis or following a major disaster. The Pima County Office of Emergency Management and Homeland Security

(PCOEMHS) will take the lead to reconvene the Planning Team on or around the anniversary of the official FEMA Plan adoption date ADEM has also committed to help with reminders to the County as a double accountability.

- **Review Content** – One month prior to the Planning Team review meeting, a reminder questionnaire will be distributed to each jurisdictions' Point of Contact by PCOEMHS and will be returned by each jurisdiction within a minimum of three weeks. The questionnaire will be comprised of the following questions:
    - ***Hazard Identification:*** *Have the risks and hazards changed?*
    - ***Goals and objectives:*** *Are the goals and objectives still able to address current and expected conditions?*
    - ***Mitigation Projects and Actions:*** *Has the project been completed? If not complete but started, what percent of the project has been completed? How much money has been expended on incomplete projects? Did the project require additional funds over the expected amount or were the costs less than expected?*

During the annual meeting, each jurisdiction will have the opportunity to provide a report to the group summarizing its review of the Plan. The report will include their responses to the above questions and any other items specific to their community. Documentation of the annual meeting will include notes on the results of the meeting as well as more specific information on the reasoning for proposed changes to the Plan for the next update cycle. Copies of the annual review report will also be included in Appendix E.

A formal presentation of the status of the goals, objectives and A/Ps will be made to each jurisdiction's board or council following the review meeting. The action will be informational only and will not require a formal action on the part of the board or council unless a major update to the Plan is proposed prior to the next five year update.

7.1.2 Monitoring of Tribal Mitigation Activities

This section describes the Pascua Yaqui Tribe's strategy for reviewing and assessing the progress of the mitigation goals and actions/projects (A/Ps) identified in this Plan.

Unless otherwise directed or warranted, the goals and objectives' review will coincide with the annual overall plan review and update schedule. Goals will be assessed using a subjective approach and a summary of the assessment will be included in the annual review memorandum.

The A/Ps and the corresponding implementation strategies for the Pascua Yaqui Tribe are identified in the Plan's mitigation strategy. For each annual review and plan update, the Pascua Yaqui Tribe will coordinate with the agencies identified for each A/P, to assess the implementation status of the identified A/P and generate a brief memorandum summarizing the status of each project using the following criteria:

<u>Current Status of Action/Project</u> - Assign a 'No Action', 'In-Progress' or 'Completed' status as appropriate

<u>Project Disposition</u> – Assign a 'Keep' or 'Drop' to identify future disposition of action/project

<u>Explanation</u> - Provide a description of the current project status including date of implementation, challenges faced, percentage completed, funding sources used, etc.

The implementation and progress of the A/Ps will be monitored by the Pascua Yaqui Tribe on at least an annual basis as described in Section 7.1.1. For FEMA supported projects, progress reports will be submitted to FEMA on a quarterly basis, or as required throughout the project duration. The degree of quarterly reporting will be dependent upon the type of A/P, its funding source, and the associated requirements. At a minimum, the quarterly report shall address:

- ✓ Project Completion Status
- ✓ Project Challenges/Issues (If any)

- ✓ Budgetary Considerations (Cost Overruns or Underruns)
- ✓ Detailed Documentation of Expenditures

Upon completion of projects, the project location will be visited and final results viewed and documented. Closed projects will then be monitored for effectiveness in the intended mitigation. FEMA supported project closeouts will include an audit of the A/P financials as well as other guidelines/requirements set forth under the funding or grant rules, and any attendant administrative plans developed by the Pascua Yaqui Tribe.

7.2 Plan Update

According to DMA 2000, the Plan requires updating and approval from FEMA every five years. The plan updates will adhere to that set schedule using the following procedure:

- ✓ One year prior to the plan expiration date, the Planning Team will re-convene to review and assess the materials accumulated in Appendix E.
- ✓ The Planning Team will update and/or revise the appropriate or affected portions of the plan and produce a revised plan document.
- ✓ The revised plan document will be presented before the respective councils and boards for an official concurrence/adoption of the changes.
- ✓ The revised plan will be submitted to ADEM and FEMA for review, comment and approval.

7.3 Incorporation into Existing Planning Mechanisms

Incorporation of the Plan into other planning mechanisms, either by content or reference, enhances a community's ability to perform hazard mitigation by expanding the scope of the Plan's influence. A poll of the participating jurisdictions revealed that success of incorporating the 2007 Plan elements over the past planning cycle into other planning programs, has varied. Ways in which the 2007 Plans have been successfully incorporated or referenced into other planning mechanisms for each jurisdiction are summarized below:

Pima County:

- The 2007 Plan is cited in the Annual Recertification and 5-yr Cycle Verification of the Community Rating System.
- Referenced during the following processes; Comprehensive Plan Amendment, Rezoning, and Basin or River Management Planning efforts.
- Used as reference material for the update of the Pima County Emergency Operations Plan

Marana

- Used by the Town of Marana during the update of the Emergency Operation Plan beginning in March 2010.
- Used as a reference for identifying of natural and man-made hazards in the Town's General Plan..

Oro Valley

- Used by the Town of Oro Valley during the update of the Emergency Operations Plan, beginning in September 2010.
- Used by the Town of Oro Valley during the development of other emergency plans (such as evacuation plans, Standard Operating Procedures, shelter in place programs, public outreach opportunities, etc.), beginning in September 2010.
- Used as a reference for the profiling of natural and man-made hazards as referenced in the Town's General Plan.

- Used as a reference for hazards mentioned in the Open Space and Natural Resource Conversation section of the Town's General Plan.
- Some of the 2007 Plan mitigation A/Ps correlate to the Town's Capital Improvement Projects program

Pascua Yaqui Tribe

- None Provided

Sahuarita

- No specific references or incorporation of the 2007 Plan was reported by Sahuarita. However, hazard mitigation has been historically referenced in the 2004 Town of Sahuarita Emergency Operations Plan and Town Code Chapter 13.20.040

Tucson:

- Used as reference material for the update of the 2006 Emergency Operations Plan
- Referenced by the City of Tucson Intranet and in the Tucson Office of Emergency Management and Homeland Security Newsletter.

In all of the above instances, the 2007 Plan was found to be beneficial, and especially with regard to the critical facility inventories, vulnerability analysis results, and the mitigation strategy. Obstacles to further incorporation of the 2007 Plan for some of the communities were generally tied to:

- A lack of awareness of the 2007 Plan by departments outside the emergency management community
- The relative "newness" of the 2007 Plan with regard to other, more commonplace planning mechanisms such as comprehensive or general plans.
- No real opportunity for incorporation of reference of the 2007 Plan (e.g. – very little other planning being done by a community).

Typical ways to use and incorporate the Plan over the next five-year planning cycle, discussed by the Planning Team, included:

- Use of, or reference to, Plan elements in general and comprehensive planning update documents.
- Addition of defined mitigation A/Ps to capital improvement programming.
- Inclusion of Plan elements into development planning and practices.
- Resource for developing and/or updating emergency operations plans.

The Plan will continue to function as a standalone document subject to its own review and revision schedule presented in Sections 7.1 and 7.2. The Plan will also serve as a reference for other mitigation and land planning needs of the participating jurisdictions. Whenever possible, each jurisdiction will endeavor to incorporate the risk assessment results and mitigation actions and projects identified in the Plan, into existing and future planning mechanisms. At a minimum, each of the responsible agencies/departments noted in Tables 6-1-1 through 6-1-6 will review and reference the Plan and revise and/or update the legal and regulatory planning documents, manuals, codes, and ordinances summarized in Tables 6-1-1 through 6-1-6, as appropriate. Specific incorporation of the Plan risk assessment elements into the natural resources and safety elements of each jurisdictions' general plans (county comprehensive plan) and development review processes, adding or revising building codes, adding or changing zoning and subdivision ordinances, and incorporating mitigation goals and strategies into general and/or comprehensive plans, will help to ensure hazard mitigated future development. In addition, an implementation strategy outlining assignments of responsibility and completion schedules for specific actions/projects proposed in this plan are summarized in Tables 6-9-1 through 6-9-6.

Table 7-1 presents a list of current planning efforts for the Pascua Yaqui Tribe that are either related to, referenced in, and/or are parallel to this Plan. It is the Pascua Yaqui Tribe's intention to integrate information as described below to ensure correlation of common planning elements.

Table 7-1: Pascua Yaqui Tribe planning efforts for future integration

Document	Description	Integration Characteristics/Mitigation Opportunities	Author / Owner
Pascua Yaqui Tribe's Master Land Use Plan	The objective the master land use plan is to provide a current document that reflects the growth and changing needs of the Pascua Yaqui pueblo , serves as a guide for decision makers. This plan was adopted in 2004.	• Minimize incompatible land uses • Provide a balance of land uses that preserves and enhances the neighborhood, support in-fill strategies, promote economic development, and protect environmentally and culturally significant resources. • No planned area development project will be allowed within 200 feet of any waterway.	The Planning Center Pascua Yaqui Tribe
Master Drainage Study for Pascua Yaqui Tribe Reservation	The master drainage study/ is a critical component to the Tribe's economic well being, as well health, safety and general welfare of the community. This plan was adopted in 2004.	• Minimize the flooding and drainage problems • No development zones set aside for conveyances of floodwaters • Construct regional storm water retention facilities	Tetra Tech, Inc. Pascua Yaqui Tribe
Zoning Ordinance	The Tribal Council is considering adopting a zoning ordinance to regulate and encourage the most appropriate uses of land. This plan is currently pending council approval.	• Reduce the effects of natural hazards on life, property, and infrastructure, • Require pre-development and post-development hydrology and proposed storm water management or drainage mitigation	The Planning Center Pascua Yaqui Tribe
Public Health and Emergency Preparedness Response Plan	Addresses response and preparedness regarding public health issues and outbreaks. Identifies mitigation measures to reduce the spread of disease. This plan was last approved in 2007 and is currently in the process of being updated.	• Used for mitigation of outbreaks on an interagency basis. • Interagency awareness and communication. • Source for Disease related	PYT Public Health and Emergency Preparedness and Pima County Health Dept. Jointly owned between PYT and Pima County

7.4 Continued Public Involvement

The Planning Team reviewed Section 7.1.5 of the 2007 Plan and discussed the challenges and successes regarding the identified continued public involvement strategy. All of the participating jurisdictions were successful to varying degrees, in their efforts to elevate hazard mitigation awareness in the general public and community on an ongoing basis. Pima County and participating jurisdictions remain committed to keeping the public informed about the hazard mitigation planning efforts, actions and projects. Table 7-2 summarizes successful public involvement efforts previously conducted by the participating jurisdictions, and proposed activities for public involvement and dissemination of information that shall be pursued whenever possible and appropriate.

Table 7-2: Continued past and future public involvement activities or opportunities identified by Pima County jurisdictions

Jurisdiction	Public Involvement Activity or Opportunity
Pima County	**Past Events:** • Made available to the public a flood hazard map internet tool (Flood Hazard Parcel Search) for properties in unincorporated Pima County • Conducted public outreach through open-house meetings for new "L" Series FEMA Flood Insurance Rate Maps (DFIRMs) • Provided brochures regarding flood hazards and flood mitigation on the RFCD website and at the RFCD office • Distributed flood hazard and safety information and brochures at public events (Earth Day, Fiesta Grande Street Fair, Earth Science Day, etc.) • Annually mailed "Your Property is in a Mapped Flood Zone" brochure to everyone in a mapped floodplain for properties in unincorporated Pima County • As new floodplain mapping occurred, provided information to those affected via brochures and the RFCD website for properties in unincorporated Pima County • Annually provided flood safety brochures to Tucson Water utility to include in monthly bills • Provided flood information at community meetings after a flood event, new floodplain mapping affecting a large number of people, or on request for properties in unincorporated Pima County • Conducted public outreach in schools upon request **Future Opportunities:** • It is anticipated that all of the past activities listed above will be continued with next Plan cycle
Marana	**Past Events:** • Conducted public outreach through open-house meetings for new "L" Series FEMA Flood Insurance Rate Maps (DFIRMs). • Provided brochures regarding flood hazards and flood mitigation on the Town of Marana website and at the Town of Marana Municipal Complex. • Provided letters to Town of Marana residents affected by the new "L" series FEMA flood insurance rate maps. The letters were to reflect the residents' specific situation. • Participated with the Buffelgrass Management Action Committee, which provides; education and outreach to Town staff and the community; map and monitor buffelgrass and foundation grass location; control with herbicide treatments; and volunteer s to help pull the grass. This will be a continuing effort. • During the 2010 General Plan, the Town Emergency Management Coordinator distributed brochures on hazard mitigation and individual preparedness as part of public outreach. **Future Opportunities:** • Continue to pursue the past activities listed above, as appropriate. • Provide information to the public through participation in the Local Emergency Planning Committee (LEPC) on hazardous materials. • Provide floodplain related hazard and mitigation information to targeted properties in high risk areas. • Plan to provide flood hazard outreach annually to residents of the Town of Marana located within the flood plain. • Create brochures for building within the flood plain.

Table 7-2: Continued past and future public involvement activities or opportunities identified by Pima County jurisdictions

Jurisdiction	Public Involvement Activity or Opportunity
Pascua Yaqui Tribe	**Past Events:** • Regular Public Service Announcements through our Tribal Radio Station • Distribution of flyers among other tribal departments **Future Opportunities:** • Maintain a permanent website that will include a copy of the current Plan, allow stakeholders to comment on mitigation planning efforts, respond to citizen inquiries, and comment on development plans as well as other mitigation efforts. • Develop and provide brochures regarding threats on our Hazard Mitigation website • Provide for hazard mapping profiles on Google Earth • Conduct public outreach in schools to educate students on the various natural and manmade hazards • Include a specific mitigation planning related agenda item for LEPC meeting. • Make available the mitigation brochures and other information produced and provided by the Arizona Division of Emergency Management, at the Town Hall and Town Library. • Annually provide a news release to local news media related to mitigation activities and floodplain management. • Annual presentations to boards and councils summarizing annual review findings on the hazard mitigation plan and summarizing noteworthy mitigation activities.

Table 7-2: Continued past and future public involvement activities or opportunities identified by Pima County jurisdictions

Jurisdiction	Public Involvement Activity or Opportunity
Oro Valley	**Past Events:** • Participated with the Buffelgrass Management Action Committee, which provides: education and outreach to Town staff and the community; map and monitor buffelgrass and fountain grass locations; control with herbicide treatments; and volunteer to help pull the grass. Ongoing efforts. • Participated with the OV Buffel Busters, a group of anywhere from five to fifty volunteers that every second Saturday of the month pull buffelgrass in specific areas. • Performed Stormwater Utility Department public presentations to the community about how the Town preserves and protects the community's natural and built environments in the wake of heavy rains, flooding, and other water catastrophes. Public participation is encouraged. • Distributed Floodplain Management brochures at public information distribution locations throughout Town offices and departments, and at neighborhood meetings sponsored by the Town. • Annually provided floodplain related hazard and mitigation information to targeted properties in high risk areas. • Conducted public outreach meetings when re-mapping of floodplain areas is conducted. **Future Opportunities:** • Continue to pursue the past activities listed above. • Provide information for the Oro Valley Vista, an e-newsletter for the Town of Oro Valley about summer monsoons, fire season, buffelgrass, and other hazards. • Develop a section on the Town's website that includes information about hazards, mitigation planning efforts, and other mitigation related activities. • Conduct community presentations throughout the year to educate homeowners about flooding and other Plan hazards, as well as about community preparedness, and emergency management activities. • Make available the mitigation brochures and other information produced and provided by the Arizona Division of Emergency Management. • Participation in, and distribution of, hazard mitigation planning materials as appropriate. • Conduct annual presentations to boards and councils summarizing annual review findings on the hazard mitigation plan and summarizing noteworthy mitigation activities. • Provide a news release to local news media related to mitigation activities and floodplain management. • Conduct public outreach in schools to educate students on the various natural and manmade hazards • Expand public education opportunities for buffelgrass and fountain grass through HOAs and other private property owners.

Table 7-2: Continued past and future public involvement activities or opportunities identified by Pima County jurisdictions

Jurisdiction	Public Involvement Activity or Opportunity
Sahuarita	**Past Events:** • Manned an information booth at the annual Fiesta Sahuarita one day event for the past 4 years • Manned an information booth at the annual Pecan Festival two day event for the last 5 years • Conducted multiple neighborhood watch group meetings with Hazard/EOP materials discussed/distributed • Solicited public input at Town Council meetings concerning Planning and Building code **Future Opportunities:** • Fiesta Sahuarita - will continue with information booth and hand out brochures over next plan cycle • Pecan Festival - will continue with information booth and hand out brochures over next plan cycle • Continuation and expansion of Neighborhood Watch groups involvement • New project working with Anza Trail School on emergency planning • New project working with Sahuarita School District on emergency planning • Town Council recent approval of Town Strategic Plan for Emergency Preparedness initiating a multitude of meetings with functional needs groups, residents, businesses and all stakeholders • Hazard Mitigation presentations and committee at newly formed group "For Our Cities Sahuarita", which represents all community stakeholders and will include multiple public meetings and citizenry input
Tucson	**Past Events:** • Manned an information booth at the annual Safety Day at the Casino del Sol • Manned an information booth at the Lowe's Safety Day • Interaction with various community groups • Met with Commission of Disabilities • Conducted a Fire Prevention Education Program (includes contacts in schools) **Future Opportunities:** • Continue to pursue the past activities listed above. • Expansion of outreach to various community groups for inclusion/information • Meeting with City of Tucson department leaders to reiterate the value of public involvement in EMHS activities, including MJHMP issues • Contact through LEPC meetings and activities • CIKR contacts during Threat and Vulnerability Assessments • Contact with citizens, businesses and other Non-Government Organizations during "Are you Ready" and preparedness activities

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SECTION 8: PLAN TOOLS

8.1 Acronyms

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

PSDI .....Palmer Drought Severity Index
RL .....Repetitive Loss
SARA .....Superfund Amendments and Reauthorization Act
SRLP .....Severe Repetitive Loss Properties
SRL .....Severe Repetitive Loss
SRP .....Salt River Project
UBC .....Uniform Building Code
USACE .....United States Army Corps of Engineers
USDA .....United States Department of Agriculture
USFS .....United States Forest Service
USGS .....United States Geological Survey
VA .....Vulnerability Analysis
WUI .....Wildland Urban Interface

8.2 Definitions

The following terms and definitions are provided for reference and are taken from the 2007 State Plan with a few minor modifications.

ARIZONA HAZARDS

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

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

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

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

Flooding

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

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

Landslide / Mudslide

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

Levee Failure / Breach

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

Severe Wind

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

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

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

Subsidence

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

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

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

GENERAL PLAN TERMS

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

Building
A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Critical Facilities and Infrastructure
Systems or facilities whose incapacity or destruction would have a debilitating impact on the defense or economic security of the nation. The Critical Infrastructure Assurance Office (CIAO) defines eight categories of critical infrastructure, as follows:

Telecommunications infrastructure: Telephone, data services, and Internet communications, which have become essential to continuity of business, industry, government, and military operations.

Electrical power systems: Generation stations and transmission and distribution networks that create and supply electricity to end-users.

Gas and oil facilities: Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.

Banking and finance institutions: Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.

Transportation networks: Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.

Water supply systems: Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.

Government services: Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.

Emergency services: Medical, police, fire, and rescue systems.

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

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

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

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

Flood Insurance Rate Map (FIRM)
Map of a community, prepared by FEMA that shows the special flood hazard areas and the risk premium zones applicable to the community.

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

Geographic Information Systems (GIS)
A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Hazard
A source of potential danger or adverse condition. Hazards include both natural and human-caused events. A natural event is a hazard when it has the potential to harm people or property and may include events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events originate from human activity and may include technological hazards and terrorism. Technological hazards arise from human activities and are assumed to be accidental and/or have unintended consequences (e.g., manufacture, storage and use of hazardous materials). While no single definition of terrorism exists, the Code of Federal Regulations defines terrorism as "…unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

Hazard Event
A specific occurrence of a particular type of hazard.

Hazard Identification
The process of identifying hazards that threaten an area.

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

Hazard Profile
A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent.

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

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

Mitigation Plan
A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in a defined geographic area, including a description of actions to minimize future vulnerability to hazards.

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

Planning
The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

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

Promulgation
To make public and put into action the Hazard Mitigation Plan via formal adoption and/or approval by the governing body of the respective community or jurisdiction (i.e. – Town or City Council, County Board of Directors, etc.).

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

Repetitive Loss Property
A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1,000 each have been paid within any 10 year period since 1978.

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

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

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

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

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

Goals
General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.

Objectives
Defined strategies or implementation steps intended to attain the identified goals. Objectives are specific, measurable, and have a defined time horizon.

Actions/Projects
Specific actions or projects that help achieve goals and objectives.

Implementation Strategy
A comprehensive strategy that describes how the mitigation actions will be implemented.

GENERAL HAZARD TERMS

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

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

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

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

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

Appendix A

Official Resolution of Adoption

Appendix B

Planning Process Documentation

W. Scott Ogden

From: Jeff Guthrie [Jeff.Guthrie@pima.gov]
Sent: Friday, February 11, 2011 1:26 PM
To: W. Scott Ogden
Subject: FW: Hazard Mitigation Plan Update

This is the Emergency Mangers from the local jurisdictions.

Jeff Guthrie

Operations Manager

Pima County Office of Emergency Management and

Homeland Security

130 W. Congress, B level

Tucson, AZ

85701

520-798-0600

From: Jeff Guthrie
Sent: Thursday, January 06, 2011 3:26 PM
To: Andre Matus; (jennifer.pegnato@tucsonaz.gov); (tjohnston@ci.sahuarita.az.us); charles.kmet@tonation-nsn.gov; David Azuelo; frank.duarte@sheriff.pima.gov; Jan Mclay; Jason Larter; Jim.Schneden@tucsonaz.gov; Larry Anderson (landerson@southtucson.org); Pat Quinn (Pat.Quinn@Tucsonaz.gov); seastone@uapd.arizona.edu; Steven Johnson (sjohnson@marana.com); Teachout, John; terrence.ford@dhs.gov
Cc: Mike Hein; 'Susan Wood'
Subject: Hazard Mitigation Plan Update

In 2005, Pima County and its incorporated jurisdictions, in conjunction with the AZ Division of Emergency Management (ADEM), developed the *Pima County Multi-Jurisdictional Hazard Mitigation Plan* (the Plan). The Plan was prepared in compliance with the requirements of the Disaster Mitigation Act of 2000 (DMA2K) and identifies mitigation measures to eliminate or reduce the effects of future disasters. The DMA2K states that all states, tribes and local jurisdictions must have a FEMA approved mitigation plan to be eligible for federal mitigation grant programs. The County's original Plan expires Jan 25, 2012, at which time an updated approved Plan will be required to maintain grant program eligibility. To assist us in updating our Plan update, ADEM obtained a grant and is assuming the 25% match to the grant. Therefore, there is no financial obligation to Pima County or the local jurisdictions, we must simply participate in meetings and provide information for the Plan. ADEM along with a contractor will be assisting us through the entire process and will be responsible for assembling the final product. This is where you come in...

Pima County would like its incorporated jurisdictions and Tribal partners to be part of the Plan update process, which is beginning at this time. You are strongly encouraged to join the Planning Team to ensure your city/town remains in the Plan and grant eligible. During the planning process, the jurisdictions' most threatening hazards/locations will be identified and discussed as well measures to mitigate the effect from future disasters. The ideal Planning Team members are made up of representatives from the following areas from each participating city/town and county:

Public Works
Planning/Zoning/Development
Engineering
Police/Fire

Once the Planning Team members are identified, I anticipate scheduling the first planning meeting for February 3rd and two follow up meetings one month apart. The Plan is intended to be complete in three 4 hour meetings held at the Pima County EOC. Due to the low number of meetings, it is imperative each jurisdiction is represented at each meeting and information is provided as required. Therefore, it is necessary to assign team member responsibility within your community to those that can make the meeting commitment and remain throughout the entire process.

Please determine your community's representatives and ask that they save the date. Please send me their contact information no later than January 21st.

Thank you in advance for your participation in this very important plan update.

Jeff Guthrie

Operations Manager

Pima County Office of Emergency Management and

Homeland Security

130 W. Congress, B level

Tucson, AZ

85701

520-798-0600

Pima County OEM

Pima County Office of Emergency Management and Homeland Security
33 N. Stone Ave, Tucson AZ 85701
(520) 798-0600 Office (520) 243-7550 Fax

January 18, 2011

Dear Community Stakeholder:

I write to you today to request the benefit of your comments and guidance to revise the *Pima County Multi-Jurisdictional Hazard Mitigation Plan* (the Plan). The Disaster Mitigation Act of 2000 (DMA2K) mandates that all states, tribes and local jurisdictions have a FEMA-approved Mitigation Plan to be eligible to receive funding from federal Mitigation Grant Programs. In 2005, Pima County and its incorporated jurisdictions, in conjunction with the Arizona Division of Emergency Management (ADEM), developed the current Plan and obtained Plan approval by FEMA as required by DMA2K.

The current Plan expires on January 25, 2012, by which time an updated Plan must be in place in order to remain eligible for Mitigation Grant Program support. I am very pleased to inform you that ADEM has obtained grant funding for a subject matter expert to provide consulting to our community for Plan review; ADEM is also covering the 25% match to the grant.

Pima County is now initiating the process to review and update the Plan. I invite your jurisdiction to participate in the Planning Team that we are developing to ensure that you are reflected in the Plan and thus remain Mitigation Grant Program eligible. While this is, of course, of benefit to your community, perhaps of greater importance is the opportunity during the planning process to identify the principal threats to your jurisdiction and develop actions that you can take to mitigate those threats to the lives and property of your constituents.

Typically, the ideal Planning Team members are representatives with expertise in the areas of Public Works, Planning/Zoning/Development, Engineering, Law Enforcement and Firefighting. Please determine your community's representatives in these fields and ask that they make themselves available to participate in the initial Planning Meeting scheduled for February 3rd, 2011 at the Pima County Herbert K. Abrams Building located at 3950 S. Country Club Rd. (at the corner of Ajo Way and Country Club Rd.) in conference room #1108. Please provide Jeff Guthrie, Operations Manager, with contact information for your representatives by January 21st. He may be reached at 243-7560 or via email at Jeff.Guthrie@pima.gov.

In addition to the initial Planning Meeting on February 3rd, I anticipate that two follow up meetings one month apart will be necessary. Each of these three meetings is anticipated to take four hours. It is imperative that you are represented at each meeting and that your entity's information is made available as required. Accordingly, I ask that you assign team member responsibility to those who can make these meeting commitments and remain on the Planning Team throughout the planning process.

Thank you for your consideration. I look forward to working with you and your representatives on this very important task. Please contact me if you have any questions, or if I can be of service.

Sincerely,

Mike Hein, Director
Pima County Office of Emergency Management

W. Scott Ogden

From: Jeff Guthrie [Jeff.Guthrie@pima.gov]
Sent: Friday, February 11, 2011 1:32 PM
To: W. Scott Ogden
Subject: FW: Hazard Mitigation Plan Update

Regional planners

Jeff Guthrie

Operations Manager

Pima County Office of Emergency Management and

Homeland Security

130 W. Congress, B level

Tucson, AZ

85701

520-798-0600

From: Jeff Guthrie
Sent: Friday, January 07, 2011 11:12 AM
To: Andrew D'Entremont; Edward Pope; Barbara Harris; Robert Bereiter
Subject: FW: Hazard Mitigation Plan Update

This is the email that went out yesterday. Please pass this to Char.

Thanks

Jeff Guthrie

Operations Manager

Pima County Office of Emergency Management and

Homeland Security

130 W. Congress, B level

Tucson, AZ

85701

520-798-0600

From: Jeff Guthrie
Sent: Thursday, January 06, 2011 3:26 PM
To: Andre Matus; (jennifer.pegnato@tucsonaz.gov); (tjohnston@ci.sahuarita.az.us); charles.kmet@tonation-nsn.gov; David Azuelo; frank.duarte@sheriff.pima.gov; Jan Mclay; Jason Larter; Jim.Schneden@tucsonaz.gov; Larry Anderson (landerson@southtucson.org); Pat Quinn (Pat.Quinn@Tucsonaz.gov); seastone@uapd.arizona.edu; Steven Johnson (sjohnson@marana.com); Teachout, John; terrence.ford@dhs.gov
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Jeff Guthrie

Operations Manager

Pima County Office of Emergency Management and

Homeland Security

130 W. Congress, B level

Tucson, AZ

85701

520-798-0600

W. Scott Ogden

From: Jeff Guthrie [Jeff.Guthrie@pima.gov]
Sent: Friday, February 11, 2011 1:30 PM
To: W. Scott Ogden
Subject: FW: Invitation to Attend: Pima County Hazard Vulnerability Planning Meeting

This is the school districts.

Sorry for the piecemeal information but it was sent out by others in our office depending on responsibilities

Jeff Guthrie
Operations Manager
Pima County Office of Emergency Management and
Homeland Security
130 W. Congress, B level
Tucson, AZ
85701
520-798-0600

From: Jillian Bradshaw
Sent: Wednesday, January 19, 2011 11:17 AM
To: Jeff Guthrie
Subject: FW: Invitation to Attend: Pima County Hazard Vulnerability Planning Meeting

---

From: Joen Painter [mailto:JPainter@tabletoptelephone.com]
Sent: Wednesday, January 19, 2011 11:23 AM
To: Jillian Bradshaw
Subject: RE: Invitation to Attend: Pima County Hazard Vulnerability Planning Meeting

Thank you for the information.
I will make sure that either I am in attendance at the meeting or our Superintendent, Bob Dooley.

Dr. Joen Painter
Principal AUSD
520-387-7602

Those who are lifting the world upward and onward are those who encourage more than criticize.
–Elizabeth Harrison, educator (1849-1927)

From: Jillian Bradshaw [mailto:Jillian.Bradshaw@pima.gov]
Sent: Wednesday, January 19, 2011 9:42 AM
To: jpainter@tabletoptelephone.com; rfederico@avsd.org; jking@avsd.org; conniholderman@amphi.com; pharris@amphi.com; cbermude@amphi.com; mgemma@amphi.com; dwalker@amphi.com; mnelson@amphi.com; kcorner@amphi.com; bweigold@amphi.com; conniholderman@amphi.com; aheinemann@amphi.com; egalaz@amphi.com; mbejaran@amphi.com; bstoner@amphi.com; ggault@amphi.com; fhepler@amphi.com; afarley@amphi.com; awichers@amphi.com; tcall@amphi.com; lhaller@amphi.com; dkuhn@amphi.com; jlansa@amphi.com; ahannah@amphi.com; mgunderson@cfsd.k12.az.us; jmarrs@cfsc.k12.az.us; lrathert@cfsd.k12.az.us; blorimer@cfsd.k12.az.us; cnichols@cfsd.k12.az.us; tkolter@cfsd.k12.az.us; jsherrill@cfsd.k12.az.us; mleeder@cfsd.k12.az.us; kboling@cfsd.k12.az.us; sickes@dsd39.org; pattonl@flowingwells.k12.az.us; shinns@flowingwells.k12.az.us; brunenkj@flowingwells.k12.az.us; WellsP@flowingwells.k12.az.us; twohillc@flowingwells.k12.az.us; bonnerb@flowingwells.k12.az.us; balla@flowingwells.k12.az.us;

lealholt@flowingwells.k12.az.us; swand@flowingwells.k12.az.us; thiffaults@flowingwells.k12.az.us; tallen@iobusd40.org; jeddy@iobusd40.org; M.M.Turner@maranausd.org; G.S.Schmidt@maranausd.org; D.A.Johnson@maranausd.org; S.J.Poling@maranausd.org; D.L.Linsalata@maranausd.org; N.L.Paddock@maranausd.org; E.R.Abrams@maranausd.org; L.R.Prouty@maranausd.org; J.W.Doty@maranausd.org; A.S.Murphy@maranausd.org; P.A.Cadigan@maranausd.org; P.J.Beine@maranausd.org; P.A.Harcus@maranausd.org; J.J.Meek@maranausd.org; E.C.Armenta@maranausd.org; S.J.Siedschlag@maranausd.org; J.M.DAmore@maranausd.org; D.L.Luce@maranausd.org; mneish@sahuarita.k12.az.us; croman@sahuarita.k12.az.us; jlehmkuhl@sahuarita.k12.az.us; tsteward@sahuarita.k12.az.us; draulston@sahuarita.k12.az.us; kshiba@sahuarita.k12.az.us; tbmaz2001@yahoo.com; rayc@susd12.org; wila@susd12.org; johnb@susd12.org; johnr@susd12.9rg; dawnm@susd12.org; debrae@susd12.org; tomh@susd12.org; emmac@susd12.org; debrab@susd12.org; bobm@susd12.org; eneidao@susd12.org; pamb@susd12.org; herbs@susd12.org; lindas@susd12.org; lilyd@susd12.org; stevep@susd12.org; pamelac@susd12.org; eddiei@susd12.org; artm@susd12.org; valeriel@susd12.org; ralphn@susd12.org; lyopp@tanq.org; gmiller@tanq.org; scenters@tang.org; ganderson@tanq.org; stuart.baker@tusd1.org; Heather.mace@tusd1.org; rachel.kundrat@tusd1.org; lindsay.loebig@tusd1.org; david.quan@tusd1.org; Joseph.hermann@tusd1.org; Cathryn.DeSalvo@tusd1.org; Diane.Quevedo@tusd1.org; Richard.Romero@tusd1.org; Larry.Chilgreen@tusd1.org; Chad.Knippen@tusd1.org; Carolyn.Eldridge@tusd1.org; Sabrina.Cruz@tusd1.org; Epifano.Guerrero@tusd1.org; Ruben.Diaz@tusd1.org; John.Howe@tusd1.org; Rex.Scott@tusd1.org; Linda.Armijo@tusd1.org; Frank.Armenta@tusd1.org; Lisa.Langford@tusd1.org; Joyce.Dillon@tusd1.org; Pearl.Miller@tusd1.org; Deborah.Anders@tusd1.org; Carolyn.Eldridge@tusd1.org; Lisa.McCorkle@tusd1.org; Kathryn.Martin@tusd1.org; Catherine.Comstock@tusd1.org; Charlotte.Patterson@tusd1.org; Jesus.Celaya@tusd1.org; Robert.Mackay@tusd1.org; David.Overstreet@tusd1.org; Helen.Grijalva@tusd1.org; Helen.LePage@tusd1.org; Juanita.Condit@tusd1.org; Andrew.Kent@tusd1.org; John.Heidel@tusd1.org; Paula.Godfrey@tusd1.org; Kathleen.Scheppe@tusd1.org; Anna.Rivera@tusd1.org; Jonathan.Ben-Asher@tusd1.org; Shannon.Mckinney@tust1.org; Carolyn.Eldridge@tusd1.org; Kathy.Bolles@tusd1.org; Maryann.Jackson@tusd1.org; Jimmy.Hart@tusd1.org; Cheri.LaRochelle@tusd1.org; Janet.Jordan@tusd1.org; David.Dodge@tusd1.org; Dan.Weisz@tusd1.org; Pamela.Clarridge@tusd1.org; Ana.Gallegos@tusd1.org; Margaret.Scott@tusd1.org; Pat.Flores@tusd1.org; Sheila.Govern@tusd1.org; Jerry.Holmes@tusd1.org; Mary.Mercado@tusd1.org; Paul.Deweerdt@tusd1.org; Jerry.Gallegos@tusd1.org; Paul.Thompson@tusd1.org; Terri.Polan@tusd1.org; Yolanda.Nunez@tusd1.org; Rosanna.Ortiz-Montoya@tusd1.org; Carolyn.Eldridge@tusd1.org; Mary.Anderson2@tusd1.org; Elizabeth.Redondo@tusd1.org; Julie.McIntyre@tusd1.org; Don.Calhoun@tusd1.org; Heidi.Aranda@tusd1.org; Victoria.Callison@tusd1.org; Robert.Mackay@tusd1.org; Tina.Isaac@tusd1.org; Robert.Mackay@tusd1.org; Kathryn.ManleyCrockett@tusd1.org; Robert.Mackay@tusd1.org; Marco.Ramirez@tusd1.org; Patricia.Dienz@tusd1.org; Holly.Leyman@tusd1.org; Ruben.Diaz@tusd1.org; Kim.Babeu@tusd1.org; Marcos.Quijada@tusd1.org; Elizabeth.Minno@tusd1.org; Robert.Pitts@tusd1.org; Cricket.Gallegos@tusd1.org; Stephen.Trejo@tusd1.org; Jose.Olivas@tusd1.org; Valerie.Payne@tusd1.org; Terry.Ross@tusd1.org; Sam.Giangardella@tusd1.org; Jonathan.Hanson@tusd1.org; Julie.Laird@tusd1.org; Jim.Christ@tusd1.org; Kerry.Vega@tusd1.org; Oscar.Dotson@tusd1.org; Epifano.Guerrero@tusd1.org; Daniel.Erickson@tusd1.org; Epifano.Guerrero@tusd1.org; Maria.Figueroa@tusd1.org; Barbara.Kohl@tusd1.org; Abel.Morado@tusd1.org; Roman.Soltero@tusd1.org; Elizabeth.Moll@tusd1.org; Debbie.Summers@tusd1.org; David.Ross@tusd1.org; John.Bellasario@tusd1.org; Ignacio.Ruiz@tusd1.org; Norma.Flores@tusd1.org; Leah.Dardis@tusd1.org; Wade.McRae@tusd1.org; Robin.Dunbar@tusd1.org; Stacie.Emert@tusd1.org; Aaliyah.Arrocha-Samuel@tusd1.org; Kristine.Hansen@tusd1.org; Maria.Marin@tusd1.org; Jonathan.Ben-Asher@tusd1.org; woodj@vail.k12.az.us; penat@vail.k12.az.us; brysond@vail.k12.az.us; mortensonm@vail.k12.az.us; finch5@vail.k12.az.us; dabneyk@vail.k12.az.us; emeryl@vail.k12.az.us; wrightm@vail.k12.az.us; graffk@vail.k12.az.us; steyerm@vail.k12.az.us; donaldsonm@vail.k12.az.us; chesebroughj@vail.k12.az.us; MTSHAW81@aol.com; maryann@academyadventures.com; ams@amstucson.org; aotes-principal@qwest.net; spear@at.tuccoxmail.com; aotms-principal@qwest.net; alctucson@msn.com; alctucson@msn.com; alctucson@msn.com; ccampuzano@guerreroschool.org; moses5555@aol.com; Alicia.Alvarez@leonagroup.com; cbraren@amerischools.org; charlenemarie72@yahoo.com; judybiz@worldnet.att.net; cmcgarvey@basistucson.org; dmoser@basistucson.org; Beginningacademy@yahoo.com; btridico@calliollin.com; tcarino@calliollin.com; lcothrun@canyonroseacademy.com; bjeppson@cardenoftucson.org
Cc: Jeff Guthrie
Subject: Invitation to Attend: Pima County Hazard Vulnerability Planning Meeting

Good Morning-

As Pima County Office of Emergency Management and Homeland Security begins a new planning cycle for revisions to the Pima County Multi-Jurisdictional Hazard Mitigation Plan, input from educational institutions becomes critical to the overall success of the program.

Please see the attached invitation from Director Mike Hein. We invite you to join us in this planning endeavor.

Thank you-

Jeff Guthrie
Operations Manager
Pima County Office of Emergency Management and
Homeland Security
130 W. Congress, B level
Tucson, AZ
85701
520-798-0600

JG: jmb

W. Scott Ogden

From: Griselda Moya-Flores [Griselda.Moya-Flores@pima.gov]
Sent: Tuesday, January 18, 2011 4:28 PM
To: Ursula Kramer; Suzanne Shields; Chris Cawein; Charles Matt Matthewson; Jean Voelkel; David Cummings; Lauren Eib; Priscilla Cornelio; Steve Kreienkamp
Cc: Jeff Guthrie
Subject: Hazard Mitigation Plan
Attachments: HazardVulnerabilityPlanning_2011.pdf

Good afternoon,

It is time for us to revise the Pima County Multi-Jurisdictional Hazard Mitigation Plan. Please see attached memorandum from Mr. Hein.

Thank you.

Griselda Moya-Flores
Administrative Specialist
Pima County Office of Emergency Management
and Homeland Security
Phone: (520) 243-7545
Fax: (520) 243-7550

W. Scott Ogden

From: Griselda Moya-Flores [Griselda.Moya-Flores@pima.gov]
Sent: Tuesday, January 18, 2011 4:31 PM
To: Randy Ortlinghaus; Reland Kane
Cc: Jeff Guthrie
Subject: Hazard Mitigation Plan
Attachments: HazardVulnerabilityPlanning_2011.pdf

Good afternoon,

It is time for us to revise the Pima County Multi-Jurisdictional Hazard Mitigation Plan. Please see attached memorandum from Mr. Hein.

Thank you.

Griselda Moya-Flores
Administrative Specialist
Pima County Office of Emergency Management
and Homeland Security
Phone: (520) 243-7545
Fax: (520) 243-7550

Memorandum JE Fuller/ Hydrology & Geomorphology, Inc.

MEETING DATE: February 3, 2011

MEETING TIME: 9:00 AM – 1:00 PM

MEETING LOCATION: Pima County Abrams Building
Tucson, AZ

DISTRIBUTION: Meeting Attendees

FROM: W. Scott Ogden - JEF

RE: Pima County Multi-Jurisdictional Hazard Mitigation Plan
Planning Team Meeting No. 1

ATTENDEES:

Char Ackerman – Oro Valley Emergency Planner
Charles Barclay – ADOT Superintendent
Robert Bereiter – Marana Emergency Planner
Keith Brann – Marana Town Engineer
Bret Canale – Marana GIS Analyst
Anna Casadei – Sahuarita Senior Planner
Paul Casertano – PAG Ops & Safety Lead
Dan Contomo – Marana USD CFO
Dane Crouse – Drexel Heights Fire Battalion Chief
Brian Delfs – Avra Valley Fire Chief
Andy D'Entremont – Pima County OEMHS Planner
Jane Fairall – Marana Deputy Town Attorney
Jordan Feld – Tucson Airport Authority Planning Director
Griselda Moya Flores – Pima County OEMHS
Jeff Guthrie – Pima County OEMHS Operations Manager
Barb Harris – Tucson OEM Emergency Planner
Thomas Hellfrich – Pima County Regional Flood Control District Mgr
Steven Johnson – Marana Police Sergeant/Emergency Coordinator
Paul Keesler – Oro Valley Permitting Manager
Jim Kress – Tucson Fire Captain
Brian Lauber – ASLD Forestry District Forester
Michael Losada – Tucson Airport Authority Police Corporal
Andre Matus – Pascua Yaqui Tribe Fire Chief
Janet McLay – Tucson OEM Emergency Management Coordinator
Mark Moore – Oro Valley Water Utility Design Reviewer
Lee Muscarella – Golder Ranch Fire Battalion Chief
Scott Ogden – JE Fuller/ Hydrology & Geomorphology, Inc.
Jennifer Pegnato – Tucson OEMHS Police Sergeant
Ed Pope – Sahuarita Emergency Response Planner
Jose Rodriguez – Oro Valley Engineering Division Manager

(Continued on Next Page)

Lisa Romero – Pima County OEMHS
Jim Schneden – Tucson Police Sergeant
Lisa Shafer – Marana Planning Director
James Stoltenberg – Rural/Metro Fire Deputy Fire Chief
Liz Temple – Pima County OEMHS Compliance Officer
T. Vanhook – Marana Community Development Director
Jim Vogelsberg – Tucson Planning & Development Adminstrator
Susan Wood – ADEM
NOTE: No Representative from South Tucson

AGENDA

1. **INTRODUCTIONS / GREETING**
2. **MITIGATION PLANNING OVERVIEW**
3. **CURRENT MITIGATION PLAN REVIEW**
4. **PLANNING PROCESS**
    a. **MJ Planning Team Roles**
    b. **Public Involvement Strategy**
5. **RISK ASSESSMENT**
    a. **Hazard Identification / Profiling**
    b. **Asset Inventory**
6. **NEXT MEETING DATES**

ACTION ITEM SUMMARY

DISCUSSION

Agenda Item 1:

- J. Guthrie opened meeting with a brief explanation of the purpose for the meeting and then introduced S. Ogden of JEF.
- S. Ogden explained the role of ADEM and JEF regarding the update process.
- S. Ogden asked each person at the meeting to introduce themselves and note whether or not they were involved with the development of the current multi-jurisdictional hazard mitigation plan (Plan).
- It was noted that the City of South Tucson was not represented. J. Guthrie will follow-up with them to ensure they understand the importance of attendance.

Agenda Item 2:

- S. Wood distributed presented an overview/review of the DMA2K mitigation process and purpose for preparing a mitigation plan. The discussion included a review of impacted grant eligibility.

Agenda Item 3:

- S. Wood led a section by section overview of the 2007 Pima County Multi-Jurisdictional Hazard Mitigation Plan (2007 Plan). Highlights of the discussion and comments included:
    - Plan format will change slightly to reflect a version that is more compatible to the format of the current State of Arizona Mitigation Plan.
    - Non-Arizona related information in the 2007 Plan will be removed.
    - Some folks were returning members from the 2007 Plan effort, but most were new to the process.
    - During the review of the community profile descriptions, S. Wood indicated that drafts of that section (new Plan Section 4) will be provided for editing and customizing by each jurisdiction. Each jurisdiction was encouraged to edit the existing text (except demographic data, which JEF will update) and make it reflect their community. She also encouraged each jurisdiction to add some text discussing the agricultural, mining, and tourism aspects as pertinent or relevant.
    - Details of Sections 5, 6, and 7 and their updates will be discussed later in the meeting today and in subsequent meetings.
    - A Tribal Annex will be created for the Pascua Yaqui Tribe to satisfy FEMA's Tribal Mitigation Plan requirements that are additional to the local planning requirements.

Agenda Item 4a:

- S. Ogden led a discussion / presentation of the planning team roles and responsibilities including:
    - The primary point of contact (PPOC)
    - The community representative
    - The local planning resources (other staff, outside agencies, business, school, non-profit reps, etc. contacted or referred to).
- Jeff Guthrie of the Pima County OEMHS was identified as the PPOC. The community representatives were identified as follows:
    - Unincorporated Pima County – Jeff Guthrie
    - Town of Marana – Steven Johnson
    - Pascua Yaqui Tribe - TBD
    - Town of Oro Valley – Char Ackerman
    - Town of Sahuarita – Ed Pope
    - City of South Tucson – (Not Present – TBD)
    - City of Tucson – Barb Harris and Janet McLay
- S. Ogden reviewed a list of possible local resources that the PPOC may invite to future meetings or coordinate with at the jurisdictional level to accomplish the various update tasks.
- S. Ogden presented a template for each jurisdiction to use during the planning process for documenting the local resources involved in the plan update outside of the main planning team.

Agenda Item 4b:

- S. Ogden led a discussion/presentation of the public involvement requirements of DMA2K.
- S. Ogden directed the team's attention to Section 3.5.5 of the 2007 Plan to review the public involvement effort done at that time. To the best of the team's knowledge, there were no significant responses from the public.
- The planning team discussed various options for pre-draft public involvement including newspaper notices, general public announcements, council/board briefings at a working session, and web page postings. The following strategies were identified:
    - Pima County will:
        - Post a notice to the county website.
        - Issue a press release similar to what was done for the 2007 Plan.
        - Coordinate the provision of links to the county's website with each jurisdiction once the website is up and running.
    - Town of Marana will:
        - Post a notice to town's website with a link to the county's.
        - Publish an article/public notice in their local newspaper.
    - Town of Oro Valley will:
        - Post a notice to town's website with a link to the county's.
        - Look into the possibility of doing an informational briefing for the Town Council.
    - Pascua Yaqui Tribe will:
        - Post a notice to town's website with a link to the county's.
        - Publish an article/public notice in their local newspaper.
        - Provide an announcement on the local radio station
    - Town of Sahuarita will:
        - Post a notice to town's website with a link to the county's.
        - Publish an article/public notice in their local newspaper.
        - Presentation/announcement at the Chamber of Commerce "For Our Cities" event.
    - City of Tucson will:
        - Post a notice to city's website with a link to the county's.
- Once the draft plan is ready, a second round of newspaper announcements will be used and the website notice will be updated with specific instructions for obtaining a draft of the plan.
- ADEM has developed template language for the county and other jurisdictions to use in the web and newspaper announcements. JEF will provide the template to the planning team via email.

Agenda Item 5a:

- S. Ogden presented an overview of what a risk assessment is and its purpose in the overall scheme of mitigation planning. He discussed the approach that the planning team will ultimately step through to update Section 5.

- The planning team reviewed the list of hazards previously evaluated in 2007 Plan as well as a comprehensive list of hazards identified in the 2010 State Plan. S. Ogden explained several of the 2010 State Plan hazards and how they related/differed from the 2007 Plan hazard list, including:
- In the 2010 State Plan, the hazard categories were redefined to reflect the damaging element of the hazards. For example, a thunderstorm or a tropical storm event primarily cause flood and wind damage, so those two categories were eliminated and the damaging elements of those events were profiled in the Flooding/Flash Flooding and Severe Wind categories.
- S. Ogden presented the results of a historic hazard event search and database compilation performed by ADEM and JEF that looks at declared and undeclared hazard events. JEF will provide copies of the Excel spreadsheets to the planning team for updating and closer review, as appropriate.
- The planning team reviewed the hazard lists and historic records and discussed which hazards could be eliminated off-hand and which should be evaluated further. The following is a brief summary of that discussion:
    - As a reminder, S. Ogden reiterated that for each hazard profiled, the Plan must include at least one mitigation action or project to address mitigation of that hazard.
    - Several planning team members wanted to profile all of the hazards and develop a risk assessment that could be used for other planning documents such as an emergency operations plan. S. Ogden reiterated that as long as each hazard profiled had at least one meaningful mitigation action/project, then that would be OK.
    - Disease – discussed whether this should be included in the Plan if it is already addressed in other planning documents developed by the county. The team concluded that the hazard should remain and reference other documents as appropriate.
    - Several of the hazards were possibilities, but the planning team wanted to have an opportunity to review with others not present at this meeting to determine if the hazard should be evaluated further.
- The conclusion of the discussion established that the following hazards will be profiled and assessed for vulnerability:
    - Dam Failure
    - Disease
    - Drought
    - Extreme Heat
    - Flooding / Flash Flooding
    - HAZMAT
    - Levee Failure
    - Severe Wind (includes microbursts, tornados, dust storms, gustnados, etc.)
    - Wildfire
    - Winter Storm

- The Planning Team will conduct further research and investigations to decide if the following hazards will be considered as well. ***The Planning Team will respond with a decision by no later than February 25th***:
    - Earthquake
    - Fissure
    - Lightning
    - Subsidence

Agenda Item 5b:

- S. Ogden led the Team through a review of Sections 5.5.3 and 5.5.4 which summarizes the asset inventory data that was used/developed for the 2007 Plan and how it was used in the 2007 Plan vulnerability analysis. Nobody in attendance at the meeting was aware of any data files that may be available from the 2007 Plan effort. It appears that the majority of data was taken from the HAZUS-MH database.
- S. Ogden presented a working definition for defining/identifying "critical" assets and some general categories and examples of what might be included. The ultimate identification of what is "critical" will be the responsibility of each jurisdiction.
- S. Ogden provided a spreadsheet and guidance document for cataloging critical assets for each jurisdiction. Each jurisdiction shall compile a list of critical assets identified by that jurisdiction using the template spreadsheet and provide to JEF for use in the vulnerability analysis.

Agenda Item 6:

- Next meetings are scheduled as follows:
    - Planning Team Meeting No. 2, March 8th, 2011, 9am to 1pm, Pima County Abrams Building, 3950 S. Country Club Road, Tucson, AZ
    - Planning Team Meeting No. 3, April 14th, 2011, 9am to 1pm, Pima County Abrams Building, 3950 S. Country Club Road, Tucson, AZ

ACTION ITEM SUMMARY:

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
1-1	J. Guthrie will follow up with City of South Tucson officials to confirm participation status	J. Guthrie [2/25/11]
1-2	JEF will email electronic version of Local Resources List template to each jurisdiction to track contributors to the plan update.	JEF [2/11/11]
1-3	Each jurisdiction shall record and document all people contacted or involved as a planning resource at the local level, using the template provided by JEF	All Jurisdictions [prior to draft]
1-4	JEF will email Section 4 - Community Descriptions to all jurisdictions for review and updating.	JEF [2/11/11]

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
1-5	All jurisdictions are to review and update their respective Community Description, as appropriate and desired. Jurisdictions are encouraged to consider including Agriculture, Mining, Manufacturing, and Tourism in their descriptions as appropriate. JEF will update demographic information, so those tables and figures may be ignored.	All Jurisdictions [3/4/11]
1-6	JEF will provide a sample public notice prepared by ADEM to the planning team for use in the website and newspaper announcements.	JEF [2/11/11]
1-7	All local jurisdictions will perform the pre-draft public involvement activities summarized in Agenda Item 4b	All Jurisdictions [3/4/11]
1-8	JEF will provide digital copies of the historic hazard database files to the planning team for review and update as needed.	JEF [2/11/11]
1-9	All jurisdictions are to review and update the historic hazard database as appropriate and desired by the community.	All Jurisdictions [3/4/11]
1-10	All jurisdictions shall evaluate the following hazards and decide whether to keep them or not: • Earthquake • Fissure • Lightning • Subsidence A keep or drop decision shall be communicated to JEF by the due date.	All Jurisdictions [2/25/11]
1-11	JEF to provide asset inventory template worksheet and instructions to all jurisdictions for their use in compiling a critical asset inventory	JEF [2/11/11]
1-12	All jurisdictions shall compile a list of critical assets, to be determined by the jurisdiction and provide the completed worksheet to JEF	All Jurisdictions [3/4/11]

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Dan Contorno	Marana Schools	CFO	CFO	682 4756	404 8275	d.j.contorno@maranausd.or
T. Van Hook	Town of Marana	Community Development	Director	382 1909	940 0766	tvanhook@marana.com
Andy D'Entremont	Pima County OFF Emergency		Planner	520 243-7565	520 465-4128	Andrew.Dentremont@pima.gov
* Ed Pope	Town of Sahuarita	Emer. Response	Planner	349-7003	343-9109	EPOPE@CS.SAHUARITA.AZ.U
Mark Moore	Oro Valley Water	Engineering	Design Reviewer	229 5017	631 4940	mmoore@orovalleyaz.gov
Dane C Crouse	Drexel Heights Fire	Operations	Battalion Chief	471 1262		DCROUSE@DREXELFIRE.NET
Bret Canale	Town of Marana	GIS	GIS DB Analyst	382-1992		bcanale@marana.com
* Steven W Sothson	Town of Marana PD	Police	Emergency Coord.	382 2034	471 0292	S.Sothson@marana.com
Jordan Tate	Tucson Airport	Planning	Director	573 8115		
Jane Fairall	Town of Marana	Legal	Deputy Town Attorney	382-1941		jfairall@marana.com
Jennifer Perez Jaffe Hill	COT	Tohono S / TPD	Sergeant	837 7463		Jennifer.Perez@Tucsonaz.go
Thomas Helfrich	P.C.	Flood Control Dist	Manager	243-1850	444-3657	Tom.Helfrich@Rfcd.Pima.gov
Lee Muscarella	Golder Ranch Fire District	Suppression	Battalion Chief	825-5911	235-5445	LMuscarella@golderranchfire.org
Jim Schneden	Tucson Police Dept.	Homeland Security	Sergeant	837-7383	429-2482	jim.schneden@tucsonaz.gov
Lisa Shafer	Town of Marana	Planning Dept.	Planning Director	382-2649	975-7169	lshafer@marana.com
Keith Brann	Town of Marana	Engineering Development	Town Engineer	382-2629		KBrann@marana.com
Jose Rodriguez	Town of Oro Valley	DIS - Engineering	Eng Div. Manager	229-4872	996-1937	JRODRIGUEZ@OROVALLEYAZ.GOV
Liz Temple	Pima OEM			520 243-7544	349-4087	elizabeth.temple@pima.go
Jeff Guthrie	" "			798-0600		jeff.guthrie@pima.gov
Griselda Moya Flores	" "			"		griselda.moya.flores@pim
Lisa Romero	" "			"		lisa.romero@pima.gov

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
* Barbara Harris	TPD	SRD	Emergency Planner	837-7501	784-1280	Barbara.Harris@tucsonaz.g
Anna Casadei	Town of Sahuarita	Planning & Zoning	Senior Planner	822-8854		acasadei@c.sahuarita.az.us
Robert Bereiter	Town of Marana	P.D.	Emerg. Planner	382-2057		rbereiter@marana.com
James Stoltenberg	Rural/Metro FD	FD	Deputy Chief	297-3660	237-1939	James-Stoltenberg@rmetro.com
* Char Ackerman	Oro Valley PD	Plng PD	Emerg. Planner	243-7564	730-4906	cackerman@orovalleyaz.gov
Jim Kress	Tucson Fire	EM/HS	Captain	837-7384	—	Jim.Kress@tucsonaz.gov
Paul Keesler	Oro Valley	Dev. Serv.	Permitting Mngr	229-4811	906-4270	PKeesler@orovalleyaz.gov
Michael Losada	TAA PD	Police	Cpl.	573-8182	870-0268	mlosada@marpat.org
Charles R Barclay	A.D.O.T.	Tucson District	Superintendent	388-4214	289-0033	cbarclay@azdot.gov
* Janet McLay	COT OEM	Tucson Emerg. Mgt.	Em. Mgt. Coord	837-7380	349-6755	jan.mclay@tucsonaz.gov
Brian Lauber	AZ St Forestry		District Forester	628-5480x24	444-9315	brianlauber@azsf.gov
Paul Casertano	Pima Assoc. of Gov'ts	Planning	Operations & Safety Lead	792-1093		pcasertano@pagnet.org
André Matus	Pascua Pueblo Fire Dept. PYI.	Fire Department	Fire Chief	520-883-5760	520-282-6608	Andre.matus@pascuayaqui-nsn.gov
Jim Vogelsberg	City of Tucson	Planning & Development	Administrator	837-4926		JimVogelsberg@Tucsonaz.gov
Brian Delfs	Avra Valley F.D.	Fire	Fire Chief	682-3255	481-2554	BDelfs@AVFIRE.ORG

Memorandum JE Fuller/ Hydrology & Geomorphology, Inc.

MEETING DATE: March 8, 2011

MEETING TIME: 9:00 AM – 1:00 PM

MEETING LOCATION: Pima County Abrams Building
Tucson, AZ

DISTRIBUTION: Meeting Attendees

FROM: W. Scott Ogden - JEF

RE: Pima County Multi-Jurisdictional Hazard Mitigation Plan
Planning Team Meeting No. 2

ATTENDEES:

Char Ackerman – Oro Valley Emergency Planner
Robert Bereiter – Marana Emergency Planner
Paul Casertano – PAG Operations & Safety Lead
Andy D'Entremont – Pima County OEMHS Planner
Jeff Guthrie – Pima County OEMHS Operations Manager
Barb Harris – Tucson OEM Emergency Planner
Steven Johnson – Marana Police Sergeant/Emergency Coordinator
Janet McLay – Tucson OEM Emergency Management Coordinator
Scott Ogden – JE Fuller/ Hydrology & Geomorphology, Inc.
Ed Pope – Sahuarita Emergency Response Planner
Jose Rodriguez – Oro Valley Engineering Division Manager
Liz Temple – Pima County OEMHS Compliance Officer
Henry Vega – City of South Tucson Public Works
Susan Wood – ADEM
NOTE: No Representative from Pascua Yaqui Tribe

AGENDA

1. **EMAP ELEMENTS**
2. **ACTION ITEM STATUS REVIEW**
3. **HAZARD PROFILING**
    a. **Finalize Hazard List**
    b. **CPRI**
4. **CAPABILITY ASSESSMENT**
    a. **Legal-Regulatory, Staff, and Fiscal Capabilities**
    b. **Past Mitigation Activities**
    c. **NFIP Participation**
    d. **Repetitive Loss Properties**
5. **EXISTING MITIGATION ACTION/PROJECT EVALUATION**
6. **PLAN MAINTENANCE PROCEDURES**
7. **NEXT MEETING DATES**

ACTION ITEM SUMMARY

DISCUSSION

Agenda Item 1:

- S. Wood presented elements for EMAP accreditation that will be added to the updated Plan. The additional elements will include:
    - **Environmental Risk and Vulnerability**: The hazard risk is evaluated with respect to three environmental elements; air, water, and soil. An evaluation risk matrix tool was used to assess the risk posed by each hazard to environmental elements.
    - **Consequences/Impacts**: This section provides an assessment of the consequence and impacts posed by an occurrence of the hazard, to the following sectors:
        - **Public** – the public in general
        - **Responders to the Incident** – a discussion of the hazard impacts/consequence posed to officials and individuals responding to or during the hazard.
        - **Continuity of Operations/Delivery of Services** – an assessment of the hazard impact/consequence to state agencies and delivery of state level services.
        - **Environment** – a general discussion of the impacts/consequences of the hazard on the environment. This will compliment the previous "Environmental Risk & Vulnerability" section.
        - **Economic / Financial Condition of Jurisdiction** – a general discussion of the impacts/consequences to the Arizona economy and financial condition.
        - **Public Confidence in Jurisdiction's Governance** – a general discussion of the impacts/consequences to the public's confidence in the ability of the state to effectively govern and maintain governance during and after the hazard event. The elements will be addressed at a county-wide level and do not need to be.
- Several jurisdictions were not interested in performing the additional effort and the EMAP accreditation. Only Pima County expressed an interest in having the EMAP elements in the Plan. S. Wood clarified that these will only be evaluated at a county-wide level and do not have to be jurisdiction specific. She also stated that the EMAP elements do add value to the Risk Assessment.
- S. Wood and S. Ogden to coordinate with Pima County on how to get this information completed.

Agenda Item 2:

- S. Ogden reviewed the status of pending action items assigned at Meeting No. 1. The following, were noteworthy discussions:
    - Several communities requested that Community Description file (for Action Item 1-5) and the Undeclared Hazard Event database (for Action Item 1-9) be resent.

- Action Item No. 1-7 - Need to change Pima County status to complete. Sahuarita website posting is up as of today (3/8/11) and an article is expected from the local paper within a week.
- Action Item No. 1-12 – The due date for this item has been revised to 3/18/11.

Agenda Item 3:

- S. Ogden presented the list of hazards that resulted from the poll of jurisdictions per Action Item No. 1-10. Each hazard was reviewed to check on which communities planned to provide mitigation actions/projects for that hazard. The polling results were:
    - Dam Failure – Pima County only
    - Disease – Pima County only
    - Drought – multiple jurisdictions
    - Earthquake – Pima County only
    - Extreme Temperature – multiple jurisdictions
    - Flooding / Flash Flooding – multiple jurisdictions
    - HAZMAT – multiple jurisdictions
    - Levee Failure – multiple jurisdictions
    - Lightning – WILL BE DROPPED
    - Subsidence – multiple jurisdictions
    - Severe Wind – multiple jurisdictions
    - Wildfire – multiple jurisdictions
    - Winter Storm – Pima County only
- S. Ogden presented the CPRI, explained the purpose of the tool, and walked through a demonstration calculation.
- Each jurisdiction is to complete a CPRI assessment of each of the above hazards using the CPRI worksheet that S. Ogden will send with other meeting follow-up materials.

Agenda Item 4a:

- S. Ogden led the planning team in a review of the 2007 Plan's capability assessment and distributed worksheet examples for discussing. He explained that the new Plan will include the same material, but will be reformatted somewhat to change presentation of the legal and regulatory tools. The format and data needs of the new table was discussed and outlined.
- The format of the Administrative and Technical Capacity table and Fiscal Resource table will remain unchanged except for new table numbers.
- S. Ogden will pre-populate and distribute a worksheet file containing the updated tables to each jurisdiction using the 2007 Plan information as a starting point. Each jurisdiction was directed to review and revise/update each table as necessary.

Agenda Item 4b:

- S. Ogden led the planning team in a discussion of documenting prior mitigation activities as a part of the overall capability assessment.

  - The Capability Assessment portion of the updated Plan will be expanded to include 2 new sets of data will be added to.
  - The first will be a paragraph summarizing prior mitigation activities involving HMGP or PDM funds that are currently tracked by ADEM.
  - The second will be a table summarizing past mitigation activities that have been completed by each jurisdiction over the past 5 years.
- S. Ogden reviewed the HMGP/PDM projects from ADEM that were done in Pima County.
- S. Ogden reviewed the format of the worksheet for summarizing past mitigation activities that have been completed by each jurisdiction over the past 5 years and talked through an example.
- JEF will provide a worksheet for each jurisdiction to document past mitigation activities. May include past projects, outreach, studies, etc., funded by any source (not just grants).

Agenda Item 4c:

- S. Ogden presented a table showing NFIP participation statistics and insurance data that was current as of February 2011 and November 2010, respectively.
- Each jurisdiction was polled with regard to management roles and the data was recorded in a table that will ultimately be included in the Plan. E. Pope (Sahuarita) was unsure of the town's management role and will have to check with others at the town.

Agenda Item 4d:

- S. Ogden presented a summary of NFIP repetitive loss property information that was provided by FEMA through ADEM and was current as of January 2010.
- S. Wood is currently working with ADWR to get an updated repetitive loss database and will distribute that data to the planning team via S. Ogden once it is available.

Agenda Item 5:

- S. Ogden led the planning team through a review of the 2007 Plan's current list of mitigation actions/projects (A/Ps) and explained the data presented in Section 6.4.
- S. Ogden explained that a part of the plan update process will include an evaluation of the 2007 Plan's mitigation actions/projects.
- S. Ogden explained the process that the planning team will use to evaluate the action/projects listed in Section 6.4 and provided examples of the evaluation worksheet. S. Ogden will compile the initial data from the 2007 Plan into worksheets specific to each jurisdiction and will send the worksheets to each jurisdiction for completion.

Agenda Item 6:

- S. Ogden requested that the planning team read and review Section 7 of the 2007 Plan and be prepared to discuss what has happened over the past 5 years and what the team wants to do for the next 5 years.

- S. Ogden also provided copies of the FEMA crosswalk that is used to grade the Plans so the planning team can see what questions need to be answered.

Agenda Item 7:

- Next meetings are scheduled as follows:
  - Planning Team Meeting No. 3, April 14th, 2011, 9am to 1pm, Pima County Abrams Building, 3950 S. Country Club Road, Tucson, AZ
  - TENTATIVE - Planning Team Meeting No. 4, May 26th, 2011, 9am to 1pm, Pima County Abrams Building, 3950 S. Country Club Road, Tucson, AZ. J. Guthrie to confirm availability of the facility.

ACTION ITEM SUMMARY:

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
2-1	S. Wood and S. Ogden to coordinate with Pima County on getting the EMAP components added to the Plan	S. Wood, S. Ogden, Pima County [3/18/11]
2-2	S. Ogden to resend Community Description and Undeclared Historic Hazard Worksheet to planning team	S. Ogden [3/11/11]
2-3	S. Ogden to send CPRI worksheet to planning team	S. Ogden [3/11/11]
2-4	Each jurisdiction is to complete a CPRI assessment of all the identified hazards and return to JEF.	All Jurisdictions [4/7/11]
2-5	S. Ogden will prepare and distribute worksheet files containing the updated capability assessment tables to each jurisdiction using the 2007 Plan information as a starting point.	S. Ogden [3/11/11]
2-6	Each jurisdiction is to review, edit and complete the capability assessment and return to JEF.	All Jurisdictions [4/7/11]
2-7	S. Ogden to send the Past Mitigation Activity worksheet to the planning team.	S. Ogden [3/11/11]
2-8	Each jurisdiction may complete the worksheet summarizing past mitigation activities that have been accomplished by each jurisdiction over the past 5 years. May include past projects, outreach, studies, etc., funded by any source (not just grants).	All Jurisdictions [4/7/11]
2-9	E. Pope (Sahuarita) to check with others at the town and report on the floodplain management role of Sahuarita under the National Flood Insurance Program.	E. Pope [4/7/11]
2-10	S. Ogden will prepare and distribute Existing Mitigation Action/Project Evaluation worksheets to each jurisdiction.	S. Ogden [3/11/11]
2-11	Each jurisdiction shall complete the Existing Mitigation Action/Project Evaluation worksheet and return it to JEF	All Jurisdictions [4/7/11]

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
2-12	Planning team shall review Section 7 of the 2007 Plan and be prepared to discuss what has happened over the past 5 years and what the team wants to do for the next 5 years at Meeting No. 3	Planning Team [4/14/11]

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Char Ackerman	Town of Oro Valley	Police Department	Emergency Planner	520-243-7564	520-730-4906	cackerman@orovalleyaz.gov
Charles Barclay	Arizona Department of Transportation	Tucson District	Superintendent	520-388-4214	520-289-0033	cbarclay@azdot.gov
Robert Bereiter	Town of Marana	Police Department	Emergency Planner	520-382-2057		rbereiter@marana.com
Keith Brann	Town of Marana	Development - Engineering	Town Engineer	520-382-2629		kbrann@marana.com
Bret Canale	Town of Marana	GIS	GIS DB Analyst	520-382-1992		bcanale@marana.com
Anna Casadei	Town of Sahuarita	Planning & Zoning Department	Senior Planner	520-822-8854		acasadei@ci.sahuarita.az.us
Paul Casertano	Pima Association of Governments	Planning	Operations & Safety Lead	520-792-1093		pcasertano@pagnet.org
Dan Contorno	Marana Unified School District	CFO	CFO	520-682-4756	520-404-8275	d.j.contorno@maranausd.org
Dane Crouse	Drexel Heights Fire District	Operations	Battalion Chief	520-471-1262		dcrouse@drexelfire.net
Brian Delfs	Avra Valley Fire District	Fire Department	Fire Chief	520-682-3255	520-481-2554	bdelfs@avfire.org
Andy D'Entremont	Pima County	Office of Emergency Management	Planner	520-243-7565	520-465-4128	andrew.dentremont@pima.gov
Jane Fairall	Town of Marana	Legal	Deputy Town Attorney	520-382-1941		jfairall@marana.com
Rafael Leon Jordan Feld	Tucson Airport Authority	Planning Department	Director	520-573-5115		jfeld@tucsonairport.org
Griselda Moya Flores	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		griselda.moya.flores@pima.gov
Jeff Guthrie	Pima County	Office of Emergency Management and Homeland Security	Operations Manager	520-798-0600		jeff.guthrie@pima.gov
Barb Harris	City of Tucson	Police Department - Office of Emergency Management	Emergency Planner	520-837-7501	520-784-1280	barbara.harris@tucsonaz.gov
Thomas Hellfrich	Pinal County	Flood Control District	Manager	520-243-1850	520-444-3637	tom.hellfrich@rfcd.pima.gov
Steven Johnson	Town of Marana	Police Department	Sergeant / Emergency Coordinator	520-382-2034	520-471-0292	sjohnson@marana.com
Paul Keesler	Town of Oro Valley	Development Services	Permitting Manager	520-229-4811	520-906-4270	pkeesler@orovalleyaz.gov
Jim Kress	City of Tucson	Fire Department - EM / HS	Captain	520-837-7384		jim.kress@tucsonaz.gov
Brian Lauber	Arizona State Land Department	State Forestry Division - Tuscon District	District Forester	520-628-5480 x 204	520-444-9315	brianlauber@azsf.gov
Michael Losada	Tucson Airport Authority	Police Department	Corporal	520-573-8182	520-870-0268	mlosada@tucsonairport.org
Andre Matus	Pascua Yaqui Tribe	Pascua Pueblo Fire Department	Fire Chief	520-879-5720	520-282-0609	andre.matus@pascuayaqui-nsn.gov
Janet McLay	City of Tucson	Office of Emergency Management	Emergency Management Coordinator	520-837-7380	520-349-6755	jan.mclay@tucsonaz.gov
Mark Moore	Town of Oro Valley	Water Utility - Engineering	Design Reviewer	520-229-5017	520-631-4940	mmoore@orovalleyaz.gov
Lee Muscarella	Golder Ranch Fire District	Suppression	Battalion Chief	520-825-5911	520-235-5445	lmuscarella@golderranchfire.org

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Jennifer Pegnato	City of Tucson	Office of Emergency Management and Homeland Security / Police Department	Sergeant	520-837-7463		jennifer.pegnato@tucsonaz.gov
Ed Pope	Town of Sahuarita	Emergency Response	Planner	520-347-7003	520-343-9101	epope@ci.sahuarita.az.us
Jose Rodriguez	Town of Oro Valley	DIS - Engineering	Engineering Division Manager	520-229-4872	520-946-1937	jrodriguez@orovalleyaz.gov
Lisa Romero	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		lisa.romero@pima.gov
Jim Schneden	City of Tucson	Police Department - Homeland Security	Sergeant	520-837-7383	520-429-2482	jim.schneden@tucsonaz.gov
Lisa Shafer	Town of Marana	Planning	Planning Director	520-382-2649	520-975-7169	lshafer@marana.com
James Stoltenberg	Rural/Metro Fire District	Fire Department	Deputy Chief	520-297-3600	520-237-1939	james.stoltenberg@rmetro.com
Liz Temple	Pima County	Office of Emergency Management and Homeland Security	Compliance Officer	520-243-7644	520-349-4087	elizabeth.temple@pima.gov
T. Vanhook	Town of Marana	Community Development	Director	520-382-1909	520-940-0766	tvanhook@marana.com
Jim Vogelsberg	City of Tucson	Planning & Development	Administrator	520-837-4926		jim.vogelsberg@tucsonaz.gov
Susan Wood	Arizona Division of Emergency Management	Mitigation Division	Planning Manager	602-464-6518		susan.wood@azdema.gov
Scott Ogden	JE Fuller/ Hydrology & Geomorphology, Inc		Project Manager / Senior Engineer	480-222-5717	480-299-3394	scott@jefuller.com
HENRY VEGA	So. Tucson	Public Works		520-770-0032		Hvega@southtucson.org

Sign-In Sheet

Pima County Multi-Juris. Haz Mit Plan
Pascua Yaqui Tribe Mtg - 4/12/11

Name	Phone	Email
A. MATUS	520-879-5721	ANDREW.MATUS2@PASCUAYAQUI-NSN.GOV
Bernice Rodriguez	520-879-5723	Bernice.E.Rodriguez@pascuayaqui-nsn.gov
ROBERT GARCIA	520-879-5791	ROBERT.GARCIA@PASCUAYAQUI-NSN.GOV

Memorandum JE Fuller/ Hydrology & Geomorphology, Inc.

MEETING DATE: April 14, 2011

MEETING TIME: 9:00 AM – NOON

MEETING LOCATION: Pima County Abrams Building
Tucson, AZ

DISTRIBUTION: Meeting Attendees

FROM: W. Scott Ogden - JEF

RE: **Pima County Multi-Jurisdictional Hazard Mitigation Plan**
Planning Team Meeting No. 3

ATTENDEES:

Char Ackerman – Oro Valley Emergency Planner
Robert Bereiter – Marana Emergency Planner
Lindy Brigham – Southern AZ Buffelgrass Coordination Center Exec. Director
Andy D'Entremont – Pima County OEMHS Planner
Sandra Espinoza – Tohono O'odham Nation OEM Hazard Mitigation Specialist
Jeff Guthrie – Pima County OEMHS Operations Manager
Barb Harris – Tucson OEM Emergency Planner
Tom Helfrich – Pima County Regional Flood Control District Manager
Steven Johnson – Marana Police Sergeant/Emergency Coordinator
Rafael Leon – Tucson Airport Authority Program Representative
Scott Ogden – JE Fuller/ Hydrology & Geomorphology, Inc.
Ed Pope – Sahuarita Emergency Response Planner
Nicolas Siemsen – Pima County OEMHS Program Director
John Wisner – Pima County OEMHS Program Director
NOTE: No Representative from South Tucson

AGENDA

1. **ACTION ITEM STATUS REVIEW**
2. **PLAN MAINTENANCE PROCEDURES**
   a. **Monitoring and Evaluation**
   b. **Plan Update**
   c. **Plan Incorporation**
   d. **Continued Public Involvement**
3. **GOALS & OBJECTIVES REVIEW/UPDATE**
4. **NEXT MEETING DATES**

ACTION ITEM SUMMARY

DISCUSSION

Agenda Item 1:

- S. Ogden reviewed the status of pending action items assigned at prior meetings as of April 13, 2011. There were no significant or noteworthy discussions and the status report is included at the end of these notes.

Agenda Item 2a:

- S. Ogden led the planning team in a review of Section 7.1.1 and 7.1.2 in the 2007 Plan and the stated monitoring and evaluation goals.
- A poll of each jurisdiction was conducted regarding past plan monitoring and evaluation activities. All reported that no formal monitoring and evaluation activities were performed per the prescribed procedures in the 2007 Plan.
- Reasons for not doing the monitoring and evaluation were mostly due to:
    - Staffing issues - changes in personnel, turnover, insufficient numbers.
    - Lack of continuity to the 2007 planning team and follow through during staff changes.
    - Lack of a perceived practicality on the part of the plan.
    - Lack of plan champion that would take the responsibility for initiating the activity.
    - Lack of plan awareness and perceived usefulness.
- The 2007 Plan was briefly reviewed and referenced during the following activities:
    - Plan was evaluated during the development of a PDM grant application by the County, TAA, and the SABCC, to mitigate wildfire hazards due to Buffelgrass.
    - The Plan was referenced to develop mitigation projects for HMGP grant applications following the 1660-DR disaster in 2006.
    - Oro Valley reviewed the Plan as a part of investigating projects for the DR-1888 and DR-1940 disaster HMGP.
- A new monitoring and evaluation schedule and scope was discussed with an acute awareness of the lack of action over the past 4 years. The following was the result:
    - ADEM will commit to initiating/prompting the need for review on or around the anniversary of the Plan approval date. ADEM will contact the Pima County Emergency Management Program Coordinator with the reminder.
    - The Pima County Emergency Management Program Coordinator will then contact the Emergency Management Representative of every participating jurisdiction and convene a review meeting. Each Emergency Management Representative will be reminded to review Section 7.1 of the Plan and come prepared to discuss and document the review.
    - The scope of the review will address the following questions and sections of the Plan:
        - Hazard Identification: Have the risks and hazards changed?
        - Goals and objectives: Are the goals and objectives still able to address current and expected conditions?

        - Mitigation Projects and Actions: Has the project been completed? If not complete but started, what percent of the project has been completed? How much money has been expended on incomplete projects? Did the project require additional funds over the expected amount or were the costs less than expected?
    - A brief memorandum will be used to document the reviews conducted over the next planning cycle and will be included in an appendix placeholder.

Agenda Item 2b:

- The planning team reviewed the plan update strategy of Section 7.1.3 in the 2007 Plan and chose to revise the section to make it less complicated and clearer in scope and schedule. The following are the resultant changes:
    - One year prior to the plan expiration date, the Planning Team will re-convene to review and assess the materials accumulated in Appendix E and the Plan itself.
    - The Planning Team will update and/or revise the appropriate or affected portions of the plan and produce a revised plan document.
    - The revised plan document will be presented before the respective councils and boards for an official concurrence/adoption of the changes.
    - The revised plan will be submitted to ADEM and FEMA for review, comment and approval.
- Responsibility for initiating the update process will fall to the Pima County Emergency Management Program Coordinator.

Agenda Item 2c:

- The planning team reviewed Section 7.1.4 of the 2007 Plan
- A poll of the jurisdictions was conducted to identify ways in which the 2007 Plan was either incorporated or referenced into other planning mechanisms within each jurisdiction. Other than those items already discussed in Agenda Item 2a, no other occurrences were known.
- Reasons for the lack of further incorporation success were discussed and were found to be similar to the reasons for the lack of plan maintenance. The planning team concluded that a greater awareness of the plan was needed and that hopefully a more regular review of the plan would help in the awareness and implementation of the plan in other planning mechanisms. It was also noted, that due to the significant staff reductions of participating jurisdictions, there is really not all that much other planning being done.
- Each jurisdiction will investigate both past incorporation/reference occurrences and also formulate anticipated future opportunities and return a list to JEF.

Agenda Item 2d:

- The planning team reviewed Section 7.1.5 of the 2007 Plan and discussed the status of the stated continued public involvement activities as follows:

  - Website Posting of 2007 Plan – the website posting of the 2007 Plan was never accomplished by the county. Tucson maintained an intranet webpage for the 2007 Plan, but no publically accessible webpage.
  - Annual Review Press Releases – since the annual reviews were not done, no press releases were issued either.
  - Plan Copy Distribution – some copies were distributed among departments/divisions of each jurisdiction, but in general, not as thoroughly as anticipated.
- Other public involvement activities that included some element of hazard mitigation were discussed and generally included:
  - LEPC meetings
  - Public meetings related to NFIP activities (release of the new DFIRMS, LOMRS, new FIS delineations, etc.)
  - Wildfire and Firewise related public presentations and information dissemination.
  - Water conservation awareness campaigns and information
  - Participation in local events, the county fair, and other special events.
- Each jurisdiction will provide a list of both past and future opportunities for continued public involvement.

Agenda Item 3:

- S. Ogden led the planning team in a review and discussion of the 2007 Plan's goals & objectives (G&Os). He also presented and reviewed a copy of the State Plan's goals and objectives for the team to use in ensuring compatibility between the state and local Plans.
- The planning team discussed both sets of G&Os and the following are highlights of that discussion:
  - Several jurisdictions noted that many of the G&Os were either irrelevant to hazard mitigation or extremely unclear and vague.
  - It was noted that a lot time and energy was expended identifying all of the G&Os and subsequent actions, many of which never made it to implementation. In general, the effort was perceived as wasted.
  - The planning team liked the relative simplicity and flexibility of the State Plan G&Os, and liked the idea of investing time and energy only identifying mitigation actions/projects that have a likely potential of being implemented over the next cycle of the Plan.
- The planning team ultimately chose to drop all of the 2007 Plan G&O&As and adopt a slightly modified version of the State Plan's G&Os (modified to reflect a local jurisdictional view).

Agenda Item 4:

- The next and last meeting is scheduled as follows:
  - Planning Team Meeting No. 4, May 26th, 2011, 9am to 1pm, Pima County Abrams Building, 3950 S. Country Club Road, Tucson, AZ.

ACTION ITEM SUMMARY:

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
3-1	Each jurisdiction will investigate both past incorporation/reference occurrences and also formulate anticipated future opportunities and return a list to JEF	All Jurisdictions [5/20/11]
3-2	Each jurisdiction will provide a list of both past and future opportunities for continued public involvement over the next plan cycle.	All Jurisdictions [5/20/11]

Pima County Multi-Jurisdictional Hazard Mitigation Plan Update – Action Item Status Report
as of April 7, 2011

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]	PIMA COUNTY	MARANA	ORO VALLEY	PASCUA YAQUI TRIBE	SAHUARITA	SOUTH TUCSON	TUCSON	EXPLANATION
1-1	J. Guthrie will follow up with City of South Tucson officials to confirm participation status	J. Guthrie [2/25/11]	C	NA	NA	NA	NA	NA	NA	• 2/8/11 – Contact made by J. Guthrie via email. Received response from Larry Anderson of South Tucson.
1-2	JEF will email electronic version of Local Resources List template to each jurisdiction to track contributors to the plan update.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-3	Each jurisdiction shall record and document all people contacted or involved as a planning resource at the local level, using the template provided by JEF	All Jurisdictions [prior to draft]	IP	IP	IP	IP	IP	IP	IP	•
1-4	JEF will email Section 4 - Community Descriptions to all jurisdictions for review and updating.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-5	All jurisdictions are to review and update their respective Community Description, as appropriate and desired. Jurisdictions are encouraged to consider including Agriculture, Mining, Manufacturing, and Tourism in their descriptions as appropriate. JEF will update demographic information, so those tables and figures may be ignored.	All Jurisdictions [3/4/11]	C	NC	C	NC	NC	NC	NC	• 2/15/11 – Pima County provided edits. • 3/4/11 – Oro Valley provided edits.
1-6	JEF will provide a sample public notice prepared by ADEM to the planning team for use in the website and newspaper announcements.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-7	All local jurisdictions will perform the pre-draft public involvement activities summarized in Agenda Item 4b	All Jurisdictions [3/4/11]	C	C	C	NC	C	NC	C	• 2/8/11 – Pima County website notice is posted and press release was sent out. • 2/28/11 – Marana website is up and running. Newspaper notices will be provided at Mtg No. 2 on 3/8/11. • 3/4/11 – Oro Valley website is up. Town chose not to do the council presentation at this time. • 3/8/11 – Sahuarita website notice is posted and E. Pope was interviewed by the local paper and will send copy when the paper comes out. • 3/9/11 – Tucson website notice is posted and linked to county site.
1-8	JEF will provide digital copies of the historic hazard database files to the planning team for review and update as needed.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-9	All jurisdictions are to review and update the historic hazard database as appropriate and desired by the community.	All Jurisdictions [3/4/11]	C	NC	C	NC	NC	NC	NC	• 3/8/11 – Pima County confirmed nothing to add at Meeting No. 2 • 3/14/11 – Oro Valley responded with nothing to add.

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Pima County Multi-Jurisdictional Hazard Mitigation Plan Update – Action Item Status Report
as of April 7, 2011

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]	PIMA COUNTY	MARANA	ORO VALLEY	PASCUA YAQUI TRIBE	SAHUARITA	SOUTH TUCSON	TUCSON	EXPLANATION
1-10	All jurisdictions shall evaluate the following hazards and decide whether to keep them or not: • Earthquake • Fissure • Lightning • Subsidence A keep or drop decision shall be communicated to JEF by the due date.	All Jurisdictions [2/25/11]	C	C	C	C	C	C	C	• 2/25/11 – Pima County, Oro Valley, Sahuarita provided responses • 2/28/11 – Tucson and Marana provided responses • 3/8/11 – Final list of hazards was decided at Mtg. No. 2
1-11	JEF to provide asset inventory template worksheet and instructions to all jurisdictions for their use in compiling a critical asset inventory	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-12	All jurisdictions shall compile a list of critical assets, to be determined by the jurisdiction and provide the completed worksheet to JEF	All Jurisdictions [3/18/11]	C	C	C	IP	C	C	C	• 3/8/11 – Nicolas Siemsen sent a working copy of the asset inventory. Will complete with communities and deliver in the next 2 weeks. • 3/18/11 – Nicolas Siemsen sent updated working file. • 3/29/11 – Marana sent asset inventory. • 4/6/11 – Nicolas Siemsen provided final data set.
2-1	S. Wood and S. Ogden to coordinate with Pima County on getting the EMAP components added to the Plan	S. Wood, S. Ogden, Pima County [3/18/11]	NC	NA	NA	NA	NA	NA	NA	•
2-2	S. Ogden to resend Community Description and Undeclared Historic Hazard Worksheet to planning team	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/8/11 – Sent via email to planning team
2-3	S. Ogden to send CPRI worksheet to planning team	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-4	Each jurisdiction is to complete a CPRI assessment of all the identified hazards and return to JEF.	All Jurisdictions [4/7/11]	C	C	C	NC	NC	NC	NC	• 3/17/11 – Pima County provided CPRI • 3/29/11 – Marana provided CPRI • 4/7/11 – Oro Valley provided CPRI
2-5	S. Ogden will prepare and distribute worksheet files containing the updated capability assessment tables to each jurisdiction using the 2007 Plan information as a starting point.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-6	Each jurisdiction is to review, edit and complete the capability assessment and return to JEF.	All Jurisdictions [4/7/11]	NC	NC	C	NC	NC	NC	NC	• 4/7/11 – Oro Valley provided completed worksheet
2-7	S. Ogden to send the Past Mitigation Activity worksheet to the planning team.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team

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Pima County Multi-Jurisdictional Hazard Mitigation Plan Update – Action Item Status Report
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ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]	PIMA COUNTY	MARANA	ORO VALLEY	PASCUA YAQUI TRIBE	SAHUARITA	SOUTH TUCSON	TUCSON	EXPLANATION
2-8	Each jurisdiction may complete the worksheet summarizing past mitigation activities that have been accomplished by each jurisdiction over the past 5 years. May include past projects, outreach, studies, etc., funded by any source (not just grants).	All Jurisdictions [4/7/11]	NC	NC	C	NC	NC	NC	NC	• 4/7/11 – Oro Valley provided a completed worksheet
2-9	E. Pope (Sahuarita) to check with others at the town and report on the floodplain management role of Sahuarita under the National Flood Insurance Program.	E. Pope [4/7/11]	NA	NA	NA	NA	NC	NA	NA	•
2-10	S. Ogden will prepare and distribute Existing Mitigation Action/Project Evaluation worksheets to each jurisdiction.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-11	Each jurisdiction shall complete the Existing Mitigation Action/Project Evaluation worksheet and return it to JEF	All Jurisdictions [4/7/11]	IP	NC	IP	NC	NC	NC	NC	• 3/17/11 – Pima County sent partially completed form. Still need responses from other departments. • 4/7/11 – Oro Valley provided a first cut at worksheet. JEF provided comments and sent back to OV for completion.
2-12	Planning team shall review Section 7 of the 2007 Plan and be prepared to discuss what has happened over the past 5 years and what the team wants to do for the next 5 years at Meeting No. 3	Planning Team [4/14/11]	IP	IP	IP	IP	IP	IP	IP	•

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Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Char Ackerman	Town of Oro Valley	Police Department	Emergency Planner	520-243-7564	520-730-4906	cackerman@orovalleyaz.gov
Charles Barclay	Arizona Department of Transportation	Tucson District	Superintendent	520-388-4214	520-289-0033	cbarclay@azdot.gov
Robert Bereiter	Town of Marana	Police Department	Emergency Planner	520-382-2057		rbereiter@marana.com
Keith Brann	Town of Marana	Development - Engineering	Town Engineer	520-382-2629		kbrann@marana.com
Bret Canale	Town of Marana	GIS	GIS DB Analyst	520-382-1992		bcanale@marana.com
Anna Casadei	Town of Sahuarita	Planning & Zoning Department	Senior Planner	520-822-8854		acasadei@ci.sahuarita.az.us
Paul Casertano	Pima Association of Governments	Planning	Operations & Safety Lead	520-792-1093		pcasertano@pagnet.org
Dan Contorno	Marana Unified School District	CFO	CFO	520-682-4756	520-404-8275	d.j.contorno@maranausd.org
Dane Crouse	Drexel Heights Fire District	Operations	Battalion Chief	520-471-1262		dcrouse@drexelfire.net
Brian Delfs	Avra Valley Fire District	Fire Department	Fire Chief	520-682-3255	520-481-2554	bdelfs@avfire.org
Andy D'Entremont	Pima County	Office of Emergency Management	Planner	520-243-7565	520-465-4128	andrew.dentremont@pima.gov
Jane Fairall	Town of Marana	Legal	Deputy Town Attorney	520-382-1941		jfairall@marana.com
Jordan Feld	Tucson Airport Authority	Planning Department	Director	520-573-5115		jfeld@tucsonairport.org
Griselda Moya Flores	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		griselda.moya.flores@pima.gov
Jeff Guthrie	Pima County	Office of Emergency Management and Homeland Security	Operations Manager	520-798-0600		jeff.guthrie@pima.gov
Barb Harris	City of Tucson	Police Department - Office of Emergency Management	Emergency Planner	520-837-7501	520-784-1280	barbara.harris@tucsonaz.gov
Thomas Hellfrich	Pinal County	Flood Control District	Manager	520-243-1850	520-444-3637	tom.hellfrich@rfcd.pima.gov
Steven Johnson	Town of Marana	Police Department	Sergeant / Emergency Coordinator	520-382-2034	520-471-0292	sjohnson@marana.com
Paul Keesler	Town of Oro Valley	Development Services	Permitting Manager	520-229-4811	520-906-4270	pkeesler@orovalleyaz.gov
Jim Kress	City of Tucson	Fire Department - EM / HS	Captain	520-837-7384		jim.kress@tucsonaz.gov
Brian Lauber	Arizona State Land Department	State Forestry Division - Tuscon District	District Forester	520-628-5480 x 204	520-444-9315	brianlauber@azsf.gov
Rafael Leon	Tucson Airport Authority	Sound Insulation	Program Representative	520-573-5113	520-245-0899	rleon@tuscsonairport.org
Michael Losada	Tucson Airport Authority	Police Department	Corporal	520-573-8182	520-870-0268	mlosada@tucsonairport.org
Andre Matus	Pascua Yaqui Tribe	Pascua Pueblo Fire Department	Fire Chief	520-879-5720	520-282-0609	andre.matus2@pascuayaqui-nsn.gov
Janet McLay	City of Tucson	Office of Emergency Management	Emergency Management Coordinator	520-837-7380	520-349-6755	jan.mclay@tucsonaz.gov
Mark Moore	Town of Oro Valley	Water Utility - Engineering	Design Reviewer	520-229-5017	520-631-4940	mmoore@orovalleyaz.gov

Date: April 14, 2011

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Lee Muscarella	Golder Ranch Fire District	Suppression	Battalion Chief	520-825-5911	520-235-5445	lmuscarella@golderranchfire.org
Scott Ogden	JE Fuller/ Hydrology & Geomorphology, Inc		Project Manager / Senior Engineer	480-222-5717	480-299-3394	scott@jefuller.com
Jennifer Pegnato	City of Tucson	Office of Emergency Management and Homeland Security / Police Department	Sergeant	520-837-7463		jennifer.pegnato@tucsonaz.gov
Ed Pope	Town of Sahuarita	Emergency Response	Planner	520-347-7003	520-343-9101	epope@ci.sahuarita.az.us
Jose Rodriguez	Town of Oro Valley	DIS - Engineering	Engineering Division Manager	520-229-4872	520-946-1937	jrodriguez@orovalleyaz.gov
Lisa Romero	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		lisa.romero@pima.gov
Jim Schneden	City of Tucson	Police Department - Homeland Security	Sergeant	520-837-7383	520-429-2482	jim.schneden@tucsonaz.gov
Lisa Shafer	Town of Marana	Planning	Planning Director	520-382-2649	520-975-7169	lshafer@marana.com
James Stoltenberg	Rural/Metro Fire District	Fire Department	Deputy Chief	520-297-3600	520-237-1939	james.stoltenberg@rmetro.com
Liz Temple	Pima County	Office of Emergency Management and Homeland Security	Compliance Officer	520-243-7644	520-349-4087	elizabeth.temple@pima.gov
T. Vanhook	Town of Marana	Community Development	Director	520-382-1909	520-940-0766	tvanhook@marana.com
Henry Vega	City of South Tucson	Public Works		520-770-0032	520-445-1402	hvega@southtucson.org
Jim Vogelsberg	City of Tucson	Planning & Development	Administrator	520-837-4926		jim.vogelsberg@tucsonaz.gov
Susan Wood	Arizona Division of Emergency Management	Mitigation Division	Planning Manager	602-464-6518		susan.wood@azdema.gov
Lindy Brigham	Southern Arizona Buffalgrass Coordination Center (SABCC)		Executive Director	520 626 8307	5209552599	lindy.brigham@buffalograss.org
Nicolas Siemsen	Pima OEM&HS		Program Coordinator	520-243-7589	520-940-5301	nicolas.siemsen@pima.gov
Sandra Espinoza	Tohono Odham Nation - OEM →		Hazard Mitigation Specialist	520-383-8905	520-471-7709	sandra.espinoza@tonation-nsn.gov
John Wisner	Pima OEM+HS/LEPC		Program Coordinator	520-798-0600	520-395-5570	john.wisner@pima.gov

Date: May 18, 2011

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Jim Rosovich	Pascua Yaqui Tribe	Procurement	Contracting Officer	(520)879-5142	(520)237-0241	Jim.Rosovich@pascuayaqui-nsn.gov
Robert Garcia	Pascua Fire Dept.		Asst. Chief	520-879-5791		Robert.garcia@pascuayaqui-nsn.gov.
Feliciano R. Cruz	Pascua yaqui Tribe Health	Health Dept	PHEP Coordinator	(520) 879-6124	(520)260-7348	Feliciano.R.Cruz JR@pascuayaqui-nsn.gov
Sonny Rivera	Facilities	Community Support	Manager	879-5979	260-5706	
Kelly Gomez	Pascua Yaqui Tribe	Land dept.	Dev. Srv. Director	5208796319	5202371569	Kelly.gomez@pascuayaqui-nsn.gov.
Marisela C. Nuñez	Pascua Yaqui Tribe	Enrollment	Director	520.879.6231	520.915.3594	marisela.c.nunez@pascuayaqui-nsn.gov
Robert Gillon	Pascua Yaqui Tribe	Attorney Gen. Office	Asst. Atty Gen	520 883-5085	520 425 6187	robert.gillon@pascuayaqui-nsn.gov

Memorandum **JE Fuller/ Hydrology & Geomorphology, Inc.**

MEETING DATE: May 26, 2011

MEETING TIME: 9:00 AM – NOON

MEETING LOCATION: Pima County Abrams Building
Tucson, AZ

DISTRIBUTION: Meeting Attendees

FROM: W. Scott Ogden - JEF

RE: **Pima County Multi-Jurisdictional Hazard Mitigation Plan**
Planning Team Meeting No. 4

ATTENDEES:

Char Ackerman – Oro Valley Emergency Planner
Robert Bereiter – Marana Emergency Planner
Lindy Brigham – Southern AZ Buffelgrass Coordination Center Exec. Director
Andy D'Entremont – Pima County OEMHS Planner
Sandra Espinoza – Tohono O'odham Nation OEM Hazard Mitigation Specialist
Jeff Guthrie – Pima County OEMHS Operations Manager
Barb Harris – Tucson OEM Emergency Planner
Tom Helfrich – Pima County Regional Flood Control District Manager
Steven Johnson – Marana Police Sergeant/Emergency Coordinator
Rafael Leon – Tucson Airport Authority Program Representative
Andre Matus – Pascua Yaqui Tribe Fire Chief
Jan McLay – Tucson Emergency Management Coordinator
Scott Ogden – JE Fuller/ Hydrology & Geomorphology, Inc.
Ed Pope – Sahuarita Emergency Response Planner
Jim Rosovich – Pascua Yaqui Tribe Contracting Officer
NOTE: No Representative from South Tucson

AGENDA

1. **ACTION ITEM STATUS REVIEW**
2. **VULNERABILITY ANALYSIS REVIEW**
3. **MITIGATION ACTION/PROJECTS AND IMPLEMENTATION STRATEGY**
4. **NEXT STEPS**

ACTION ITEM SUMMARY

DISCUSSION

Agenda Item 1:

- S. Ogden reviewed the status of pending action items assigned at prior meetings as of May 23, 2011. There were no significant or noteworthy discussions and the status report is included at the end of these notes.

Agenda Item 2:

- S. Ogden presented results of the vulnerability analysis that included an overview of the hazard profile mapping, base data, and various summary tables showing exposure and loss estimates for the critical facilities, population, and general HAZUS based residential, commercial, and industrial sectors. The following are general notes of the planning team discussions and comments:
    - Questions were raised regarding the critical facilities and why there are so many cell towers and nothing for other facilities such as the railroad trestles, Kinder Morgan pipeline, or the fiber optic lines traversing Pima County. S. Ogden responded that JEF was using the data provided by the county and assumed that the data provided was the planning teams' final list. JEF will include any other data if it is provided.
    - Concerns were expressed that the data would appear represent a greater vulnerability of critical facilities to HAZMAT than to say Flooding, when the logical conclusion is that there is little vulnerability of structures to HAZMAT versus Flood related concerns. S. Ogden explained that there are two levels of numbers, exposure and loss estimates. The truth is that there are significantly more structures exposed to high hazard HAZMAT areas, however, there are no losses estimated for those structures. There are, however, losses estimated for critical facilities exposed to Flooding.
    - J. Guthrie noted that the county is nearing the completion of a countywide CWPP and will check with their contractor to see of the county-wide fuels hazard layer is available for use. There was also a desire to make sure that hazard area determinations included consideration of the buffel grass.
    - The planning team noted that population counts were extremely low for several of the communities. S. Ogden explained that the base data sets from HAZUS that were used are based on 2000 Census Data. Several team members noted that they believed 2010 Census redistricting data was available at the block level. S. Ogden was not aware of the data and will use the 2010 data if it can be obtained.
    - Winter Storm data is missing a data point for Mt. Lemmon and hence the max snow depth bands are probably not correct. S. Ogden will see if there is a way to adjust the data for this anomaly.
- The planning team requested digital copies of the VA workmaps. S. Ogden stated he would place them on the ftp site once the various items were adjusted per today's discussions.
- S. Ogden requested that the planning team review the VA results and respond with any addition comments.

Agenda Item 3:

- S. Ogden reviewed the process of updating the overall mitigation strategy and specifically the mitigation action/project formulation and implementation strategy.
- S. Ogden led a review/explanation of the various categories of possible mitigation actions/projects and presented information from the 2010 State Plan summarizing various sources of grant funding that may be used for hazard mitigation.
- S. Ogden presented the table/worksheet that will be used to document the actions/projects and implementation strategy. JEF will provide a copy of the table with the actions/projects from the 2006 Plan that were designated as "Keep" or "Revise" already entered.
- Each jurisdiction was instructed to complete the worksheet per the guidelines discussed during the meeting and provide to S. Ogden.
- S. Ogden also explained the new requirement that each jurisdiction participating in the NFIP program, must include at least one mitigation action/project that addresses continued compliance with NFIP requirements. S. Ogden provided a sheet of example of NFIP compliance mitigation action/projects for reference and/or ideas.

Agenda Item 4:

- Action Items for this meeting are summarized below.
- This was the last meeting. The next steps will be to finish all outstanding assignments, and get the draft of the Plan completed and in review with the State and Planning Team.

ACTION ITEM SUMMARY:

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]
4-1	Planning Team to review VA results and respond with any comments/corrections to S. Ogden	All Jurisdictions [7/1/11]
4-2	S. Ogden to upload the VA workmaps to the JEF ftp and send note to planning team informing of their availability.	S. Ogden [6/24/11]
4-3	JEF to pre-enter the "Keep" and "Revise" designated projects from the Existing Mitigation A/P Evaluation into the Mitigation Action/Project and Implementation Strategy worksheet and send the worksheet to each respective jurisdiction.	JEF [6/10/11]
4-4	Each jurisdiction shall complete the Mitigation Action/Project and Implementation Strategy worksheet, including the addition of any new Mitigation A/Ps and at least one A/P addressing NFIP compliance, and return it JEF	ALL Jurisdictions [7/8/11]

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1-1	J. Guthrie will follow up with City of South Tucson officials to confirm participation status	J. Guthrie [2/25/11]	C	NA	NA	NA	NA	NA	NA	• 2/8/11 – Contact made by J. Guthrie via email. Received response from Larry Anderson of South Tucson.
1-2	JEF will email electronic version of Local Resources List template to each jurisdiction to track contributors to the plan update.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-3	Each jurisdiction shall record and document all people contacted or involved as a planning resource at the local level, using the template provided by JEF	All Jurisdictions [prior to draft]	IP	C	IP	IP	C	IP	IP	• 4/13/11 – Marana provided completed document • 5/20/11 – Sahuarita provided completed document
1-4	JEF will email Section 4 - Community Descriptions to all jurisdictions for review and updating.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-5	All jurisdictions are to review and update their respective Community Description, as appropriate and desired. Jurisdictions are encouraged to consider including Agriculture, Mining, Manufacturing, and Tourism in their descriptions as appropriate. JEF will update demographic information, so those tables and figures may be ignored.	All Jurisdictions [3/4/11]	C	C	C	NC	C	NC	C	• 2/15/11 – Pima County provided edits. • 3/4/11 – Oro Valley provided edits. • 4/13/11 – Marana provided edits. • 4/13/11 – Tucson provided edits. • 5/5/11 – Sahuarita provided edits.
1-6	JEF will provide a sample public notice prepared by ADEM to the planning team for use in the website and newspaper announcements.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email
1-7	All local jurisdictions will perform the pre-draft public involvement activities summarized in Agenda Item 4b	All Jurisdictions [3/4/11]	C	C	C	C	C	NC	C	• 2/8/11 – Pima County website notice is posted and press release was sent out. • 2/28/11 – Marana website is up and running. Newspaper notices will be provided at Mtg No. 2 on 3/8/11. • 3/4/11 – Oro Valley website is up. Town chose not to do the council presentation at this time. • 3/8/11 – Sahuarita website notice is posted and E. Pope was interviewed by the local paper and will send copy when the paper comes out. • 3/9/11 – Tucson website notice is posted and linked to county site. • 5/2/11 – Pascua Yaqui Tribe has website up.
1-8	JEF will provide digital copies of the historic hazard database files to the planning team for review and update as needed.	JEF [2/11/11]	NA	NA	NA	NA	NA	NA	NA	• 2/11/11 – Data and files sent by email

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1-10	All jurisdictions shall evaluate the following hazards and decide whether to keep them or not: • Earthquake • Fissure • Lightning • Subsidence A keep or drop decision shall be communicated to JEF by the due date.	All Jurisdictions [2/25/11]	C	C	C	C	C	C	C	• 2/25/11 – Pima County, Oro Valley, Sahuarita provided responses • 2/28/11 – Tucson and Marana provided responses • 3/8/11 – Final list of hazards was decided at Mtg. No. 2
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2-1	S. Wood and S. Ogden to coordinate with Pima County on getting the EMAP components added to the Plan	S. Wood, S. Ogden, Pima County [3/18/11]	C	NA	NA	NA	NA	NA	NA	• 4/7/11 – S. Wood provided EMAP template to J. Guthrie
2-2	S. Ogden to resend Community Description and Undeclared Historic Hazard Worksheet to planning team	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/8/11 – Sent via email to planning team
2-3	S. Ogden to send CPRI worksheet to planning team	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-4	Each jurisdiction is to complete a CPRI assessment of all the identified hazards and return to JEF.	All Jurisdictions [4/7/11]	C	C	C	C	C	NC	C	• 3/17/11 – Pima County provided CPRI • 3/29/11 – Marana provided CPRI • 4/7/11 – Oro Valley provided CPRI • 4/12/11 – PYT provided CPRI at Tribal Annex Mtg No. 1 • 4/13/11 – Tucson provided CPRI • 5/5/11 – Sahuarita provided CPRI

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ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]	PIMA COUNTY	MARANA	ORO VALLEY	PASCUA YAQUI TRIBE	SAHUARITA	SOUTH TUCSON	TUCSON	EXPLANATION
2-5	S. Ogden will prepare and distribute worksheet files containing the updated capability assessment tables to each jurisdiction using the 2007 Plan information as a starting point.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-6	Each jurisdiction is to review, edit and complete the capability assessment and return to JEF.	All Jurisdictions [4/7/11]	IP	C	C	C	C	NC	C	• 4/7/11 – Oro Valley provided completed worksheet • 4/12/11 – PYT completed capability assessment at Tribal Annex Mtg No. 1. • 4/12/11 – PCRFCD provided its portion of the Uninc County's capability assessment. • 4/13/11 – Marana provided completed capability assessment • 4/13/11 – Tucson provided completed capability assessment • 5/9/11 – Sahuarita provided completed capability assessment
2-7	S. Ogden to send the Past Mitigation Activity worksheet to the planning team.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-8	Each jurisdiction may complete the worksheet summarizing past mitigation activities that have been accomplished by each jurisdiction over the past 5 years. May include past projects, outreach, studies, etc., funded by any source (not just grants).	All Jurisdictions [4/7/11]	IP	C	C	NC	NC	NC	C	• 4/7/11 – Oro Valley provided a completed worksheet • 4/12/11 – PCRFCD provided a list of projects • 4/13/11 – Marana provided list. • 4/13/11 – Tucson provided list.
2-9	E. Pope (Sahuarita) to check with others at the town and report on the floodplain management role of Sahuarita under the National Flood Insurance Program.	E. Pope [4/7/11]	NA	NA	NA	NA	C	NA	NA	• 4/14/11 – Per PCRFCD, Sahuarita manages its own floodplain. E. Pope will verify.
2-10	S. Ogden will prepare and distribute Existing Mitigation Action/Project Evaluation worksheets to each jurisdiction.	S. Ogden [3/11/11]	NA	NA	NA	NA	NA	NA	NA	• 3/10/11 – Sent via email to planning team
2-11	Each jurisdiction shall complete the Existing Mitigation Action/Project Evaluation worksheet and return it to JEF	All Jurisdictions [4/7/11]	C	IP	IP	NC	NC	NC	IP	• 3/17/11 – Pima County sent partially completed form. Still need responses from other departments. • 4/7/11 – Oro Valley provided a first cut at worksheet. JEF provided comments and sent back to OV for revision. • 4/13/11 – Marana provided first cut. JEF provided comments and sent back to Marana for revision • 4/14/11 - Tucson provided first cut at Mtg No. 3 via paper copy. JEF provided comments and sent back to Tucson for revision. • 4/21/11 – Pima County finalized form and is complete now.
2-12	Planning team shall review Section 7 of the 2007 Plan and be prepared to discuss what has happened over the past 5 years and what the team wants to do for the next 5 years at Meeting No. 3	Planning Team [4/14/11]	C	C	C	C	C	C	C	• 4/14/11 – Discussed at Mtg No. 3

STATUS KEY	Required for Plan Approval	(NC) Not Complete	(IP) In Progress	(C) Complete	(NA) Not Assigned

Pima County Multi-Jurisdictional Hazard Mitigation Plan Update – Action Item Status Report
as of May 23, 2011

ITEM NO.	DESCRIPTION	RESPONSIBILITY [DUE DATE]	PIMA COUNTY	MARANA	ORO VALLEY	PASCUA YAQUI TRIBE	SAHUARITA	SOUTH TUCSON	TUCSON	EXPLANATION
3-1	Each jurisdiction will investigate both past incorporation/reference occurrences and also formulate anticipated future opportunities and return a list to JEF	All Jurisdictions [5/20/11]	IP	NC	C	NC	C	NC	NC	• 5/10/11 – Sahuarita provided a completed list. • 5/17/11 – Oro Valley provided a completed list. May add to or refine later. • 5/20/11 – PCRFCD provided their portion of the list •
3-2	Each jurisdiction will provide a list of both past and future opportunities for continued public involvement over the next plan cycle.	All Jurisdictions [5/20/11]	IP	NC	C	NC	NC	NC	NC	• 5/17/11 – Oro Valley provided a completed list. May add to or refine later. • 5/20/11 – PCRFCD provided their portion of the list

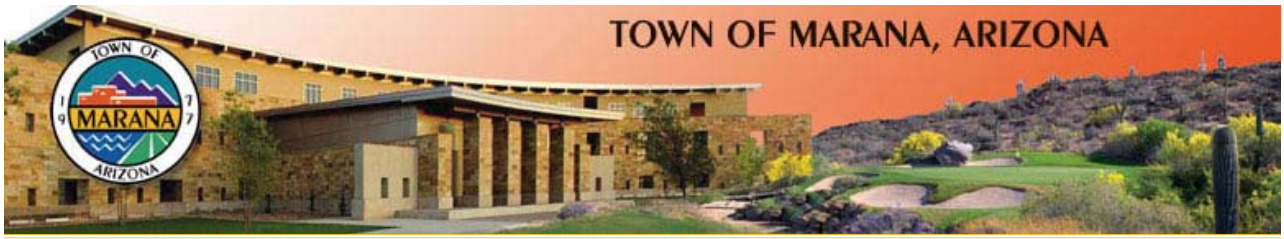
STATUS KEY	Required for Plan Approval	(NC) Not Complete	(IP) In Progress	(C) Complete	(NA) Not Assigned

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Char Ackerman	Town of Oro Valley	Police Department	Emergency Planner	520-243-7564	520-730-4906	cackerman@orovalleyaz.gov
Charles Barclay	Arizona Department of Transportation	Tucson District	Superintendent	520-388-4214	520-289-0033	cbarclay@azdot.gov
Robert Bereiter	Town of Marana	Police Department	Emergency Planner	520-382-2057		rbereiter@marana.com
Keith Brann	Town of Marana	Development - Engineering	Town Engineer	520-382-2629		kbrann@marana.com
Lindy Brigham	Southern Arizona Buffelgrass Coordination Center		Executive Director	520-626-8307	520-955-2599	lindy.brigham@buffelgrass.org
Bret Canale	Town of Marana	GIS	GIS DB Analyst	520-382-1992		bcanale@marana.com
Anna Casadei	Town of Sahuarita	Planning & Zoning Department	Senior Planner	520-822-8854		acasadei@ci.sahuarita.az.us
Paul Casertano	Pima Association of Governments	Planning	Operations & Safety Lead	520-792-1093		pcasertano@pagnet.org
Dan Contorno	Marana Unified School District	CFO	CFO	520-682-4756	520-404-8275	d.j.contorno@maranausd.org
Dane Crouse	Drexel Heights Fire District	Operations	Battalion Chief	520-471-1262		dcrouse@drexelfire.net
Brian Delfs	Avra Valley Fire District	Fire Department	Fire Chief	520-682-3255	520-481-2554	bdelfs@avfire.org
Andy D'Entremont	Pima County	Office of Emergency Management	Planner	520-243-7565	520-465-4128	andrew.dentremont@pima.gov
Sandra Espinoza	Tohonon O'odham Nation	Office of Emergency Management	Hazard Mitigation Specialist	520-383-8905	520-471-7709	sandra.espinoza@tonation-nsn.gov
Jane Fairall	Town of Marana	Legal	Deputy Town Attorney	520-382-1941		jfairall@marana.com
Jordan Feld	Tucson Airport Authority	Planning Department	Director	520-573-5115		jfeld@tucsonairport.org
Griselda Moya Flores	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		griselda.moya.flores@pima.gov
Jeff Guthrie	Pima County	Office of Emergency Management and Homeland Security	Operations Manager	520-798-0600		jeff.guthrie@pima.gov
Barb Harris	City of Tucson	Police Department - Office of Emergency Management	Emergency Planner	520-837-7501	520-784-1280	barbara.harris@tucsonaz.gov
Thomas Helfrich	Pinal County	Flood Control District	Manager	520-243-1850	520-444-3637	tom.helfrich@rfcd.pima.gov
Steven Johnson	Town of Marana	Police Department	Sergeant / Emergency Coordinator	520-382-2034	520-471-0292	sjohnson@marana.com
Paul Keesler	Town of Oro Valley	Development Services	Permitting Manager	520-229-4811	520-906-4270	pkeesler@orovalleyaz.gov
Jim Kress	City of Tucson	Fire Department - EM / HS	Captain	520-837-7384		jim.kress@tucsonaz.gov
Brian Lauber	Arizona State Land Department	State Forestry Division - Tuscon District	District Forester	520-628-5480 x 204	520-444-9315	brianlauber@azsf.gov
Rafael Leon	Tucson Airport Authority	Sound Insulation	Program Representative	520-573-5113	520-245-0899	rleon@tuscsonairport.org
Michael Losada	Tucson Airport Authority	Police Department	Corporal	520-573-8182	520-870-0268	mlosada@tucsonairport.org
Andre Matus	Pascua Yaqui Tribe	Pascua Pueblo Fire Department	Fire Chief	520-879-5720	520-282-0609	andre.matus2@pascuayaqui-nsn.gov

Name	Jurisdiction/Agency/Organization	Department/Division/Branch	Title	Office Phone	Cell Phone	E-Mail Address
Janet McLay JMcL	City of Tucson	Office of Emergency Management	Emergency Management Coordinator	520-837-7380	520-349-6755	jan.mclay@tucsonaz.gov
Mark Moore	Town of Oro Valley	Water Utility - Engineering	Design Reviewer	520-229-5017	520-631-4940	mmoore@orovalleyaz.gov
Lee Muscarella	Golder Ranch Fire District	Suppression	Battalion Chief	520-825-5911	520-235-5445	lmuscarella@golderranchfire.org
Scott Ogden	JE Fuller/ Hydrology & Geomorphology, Inc		Project Manager / Senior Engineer	480-222-5717	480-299-3394	scott@jefuller.com
Jennifer Pegnato	City of Tucson	Office of Emergency Management and Homeland Security / Police Department	Sergeant	520-837-7463		jennifer.pegnato@tucsonaz.gov
Ed Pope EP	Town of Sahuarita	Emergency Response	Planner	520-~~347~~ 344-7003	520-343-9101	epope@ci.sahuarita.az.us
Jose Rodriguez	Town of Oro Valley	DIS - Engineering	Engineering Division Manager	520-229-4872	520-946-1937	jrodriguez@orovalleyaz.gov
Lisa Romero	Pima County	Office of Emergency Management and Homeland Security		520-798-0600		lisa.romero@pima.gov
Jim Schneden	City of Tucson	Police Department - Homeland Security	Sergeant	520-837-7383	520-429-2482	jim.schneden@tucsonaz.gov
Lisa Shafer	Town of Marana	Planning	Planning Director	520-382-2649	520-975-7169	lshafer@marana.com
Nicolas Siemsen	Pima County	Office of Emergency Management and Homeland Security	Program Coordinator	520-243-7589	520-940-5301	nicolas.siemsen@pima.gov
James Stoltenberg	Rural/Metro Fire District	Fire Department	Deputy Chief	520-297-3600	520-237-1939	james.stoltenberg@rmetro.com
Liz Temple	Pima County	Office of Emergency Management and Homeland Security	Compliance Officer	520-243-7644	520-349-4087	elizabeth.temple@pima.gov
T. Vanhook	Town of Marana	Community Development	Director	520-382-1909	520-940-0766	tvanhook@marana.com
Henry Vega	City of South Tucson	Public Works		520-770-0032	520-445-1402	hvega@southtucson.org
Jim Vogelsberg	City of Tucson	Planning & Development	Administrator	520-837-4926		jim.vogelsberg@tucsonaz.gov
John Wisner	Pima County	Office of Emergency Management and Homeland Security	Program Coordinator	520-798-0600	520-395-5560	john.wisner@pima.gov
Susan Wood	Arizona Division of Emergency Management	Mitigation Division	Planning Manager	602-464-6518		susan.wood@azdema.gov
Jim Rosovich JMR	Pascua Yaqui Tribe	Contracting Procurement	Contracting Off	5208795142	520-237-0842	Jim.Rosovich@pascuayaqui-nsn.gov

Appendix C

Public Involvement Records



2/28/2011 5:02:51 PM

Marana Municipal Complex
11555 W. Civic Center Drive
Marana, AZ 85653
P:520-382-1999
F:520-382-1998
Contact Us | Map

Talk To Us Comments, Concerns & Suggestions

Become a Marana Police Officer

WELCOME

Thank you for visiting the Town of Marana Web site. We hope that in touring our site you can learn about us, what we do and the services we provide to our citizens.

Marana is a relatively new municipality, incorporating in 1977 to control our most valuable resource – water. Although the Town is young, Marana has a rich history, and heritage preservation is one of our priorities.

With our unique location between Tucson and Phoenix, Marana is an attractive community dedicated to maintaining a friendly environment where people can work, shop, live and play.

Welcome all,
Mayor Ed Honea and the Marana Town Council

CALENDAR ... All Events

Tue, Mar. 1
Town Council meeting

Tue, Mar. 8
Town primary election

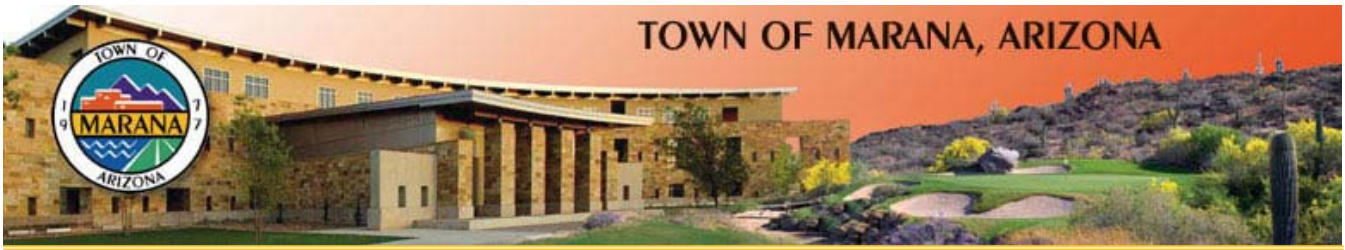
Tue, Mar. 15
Pole Barn Presentation

ANNOUNCEMENTS ... All News

Small business open house Thursday
The Town's Business and Economic Development Citizen Advisory Commission is holding its first small business open house Thursday from 4 p.m. to 7 p.m. at Wheeler Taft Abbett Library. The library is located at 7800 N. Schisler Drive. Read on...

Town seeking volunteers to assist police
The Marana Police Department is recruiting residents and business owners who want to assist as part of the Volunteers in Police Service (VIPS) program. Read on...

Town updating hazard mitigation plan
Hazard mitigation planning is the process used to identify risks and vulnerabilities associated with disasters and to develop long-term strategies for protecting people and property in future hazard events. Read on...



Marana Municipal Complex
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P:520-382-1999
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Contact Us | Map

Talk To Us Comments, Concerns & Suggestions

Become a
Marana
Police Officer

Posted on: February 18, 2011

Town updating hazard mitigation plan

The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage and a framework for developing appropriate mitigation projects. Under the Disaster Mitigation Act of 2000 (DMA2K), state, county, local and tribal governments are required to have a FEMA approved hazard mitigation plan as a condition for receiving mitigation grant funds.
In order to meet the requirements to ensure continued assistance eligibility, a planning team comprised of representatives from the Town of Marana, Oro Valley, South Tucson, Sahuarita, Tohono O'odham Nation, Pascua Yaqui Tribe, City of Tucson and Pima County will be meeting regularly to update the current hazard mitigation plans for the participating jurisdictions. The planning team anticipates having a plan draft in August, at which time public access to the plan will be provided with the opportunity to comment.

The primary areas of work/focus in the plan development are:

Identify hazards that may impact or have impacted the community
Develop a profile of the most relevant hazards
Assess vulnerability to hazards
Establish goals and objectives for hazard risk reduction/elimination
Develop actions/projects to achieve goals and objectives

Need additional information or have questions?
Please contact:
Sgt. Steven W. Johnson
Town of Marana Police Department
11555 W Civic Center Dr., Bldg B, Marana AZ 85653
sjohnson@marana.com

⇐ **Previous**
Town seeking volunteers to assist police

Next ⇒
Tour of the Tucson Mountains coming back to Marana

Other News in Home

Small business open house Thursday
Posted on: February 28, 2011

Town seeking volunteers to assist police
Posted on: January 27, 2011

Tour of the Tucson Mountains coming back to Marana
Posted on: February 9, 2011

Town newsletter online
Posted on: August 2, 2010

Opening for citizen advisory commission

Accessibility Information

Posted on: January 10, 2011

Construction Division Manager honored
Posted on: January 26, 2011

MPD officer earns award
Posted on: January 25, 2011

Town Manager earns ICMA designation
Posted on: January 19, 2011

2010 General Plan
Posted on: January 13, 2010

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TICKETS $125 ($100 IF PURCHASED BEFORE MARCH 1)
www.tohonochulpark.org Tohono Chul Park
7366 N. Paseo del Norte, Tucson NATURE. ART. CULTURE.

MARANA PARTICIPATING IN HAZARD MITIGATION PLAN UPDATE

The towns of Marana and Oro Valley will join representatives from South Tucson, Sahuarita, Tohono O'odham Nation, Pascua Yaqui Tribe, City of Tucson and Pima County as part of a planning team that will meet regularly to help update the ways in which local agencies mitigate natural and manmade hazards.

Communities will be responsible for updating their own plans, which were previously approved by FEMA.

Hazard mitigation planning is used to identify risks and vulnerabilities associated with disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction and repeated damage, and develops a framework for appropriate mitigation projects.

Committee members will address ways to alert the public about such disasters as floods, hazardous materials spills and severe winds, said Marana police Sgt. Steven Johnson. One such tool is the website www.mystateusa.com, an emergency alerting system that provides information about severe weather conditions and evacuation routes.

The Disaster Mitigation Act of 2000 requires local, county, tribal and state governments to have FEMA-approved plans in order to be eligible for federal hazard mitigation grant funds. The plan focuses on an area's most threatening hazards and establishes a strategy to reduce or eliminate the risk from those hazards to the people and property of Pima County.

The team anticipates having a plan draft in August, at which time the public will have the opportunity to comment.

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Homeland Security

Hazard Mitigation Plan Update

The Town of Oro Valley is participating in a Hazard Mitigation Plan Update. Hazard mitigation planning is the process used to identity risks and vulnerabilities associated with disasters and to develop long-term strategies for protecting people and property in future hazardous events. For more information, please refer to the Pima County website at www.pima.gov or contact Char Ackerman at cackerman@orovalleyaz.gov.

Homeland Security

The Oro Valley Police Department along with the Town of Oro Valley are committed to the safety and protection of its citizens and employees. With the events of September 11, 2001, the Oro Valley Police Department established the Town of Oro Valley Office of Emergency Management. The goal of this division is to provide employees of the Town of Oro Valley the proper training and equipment to maintain our high level of service in any type of man-made, technological or natural disaster that it may be confronted with. This includes Personnel Protective Equipment (PPE), National Incident Management System (NIMS) and series of exercises to strengthen the response and decision-making capabilities of Town personnel.

The duties and responsibilities have grown since 2001 to consist of the following:

- Develop the departments Critical Incident Response Guide
- Develop the departments Major Action Plan
- Organize and facilitate departments Continuity of Operations Plan
- Train department members and other town staff in the Incident Command System
- Develop table top exercises to train town personnel, and outside agencies, in the proper response to major emergencies and disasters
- Conduct threat and risk assessments evaluations of Town buildings and critical infrastructure
- Apply for and manage Homeland Security grants
- Serve on the following state and local committees:
  - Local Emergency Planning Committee
  - Urban Area Security Initiative (UASI) Steering Committee
  - Urban Area Security Initiative (UASI) Training and Exercise Committee
  - Arizona Counter Terrorism Information Center Southern Region Terrorism Liaison Officer (TLO) Coordinator
  - Homeland Security Exercise and Evaluation Program
  - Oro Valley Citizen Corps Council
- Assist outside organizations prepare emergency/disaster plans

Oro Valley Police Department | 11000 N. La Cañada Drive, Oro Valley AZ 85737
(520) 229-4900 | (520) 229-4979 fax

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http://www.pascuayaqui-nsn.gov/index.php?option=com_content&view=article&id=77&Itemid=75
File Edit View Favorites Tools Help
Google Go Bookmarks 100 blocked Check AutoLink AutoFill Send to Settings
Favorites Suggested Sites Free Hotmail Free AOL & Unlimited Internet Google Maps MapQuest Home Yahoo! Groups Web Slice Gallery
Facebook (2) Fire Department Page Safety Tools

Fire Department

Tuesday, 08 September 2009 09:19 administrator

Pascua Yaqui Tribe Opens Southern Arizona's Largest Fire Station June3
26,125 Square Foot Facility is Newest and Largest Fire Station in Tucson

(Tucson, Ariz.) – June 1, 2004—On Thursday June3,2004 the Pascua Yaqui Tribe opens Tucson's newest and largest fire station in Southern Arizona. The new Pascua Pueblo Fire Station #1 is 26,125 square feet and has four fire truck bays to hold three brand new public safety vehicles including a new ambulance, a new pumper fire truck and a 100 foot aerial ladder truck.

The 26,125 square foot fire station building was built with federal grant funds and Tribal support made possible with gaming revenue. The new fire station includes the benefits of having a state of the art public safety facility in the Southwestern Tucson region without raising taxes. The Pascua Yaqui Fire Department will serve the Pascua Yaqui Reservation but future plans may include using the new facility as a regional training center that could benefit the entire greater Tucson community. The new fire station will support quicker response time to regional public safety incidents. The new training capability could further improve rapid response to local emergency situations.

Internet 115%

Pascua Yaqui Tribe and Pima County Begins Work on Hazard Mitigation Plan Update

Posting April 29, 2011

Hazard mitigation planning is the process used to identify risks and vulnerabilities associated with disaster and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage and a framework for developing appropriate mitigation projects. Under the Disaster Mitigation Act of 2000 (DMA2K), state, county, local and tribal governments are required to have a FEMA approved hazard mitigation plan as a condition for receiving mitigation grant funds.

In order to meet the requirements to ensure continued assistance eligibility, a planning team comprised of representatives from the Pascua Yaqui Tribe and Pima County will be meeting regularly to update the current hazard mitigation plans for the participating jurisdictions. The planning team anticipates having a plan draft in the fall of 2011, at which time public access to the plan will be provided, with the opportunity to comment.

The primary areas of work/focus in the plan development are:

- Identify hazards that may impact or have impacted the community
- Develop a profile of the most relevant hazards
- Assess vulnerability to hazards
- Establish goals and objectives for hazard risk reduction/elimination
- Develop action/projects to achieve goals and objectives.

Additional Information & Questions

Please contact:

Kelly Gomez
Land Office Director
Pascua Yaqui Tribe
7474 S. Camino de Oeste
Tucson, Az. 85757
520-879-6350

Andre Matus
Fire Chief
Pascua Pueblo Fire Station
4631 W. Calle Torim
Tucson, Arizona 85757
520-879-5720

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Contact

- Pima County Telephone Listing

Department Listing

- Administration
- Community Development
- Healthcare
- Justice and Courts
- Public Works

E-Services

- E-Government Services
- E-Government Forms
- Frequently asked Questions

Information & Services

- Business
- Community Resources
- Courts & Legal Services
- County Jobs
- Employment Assistance
- Family, Health & Environment
- Improvement Districts
- Licenses & Permits
- Living in Pima County
- Parks, Recreation & Tourism
- Public Safety
- Support Services
- Taxes
- Transportation
- Voter Information
- Your Local Government
- A Guide to Pima County's Downtown Tucson Parking Garages

Welcome to Pima County, Arizona

Marana Confiscation of County Wastewater Facilities through Senate Bill 1171

- Senate Bill 1171
- County Administrator Huckelberry's January 26, 2011 Memorandum to the Board of Supervisors Regarding Impacts of Senate Bill 1171
- County Administrator Huckelberry's January 31, 2011 Memorandum to the Board of Supervisors Regarding Bond Financing Difficulties with Senate Bill 1171
- "Marana wastewater move illegal, costly, harmful to regional planning," County Administrator Huckelberry Special to the Arizona Daily Star – February 4, 2011
- "SB 1171 wastewater plan will help advance Marana's goals," Marana Mayor Honea Special to the Arizona Daily Star – February 4, 2011
- County Administrator's February 8, 2011 Memorandum to the Board of Supervisors Regarding Marana Mayor Honea's February 4, 2011 Special to the Arizona Daily Star
- Board of Supervisors Chairman Ramón Valadez' January 26, 2011 Correspondence to State Senator Frank Antenori Outlining Pima County's Commitment to the Provision of Wastewater Services to Marana

Pima County Multi-Species Conservation Plan (MSCP)

In early December 2010, Pima County submitted an Administrative Draft of the Multi-Species Conservation Plan for administrative review by the U.S. Fish and Wildlife Service (USFWS). Once Pima County and the USFWS agree to the terms and conditions of the Permit, the County will have achieved a significant milestone in providing regulatory certainty for the County and much of the development community with regard to the compliance with the Endangered Species Act.

- Pima County Multi-Species Conservation Plan

February Arctic Blast Update

- The most up to date information on when service will be restored in your neighborhood is available at swgas.com
- On behalf of the Pima County Board of Supervisors, Chairman Ramon Valadez thanked Pima County residents for their patience and resilience during the recent days. More...

Trauma Counseling Resources

- Resources for trauma and other topics related to crisis including help in dealing with stress, anxiety and the grieving process...

Notice

- Pima County Stadium District and Kino Community Center Proposed Fee Schedules
- Pima County Begins Work on Hazard Mitigation Plan Update...
- Pima County Collaborates with the University of Arizona College of Pharmacy to Seek National Institute of Mental Health Research Grant...
- Proposed Fee Increase - Pima County Forensic Science Center

Current

Imagine Greater Tucson

- Help shape our region's future, take the survey...

Tumamoc Hill Proposed Consolidation Plan

- November 23, 2010 letter from Dr. Robert Shelton, President of The University of Arizona, confirming the University's collaboration in the radio facility consolidation plan for Tumamoc Hill.
- County Administrator's Letter Dated November 17, 2010 to President Shelton Regarding Tumamoc Hill Communications Facilities
- County Administrator's November 16, 2010 Memorandum to the Board - Summary of Public Meetings on Tumamoc Consolidation Plan

Pima County Begins Work on Hazard Mitigation Plan Update
Posting 2-8-11

Hazard mitigation planning is the process used to identify risks and vulnerabilities associated with disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage and a framework for developing appropriate mitigation projects. Under the Disaster Mitigation Act of 2000 (DMA2K), state, county, local and tribal governments are required to have a FEMA approved hazard mitigation plan as a condition for receiving mitigation grant funds.

In order to meet the requirements to ensure continued assistance eligibility, a planning team comprised of representatives from Pima County, Marana, Sahuarita, Oro Valley, City of Tucson, South Tucson, Pasqua Yaqui, Tohono O'odham Nation and the University of Arizona will be meeting regularly to update the current hazard mitigation plans for the participating jurisdictions. The planning team anticipates having a plan draft in August, 2011), at which time public access to the plan will be provided, with the opportunity to comment.

The primary areas of work/focus in the plan development are:

- Identify hazards that may impact or have impacted the community
- Develop a profile of the most relevant hazards
- Assess vulnerability to hazards
- Establish goals and objectives for hazard risk reduction/elimination
- Develop actions/projects to achieve goals and objectives

Additional Information & Questions
Please contact:

Jeff Guthrie
Pima County Office of Emergency Management and
Homeland Security
Jeff.Guthrie@Pima.Gov

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Tuesday, March 8, 2011

Sahuarita Begins Work on Hazard Mitigation Plan Update

Hazard mitigation planning is the process used to identify risks and vulnerabilities associated with disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage and a framework for developing appropriate mitigation projects. Under the Disaster Mitigation Act of 2000 (DMA2K), state, county, local and tribal governments are required to have a FEMA approved hazard mitigation plan as a condition for receiving mitigation grant funds.

In order to meet the requirements to ensure continued assistance eligibility, a planning team comprised of representatives from the Town of Sahuarita along with representatives from Pima County, Tucson, Marana and Oro Valley will be meeting regularly to update the current hazard mitigation plans for the participating jurisdictions. The planning team anticipates having a plan draft in December of 2011 at which time public access to the plan will be provided, with the opportunity to comment.

The primary areas of work/focus in the plan development are:

Identify hazards that may impact or have impacted the community

- Develop a profile of the most relevant hazards
- Assess vulnerability to hazards
- Establish goals and objectives for hazard risk reduction/elimination
- Develop actions/projects to achieve goals and objectives

Additional Information & Questions
Please contact:

Ed Pope
Town of Sahuarita
Regional Emergency Response Planner
Sahuarita Police Department
Epope@ci.sahuarita.az.us
520-344-7003

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Procurement
Pay Court Fees
Sun Shuttle
Fraud/Ethics Violations Reporting
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March 2011

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

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Ed Pope
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Regional Emergency Response Planner
Sahuarita Police Department
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520-344-7003

Featured Artist

THE SAHUARITA SUN

WEDNESDAY
MARCH 9, 2011
Vol. 6 No. 10

HAZARD

CONTINUED FROM PAGE A1

Planner, Sahuarita's goal mirrors that of other communities contributing information for the statewide plan: to provide emergency-operations plans, training and exercises to prepare responders, and help ensure continuity of vital public facilities following a disaster. Sahuarita's 26-page working draft is undergoing additions, edits and reviews almost daily to meet the September deadline, should the proposed FEMA budget cuts take effect, Pope said.

Sahuarita's plan isn't developing from scratch but involves updating its portion of the state's existing Hazard Mitigation Plan from 2005, Pope said. Revisions reflect technological advancements now available to public entities, particularly in the global-positioning system realm, providing much greater geographic detail than before, he noted. This is helpful in rapidly pinpointing and repairing vital public facilities and restoring key resources affected by a disaster. Contributing to the plan are representatives in the town's Public Works, Parks and Recreation, Human Resources, Planning and Zoning and Police departments.

Originally slated for a December unveiling, Sahuarita's plan draft is expected to be ready for public review by late July or August. Meetings will be announced.

Following the public review process, Sahuarita's plan will be sent to the Arizona Department of Emergency Management to be part of the state's multi-jurisdictional Hazard Mitigation Plan, which would then be cleared by the Governor's Office, and from there, sent to FEMA for its consideration. Even if the federal budget cuts come about and planners lose their third year of funds to work on developing disaster-mitigation strategies, Pope said he would follow through to see that Sahuarita's plan is in order so the town will be better prepared if disaster hits.

"We'll get everything done the best we can," he said.

Green Valley to see mock disaster drill

A mock-disaster drill simulating a hazardous-material spill will begin at 8 a.m. Saturday at Green Valley Recreation's Santa Rita Springs Social Center on Via Rio Fuerte, and last about four hours.

The drill will involve a "shelter-in-place" emergency-response exercise, during which an estimated 50 to 60 participating volunteers will go door to door to inform residents of potential dangers, as well as hand out informational brochures on disaster preparedness. They will be wearing vests, helmets and badges identifying them as emergency responders.

The drill is among various exercises conducted periodically to help train emergency responders for an actual emergency. Drill participants include state-certified emergency responders as well as citizen volunteers certified through a federally mandated course of study offered by the Greater Green Valley chapter of the national Community Emergency Response Team.

The citizen volunteer training involves a 20-hour course that includes instruction on personal and community preparedness, fire safety, first aid, search/rescue practices, and a mock-incident exercise. This is followed by monthly sessions on additional topics, and periodic exercises such as Saturday's. The 20-hour course, offered free, is presented twice a year and whenever else there are enough students to fill a class, Kerr said. The next is slated for fall. For more information, contact Kerr at 399-1234.

Disaster grant in the works

By Kitty Bottemiller
Special to the Sahuarita Sun

Town officials are working to make Sahuarita's 30.5-square miles and 25,000 residents less likely to fall to the whims of Mother Nature in the event of a disastrous event.

Representatives from several departments are drafting an inclusive, statewide Hazard Mitigation Plan to ward off the worst of windstorms, drought, flooding or any other potential threat — natural or manmade — that might afflict the area. The plan is required for Sahuarita and other communities to qualify for federal grants to help prepare in advance for the unexpected. And, should it strike, minimize injury, death, property damage and economic loss.

Officials want to move the planning process through required channels quickly, given recent talk of federal budget cuts that could lop as much as a full year off the original three-year funding originally approved for the task, stopping the funding clock Sept. 30, the end of the current fiscal year. Nationally, the cuts proposed by President Obama to trim billions from the overall 2011 federal budget would include $425 million in Pre-Disaster Mitigation grants through the Federal Emergency Management Agency (FEMA).

According to Ed Pope, Sahuarita's Regional Emergency Response

SEE HAZARD, PAGE A5

Sahuarita works on emergency plans

By Kitty Bottemiller
Special to the Green Valley News

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"We'll get everything

Mock disaster drill comes to GV

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— Kitty Bottemiller

EMERGENCY MANAGEMENT

Welcome to the City of Tucson Office of Emergency Management and Homeland Security

Local Emergency Management Day to Day Info

- The City of Tucson Joins Pima County and Other Local Governments in Hazard Mitigation Planning
- Partner Site - Tucson Urban Area Security Initiative - a Regional Automated Emergency Notification System
- Emergency Preparedness for Individuals with Disabilities - Adopted from W. Virginia (pdf)
- 8 Signs of Terrorism Video
- TOEMHS - March 2011 Update (pdf)

Follow Ready.Gov's Preparedness Twitter

Federal Region 9, including Arizona - Live Updates

- FEMA, Cal EMA approve $52,864 for Imperial County agencies to aid in winter storm disaster recovery
  Pasadena, CA. - Three Imperial County public agencies are being granted $52,864* in Public Assistance (PA) funds from the Federal Emergency Management Agency (FEMA) and the California Emergency Management Agency (Cal EMA) for disaster recovery associated with the severe winter storms that swept the state in January and February.
- FEMA, Cal EMA approve $105,727 For Siskiyou County Agencies To Aid In Winter Storm Disaster Recovery
  Pasadena, Calif. -- Four Siskiyou County public agencies are being granted $105,727 in Public Assistance (PA) funds from the Federal Emergency Management Agency (FEMA) and the California Emergency Management Agency (Cal EMA) for disaster recovery connected with the severe winter storms that swept the state earlier this year.
- FEMA, State Pledge $84,953 To Calaveras County Agencies To Aid In Winter Storm Disaster Recovery
  Pasadena, Calif. -- Two Calaveras County agencies are being granted $84,953 in Public Assistance (PA) funds from the Federal Emergency Management Agency (FEMA) and the California Emergency Management Agency (Cal EMA) for disaster recovery associated with the severe winter storms that swept the state earlier this year.

Notices

Review the 2nd Draft Release of the Pima County Hazard Mitigation Plan

Pima County Office of Emergency Management & Homeland Security

Federal

Pima County Office of Emergency Management & Homeland Security (PCOEMHS) is the local, federally mandated program of the **Federal Emergency Management Agency (FEMA).**

State

OEMHS is an extension of the Arizona State Division of Emergency Management and the Arizona State Department of Homeland Security

County

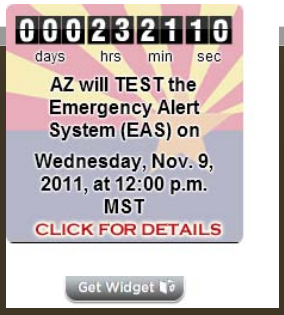
OEMHS works to prevent the loss of life and reduce property damage due to man-made, technological and natural distasters.

OEMHS provides professional emergency management services that include Prevention, Protection, Response and Recovery activities. OEMHS also assists municipalities and local governments with developing plans to ensure the highest level of preparedness.

ENTER SITE

County Administration

- Assessor's Office
- Board of Supervisors
- Clerk of the Board
- County Administrator
- Elections
- Facilities Management
- Finance & Risk Management
- Human Resources
- Office of Emergency Management & Homeland Security
- Pima County Recorder
- Procurement Department
- Treasurer's Office



Preparedness

Multi-Hazard Mitigation Plan

A planning team comprised of representatives from the Pima County, Oro Valley, Sahuarita, Tucson, Marana, South Tucson, Pascua Yaqui, Southern Arizona Buffelgrass Coordination Center and Tucson Airport Authority has been meeting regularly to participate in a hazard mitigation planning process. The purpose of this process is to develop a multi-hazard mitigation plan for the participating entities according to The Disaster Mitigation Act of 2000 (DMA2K). The DMA2K requires all local, county, tribal and state governments to have a FEMA approved hazard mitigation plan in order to be eligible for certain federal disaster mitigation funds. This plan focuses on the area's most threatening hazards and provides a strategy to reduce or eliminate the risk from those hazards to the people and property of Pima County. The first draft of the Pima County Hazard Mitigation Plan has been completed and is ready for public viewing and comment. The Plan may be viewed at http://www.pima.gov/OEMHS from November 1st until November 10th. For more information please contact Jeff Guthrie at the Pima County Office of Emergency Management and Homeland Security, 798-0600 or Jeff.Guthrie@Pima.gov

Download the Pima County Multi Jurisdiction Hazard Mitigation 2011 Draft Plan (27mb)

Planning makes it possible to manage the entire life cycle of a potential crisis. Strategic and operational planning establishes priorities, identifies expected levels of performance and capability requirements, provides the standard for assessing capabilities, and helps stakeholders learn their roles. The planning elements identify what an organization's Standard Operating Procedures (SOP) or Emergency Operations Plans (EOP) should include for ensuring that contingencies are in place for delivering the capability during a large-scale disaster.

To this end, Pima County Office of Emergency Management and Homeland Security continually updates and improves it's spectrum of planning documents to ensure that the population of Pima County is safer from natural and man-made disasters.

Planning Guidance Documentation

- The National Response Framework Brochure
- The National Response Framework FAQ
- The National Response Framework Document

The National Response Framework

The National Response Framework, and it's corresponding Emergency Support Functions, as well as Support and Incident Annexes, presents the guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies – from the smallest incident to the largest catastrophe.

This important document establishes a comprehensive, national, all-hazards approach to domestic incident response.

The Framework defines the key principles, roles, and structures that organize the way we respond as a Nation. It describes how communities, tribes, States, the Federal Government, and private-sector and nongovernmental partners apply these principles for a coordinated, effective national response. It also identifies special circumstances where the Federal Government exercises a larger role, including incidents where Federal interests are involved and catastrophic incidents where a State would require significant support. The Framework enables first responders, decision makers, and supporting entities to provide a unified national response.

Pima County has updated all of it's plans to mirror the principles and practices laid out in the National Response Framework, ensuring that the Office of Emergency Management and Homeland Security is ready to respond to local, regional and national incidents.

NTAS NO ACTIVE ALERTS WWW.DHS.GOV/ALERTS

All-hazards Planning Theory

All-hazards planning is built upon scalable, flexible, and adaptable coordinating structures that allow for planning documents to be useful for both the expected and unexpected incidents, as they arise, no matter the size, scope or complexity.

Encouraged from within Federal doctrine, such as the National Response Framework, all-hazards planning has become the preferred method and is in use across all Pima County planning documents.

How our plans make the community safer

Local police, fire, emergency medical services, public health and medical providers, emergency management, public works, environmental response professionals, and others in the community are often the first to detect a threat or hazard, or respond to an incident. They also are often the last to leave an incident site or otherwise to cope with the effects of an incident. The local senior elected or appointed official (the mayor, city manager, or county manager) is responsible for ensuring the public safety and welfare of residents. In today's world, senior officials and their emergency managers build the foundation for an effective response. They organize and integrate their capabilities and resources with neighboring jurisdictions, the State, NGOs, and the private sector. Increasingly, businesses are vital partners within communities wherever retail locations, service sites, manufacturing facilities, or management offices are located. NGOs and not-for-profit organizations also play a key role in strengthening communities' response efforts through their knowledge of hard-to-reach populations, outreach, and services.

Recognizing this, Pima County Office of Emergency Management makes every effort to ensure that planning documentation includes all aspects of the local level of response to and recovery from incidents, small and large, when it creates is planning documents. In doing so, it can be insured that the actions made before, during and after a disaster are the best possible given the situation, helping to save lives and protect property within the region.

Planning Partners

Pima County works closely with all of the jurisdictions within its borders to ensure that plans are consistent and organized.

- FEMA Planning Information
- Arizona Division of Emergency Management Planning Information

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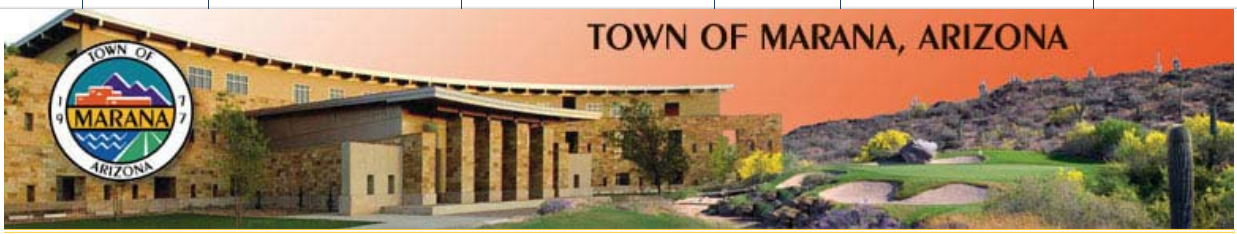

DEPARTMENTS | GOVERNMENT | SERVICES | E-GOV | COMMUNITY

11/7/2011 10:04:34 AM

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- PAG 208 Plan Amendment
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- Public Records Request
- Purchasing
- Public Auction
- Document Center
- Archives
- Traffic Alerts
- Citizen Request Tracker
- Public Hearings

SEARCH

GO

Marana Municipal Complex
11555 W. Civic Center Drive
Marana, AZ 85653
P:520-382-1999
F:520-382-1998
Contact Us | Map

Talk To Us Comments, Concerns & Suggestions

Accessibility Information

WELCOME

Thank you for visiting the Town of Marana Web site. We hope that in touring our site you can learn about us, what we do and the services we provide to our citizens.

Marana is a relatively new municipality, incorporating in 1977 to control our most valuable resource – water. Although the Town is young, Marana has a rich history, and heritage preservation is one of our priorities.

With our unique location between Tucson and Phoenix, Marana is an attractive community dedicated to maintaining a friendly environment where people can work, shop, live and play.

Welcome all,
Mayor Ed Honea and the Marana Town Council

Home | Email | Site Map | Printer Friendly | Legal Notices | Powered by CivicPlus

CALENDAR ... All Events

Tue, Nov. 15
Town Council meeting

Thu, Nov. 17
Parks and Recreation Commission meeting

Wed, Nov. 30
Planning Commission meeting

ANNOUNCEMENTS ... All News

Phones down at Operations Center
Employees at the Marana Operations Center are unable to make or receive external calls this morning. Technology Services is working to resolve the problem.

Hazard Mitigation Plan open for public comment
A team including representatives from the Town of Marana, Pima County Office of Emergency Planning and Homeland Security and other regional jurisdictions has been meeting to participate in a hazard mitigation planning process. Read on...

El Tour coming through Marana
The 29th Annual El Tour de Tucson's route includes Marana when the race is run Nov. 19. Motorists should expect delays along the course for much of the day. Read on...

COMMITTED TO THE FUTURE ... INSPIRED BY OUR PAST

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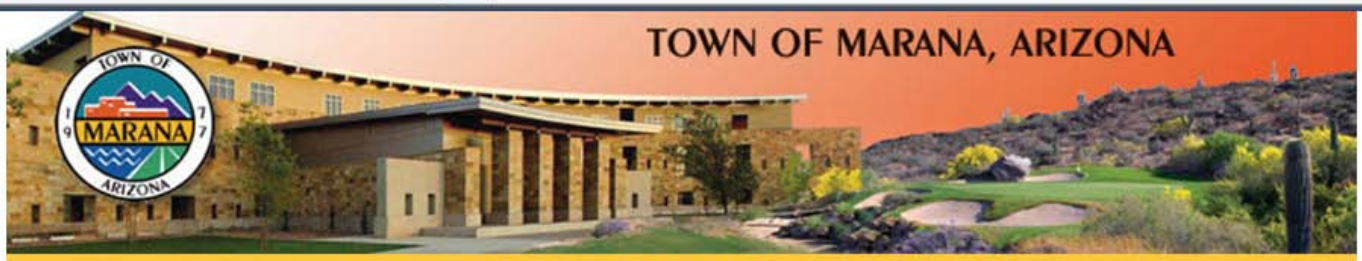
http://www.marana.com/CivicAlerts.aspx?AID=262
File Edit View Favorites Tools Help
Google Go Bookmarks 117 blocked Check AutoLink AutoFill Settings
Favorites Suggested Sites Free Hotmail Free AOL & Unlimited Internet Google Maps MapQuest Home Yahoo! Groups Web Slice Gallery
Connecting... Page Safety Tools



Marana Municipal Complex
11555 W. Civic Center Drive
Marana, AZ 85653
P:520-382-1999
F:520-382-1998
Contact Us | Map

Posted on: November 1, 2011

Hazard Mitigation Plan open for public comment

A team including representatives from the Town of Marana, Pima County Office of Emergency Planning and Homeland Security and other regional jurisdictions has been meeting to participate in a hazard mitigation planning process.

The purpose of this process is to develop a multi-hazard mitigation plan for Pima County and the Town of Marana that adheres to The Disaster Mitigation Act of 2000 (DMA2K). The DMA2K requires all local, county, tribal and state governments to have a FEMA-approved hazard mitigation plan in order to be eligible for certain federal disaster mitigation funds.

This plan focuses on the area's most threatening hazards and provides a strategy to reduce or eliminate the risk to the people and property of the Town of Marana. The first draft of the Pima County Multi-Jurisdictional Hazard Mitigation Plan has been completed and is ready for public viewing and comment. The plan may be viewed at the link below or at the Marana Municipal Complex, 11555 West Civic Center Drive, Monday through Friday, 8 a.m. to 4 p.m. until Nov. 9.

For more information, please contact Sgt. Steve Johnson at 382-2034 or sjohnson@marana.com.

Additional Info...

Previous
Phones down at Operations Center

Next
El Tour coming through Marana

Other News in Home

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All categories

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- All Categories
- Home

Done Internet 115%

W. Scott Ogden

From: Steve Johnson [sjohnson@MARANA.COM]
Sent: Monday, November 07, 2011 10:36 AM
To: Shad Bustamante
Cc: W. Scott Ogden
Subject: RE: Hazard mitigation plan

Shad,

Thanks

Steven Johnson, Sergeant
Marana Police Department
Day Shift Supervisor
11555 W. Civic Center Drive, Bldg B.
Marana, AZ 85653
(520) 382-2034 Office
(520) 382-2004 Fax
sjohnson@marana.com

From: Shad Bustamante
Sent: Monday, November 07, 2011 8:33 AM
To: Steve Johnson
Subject: FW: Hazard mitigation plan

Sgt. Johnson,

I am not sure if you already received the information below from Rodney.

Thanks,

Shad Bustamante
Engineering Aide
Town of Marana
11555 W. Civic Center Drive
Marana, Arizona 85653
(520) 382-2600 Office
(520) 382-2644 Fax

From: Rodney Campbell
Sent: Thursday, November 03, 2011 4:32 PM
To: Shad Bustamante
Subject: RE: Hazard mitigation plan

I sent this to both the Marana Weekly and Explorer and posted it on KOLD's web site.

A team including representatives from the Town of Marana, Pima County Office of Emergency Planning and Homeland Security and other regional jurisdictions has been meeting to participate in a hazard mitigation planning process.

The purpose of this process is to develop a multi-hazard mitigation plan for Pima County and the Town of Marana that adheres to The Disaster Mitigation Act of 2000 (DMA2K). The DMA2K requires all local, county, tribal and state governments to have a FEMA-approved hazard mitigation plan in order to be eligible for certain federal disaster mitigation funds.

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For more information, please contact Sgt. Steve Johnson at 382-2034 or sjohnson@marana.com.

From: Shad Bustamante
Sent: Tuesday, November 01, 2011 1:04 PM
To: Rodney Campbell
Subject: RE: Hazard mitigation plan

Rodney,

Can you do me a favor when you get a chance and send the information you provided to news outlets, as well as a screenshot of our website informing the public about the Hazard Mitigation Plan to Sgt. Johnson for documentation purposes.

Thanks,

Shad Bustamante
Engineering Aide
Town of Marana
11555 W. Civic Center Drive
Marana, Arizona 85653
(520) 382-2600 Office
(520) 382-2644 Fax

From: Rodney Campbell
Sent: Tuesday, November 01, 2011 12:59 PM
To: Shad Bustamante
Subject: Hazard mitigation plan

I sent it to the Marana Weekly and Explorer to post on their web sites and added it KOLD's neighborhood news section on its site.

Rodney Campbell
Town of Marana Public Information Officer
Office of Strategic Initiatives
Phone: (520) 382-1936
www.marana.com

Marana -- Home of the PGA TOUR World Golf Championships - Accenture Match Play Championship (Feb. 20-26, 2012)

Want updates? Follow the Town of Marana on Twitter and become a fan on Facebook.

To ensure compliance with the Open Meeting Law, recipients of this message should not forward it to other members of the Council. Members of the Council may reply to this message, but they should not send a copy of the reply to other members.

Police Department - Windows Internet Explorer

http://www.ovpd.org/Page881.aspx

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Oro Valley POLICE

Caring for our heritage, our community, our future.

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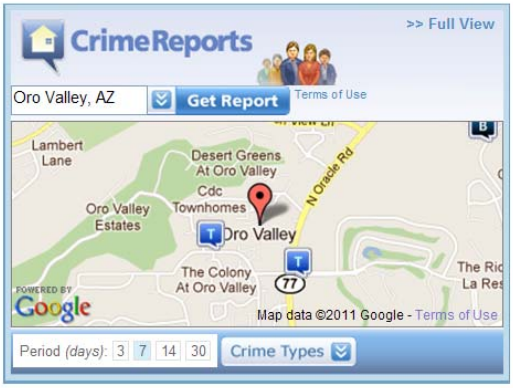
- Career Opportunities
- Communications Bureau
- Community Information
- Crime and Safety Information
- Executive Officer
- FAQs
- Field Services Division
- General Information
- Records Unit
- Services
- Support Services Division
- OVPD Calendar

REVERSE 911

Integrity
Fairness
Excellence

Police Department



How Do I...

- Find FAQs
- Take the Citizen Survey
- Obtain a Police Report
- Job Opportunities
- Get Fingerprinted
- Find Crime Stats
- Find Community Events
- Find Community Programs
- Read the Crime Fighter
- Register/Update Reverse 911
- Contact OVPD

Citizen Survey

Click on Explorers for information.

Know Your Town's Budget

This document has two pages of facts and numbers to help you know your Town's budget. It has a question and answer format on one page, with expenditure reductions, efficiencies, policies and a timeline on the other. It is a great glance.

http://www.orovalleyaz.gov/Town_Government/Police_Department/General_Information/Citizen_Survey.htm

Police Department - Windows Internet Explorer

http://www.ovpd.org/Page881.aspx

Integrity
Fairness
Excellence

Click on Explorers for information.

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For more information on the Police Department budget, visit Know Your Police Department's Budget.

Multi-Hazard Mitigation Plan

A planning team comprised of representatives from the Town of Oro Valley, Pima County Office of Emergency Management and Homeland Security and other regional jurisdictions met regularly to participate in a hazard mitigation planning process. The purpose of this process is to develop a multi-hazard mitigation plan for Pima County according to the Disaster Mitigation Act of 2000 (DMA2K). The Disaster Mitigation Act requires all local, county, tribal and state governments to have a FEMA approved hazard mitigation plan in order to be eligible for certain federal disaster mitigation funds. This plan focuses on the area's most threatening hazards and provides a strategy to reduce or eliminate the risk to the people and property of the Town of Oro Valley. The first draft of the *Pima County Multi-Jurisdictional Hazard Mitigation Plan* was completed and is ready for public viewing and comment. The plan may be reviewed until November 10, 2011. For more information, please contact Char Ackerman at (520) 229-4950 or by email.

Upcoming Events

November 9, 2011	Digital Child Identification	**December 14, 2011**	Digital Child Identification
December 17, 2011	Dispose-A-Med Oro Valley	**January 10, 2012**	CERT Training
January 11, 2012	Digital Child Identification	**January 28, 2012**	Dispose-A-Med Oro Valley
February 18, 2012	Dispose-A-Med Oro Valley	**March 14, 2012**	Digital Child Identification
March 24, 2012	Dispose-A-Med Oro Valley	**April 21, 2012**	Dispose-A-Med Oro Valley
May 9, 2012	Digital Child Identification	**May 19, 2012**	Dispose-A-Med Oro Valley
June 16, 2012	Dispose-A-Med Oro Valley	**July 11, 2012**	Digital Child Identification
July 28, 2012	Dispose-A-Med Oro Valley	**August 25, 2012**	Dispose-A-Med Oro Valley
September 12, 2012	Digital Child Identification	**September 22, 2012**	Dispose-A-Med Oro Valley
October 20, 2012	Dispose-A-Med Oro Valley	**November 14, 2012**	Digital Child Identification
December 15, 2012	Dispose-A-Med Oro Valley		

Vision Statement

Seek Excellence, Remain Vigilant, Involve Community, Enforcement

Mission Statement

We, the members of the Oro Valley Police Department, are dedicated to providing excellent service through partnerships that build trust, prevent crime and promote a safe environment to enhance the quality of life.

Multi-Hazard Mitigation Plan

A planning team comprised of representatives from the Pascua Yaqui Tribe and the Arizona Division of Emergency Management has been meeting regularly to participate in a hazard mitigation planning process. The purpose of this process is to develop a multi-hazard mitigation plan for the Pascua Yaqui Tribe according to The Disaster Mitigation Act of 2000 (DMA2K). The DMA2K requires all local, county, tribal and state governments to have a FEMA approved hazard mitigation plan in order to be eligible for certain federal disaster mitigation funds. This plan focuses on the area's most threatening hazards and provides a strategy to reduce or eliminate the risk from those hazards to the people and property of The Pascua Yaqui Tribe. The first draft of the Pascua Yaqui Tribe Hazard Mitigation Plan has been completed and is ready for public viewing and comment. The Plan may be viewed at 7474 S. Camino de Oeste or at http://intranet/departments/fire/default.aspx from November 10th, 2011 until Monday November 28th, 2011. For more information please contact Kelly Gomez at 879-6350.

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Monday, November 21, 2011

CLICK ABOVE FOR PERFORMANCE MEASURES REPORT

PDEQ Public Hearing on ASARCO Permit Revision Set for Nov. 15, 2011

Pima County, Ariz. (Nov. 7, 2011) - Pima County Department of Environmental Quality will hold a public hearing Tuesday, Nov. 15, 2011, on the request by ASARCO for a revision to the ASARCO Mission Complex air quality permit. The open pit copper mine operates along I-19, in Sahuarita.

Town Council Seeks New Parks and Recreation Commission Member

The Parks and Recreation Commission has a vacancy. The term for this Commissioner will end in May 2012, but can be re-appointed for a four year term after that.

The Commission acts in an advisory capacity to the Town Council and the parks and recreation director in matters pertaining to the parks and recreation department, particularly in the areas of recreation programs, park design, open space and trail use, budget planning, and other related issues.

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN THAT THE TOWN OF SAHUARITA PLANNING AND ZONING COMMISSION WILL HOLD A PUBLIC HEARING ON **MONDAY, DECEMBER 5, 2011 AT OR AFTER 6:30 P.M.** TO CONSIDER:

A Type II Conditional Use Permit application for an auto repair business at 18280 S. Old Nogales Highway. The Conditional Use Permit would allow for the continued operation of Sonora Desert Off Road Center on this property, zoned Rural Homestead (RH).

The public hearing will be held at the Town Council Chambers, 375 W. Sahuarita Center Way. Interested persons may appear at the public hearing in person, by agent or attorney. All persons will be given an opportunity to speak. (Case #SA10-10-04)
For additional information, contact Dylan Parry at the Town of Sahuarita Planning & Zoning Division at (520) 822-8855.

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Sahuarita in Final Phase of Town Hazard Mitigation Plan Updating

For the past twelve months, the Town of Sahuarita has been actively participating in the collaborative working group updating the State of Arizona Multi-Jurisdictional Hazard Mitigation Plan of 2012. This plan, which is only updated every ten years, is the process used to identify risks and vulnerabilities associated with any potential Town disasters and to develop long-term strategies for protecting the people of Sahuarita and their property for such future events. Under the Disaster Mitigation Act of 2000, state, county, local and tribal governments are required to have a FEMA approved hazard mitigation plan as a condition for receiving mitigation grant funds.

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- Speak Up Sahuarita
- Sun Shuttle
- Site-map
- Town Code

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Monday, November 21, 2011

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The primary areas of work/focus in the plan development are:

- **Identify hazards that may impact or have impacted the community**
- **Develop a profile of the most relevant hazards**
- **Assess vulnerability to hazards**
- **Establish goals and objectives for hazard risk reduction/elimination**
- **Develop actions/projects to achieve goals and objectives**

In order to meet the requirements and to ensure continued assistance eligibility, a planning team comprised of representatives from the Town of Sahuarita along with Pima County, Tucson, Marana, Oro Valley and the State of Arizona Department of Emergency Management (ADEM) have been
meeting regularly to update the current hazard mitigation plans for the all jurisdictions within the county. Also participating in this process has been members and representatives of the Sahuarita Town Council, Town Manager's Office, Public Works Department, Planning and Building Department and the Parks and Recreation Department.

The first draft of the State/Pima County/Sahuarita Hazard Mitigation Plan has been completed and is ready for public viewing and comment. The Plan may be viewed and available for comment from November 21 through December 6, 2011. For viewing or additional information contact Ed Pope, the Town of Sahuarita Emergency Response Planner from 7:00am to 4:00pm, Monday through Friday at the contacts listed below.

Ed Pope
Town of Sahuarita
Regional Emergency Response Planner
Epope@ci.sahuarita.az.us
520-344-7003

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Appendix D

Detailed Historic Hazard Records

State and Federally Declared Events That Included Pima County
January 1966 to August 2010

Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Damage Costs ($)
Dam Failure	0	0	0	$0
Disease	7	0	0	$0
Drought	8	0	0	$300,000,000
Earthquake	0	0	0	$0
Extreme Heat	0	0	0	$0
Fissure	0	0	0	$0
Flooding / Flash Flooding	13	39	1087	$904,837,000
Hazardous Materials Incident	3	0	0	$0
Landslide / Mudslide	0	0	0	$0
Levee Failure	0	0	0	$0
Severe Wind	1	0	2	$230,000
Subsidence	0	0	0	$0
Wildfire	17	0	0	$38,100,000
Winter Storm	0	0	0	$0

Notes:
- Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values

State of Arizona Declaration				Federal Presidential Declaration				
Date	**Hazard**	**State PCA No.**	**Expenditures**	**Date**	**ID**	**Expenditures**	**Counties Affected**	**Description**
2/24/1966	Flooding / Flash Flooding		$43,673	04/30/66	217-DR	$3,256,224	Graham, Greenlee, Maricopa, Pima, Pinal	Floods; state/federal disaster declared. A cold winter storm put up to 1.26 inches of rain in many areas of Tucson. Eleven accidents from slick roads and flooding produced most of the damage in the Tucson area.
6/15/1972	Flooding / Flash Flooding		$16,158	07/03/72	343-DR	$10,879,002	Maricopa, Pima, Pinal	Flood damages in Maricopa County were over $8,000,000. Scottsdale and Phoenix were hit the hardest.
4/28/1973	Wildfire		$36,718				Statewide	
1/7/1974	Service Interruption		$199,028				Statewide	Energy Shortage
4/22/1975	Wildfire		$8,923				Statewide	
9/2/1977	Infestation						Statewide	Cotton Crop Pesticide Application
10/9/1977	Tropical Storm / Huricane		$298,422	11/04/77	540-DR		Pima, Pinal, Santa Cruz	DR-540: Tropical Storm Heather caused four days of heavy rains and severe flooding in the Santa Cruz and San Pedro Rivers. The greatest destruction was along the Santa Cruz between Nogales and Marana, where peak discharge occurred. Four-day rainfall amounts ranged from 4 to 14 inches, exceeding average annual precipitation amounts in some places. 700 people were evacuated from their homes, and severe damage occurred to crops, livestock, water supplies, and property. Property damage in Pima, Pinal, and Santa Cruz Counties was an estimated $15.2 million
3/2/1978	Flooding / Flash Flooding		$485,718	03/04/78	551-DR	$67,122,627	Statewide	Warm temperatures accompanied by heavy rain filled reservoirs behind all of the dams on the Salt and Verde Rivers and forced large volumes of runoff to be released. This was the largest flow of water down the Salt since 1891. The released water overflowed the channel and flooded residential areas and farmlands. During the same period storm fronts passing over the state caused flash flooding and destruction. 9.53 inches of rainfall occurred on Mt Lemmon. Overflows of the Gila River flooded Duncan and 1000-2000 acres of farmland in Safford Valley. The Rillito Creek, Pantano and Tanque Verde Creeks in Tucson were near bankfull. Total damage was approximately $65.9 million, of which $37 million was attributed to Maricopa County alone. Thousands of homes were damaged and 116 homes were destroyed. More than 7,000 people had to be sheltered and four people lost their lives. For Maricopa County - the storm centered over the mountains north and east of Phoenix, 35 miles north at Rock Springs. Extrapolation of intensity-probability data: 5.73 in./ 24 hr. equates to a 400 yr. storm. Main source of flooding due to Verde River with runoff volume exceeding reservoir storage capacity above Bartlett Dam. Flooding also occurred along irrigation canals on north side of metro area, and along tributaries of the Gila River and Queen Creek. 1 death-countywide. Total damage costs: $37 million: $3.1 million-residential, $16 million-public, $4 million-agriculture, $7.8 million-industrial, $0.75 million-commercial. "Flood Damage Report, 28 February-6 March 1978 on the storm and floods in Maricopa County, Arizona", U.S. Army Corps of Engineers, Los Angles District, FCDMC Library #802.024.
4/21/1978	Wildfire		$11,528				Statewide	
11/30/1978	Prison Problem		$425				Statewide	Prison Break
12/16/1978	Flooding / Flash Flooding		$1,909,498	12/21/78	570-DR	$113,561,122	Statewide	Following the spring flooding, Arizona was hit hard again in December 16th-20th. Total precipitation ranged from less than 1 inch in the northeastern and far southwestern portions of Arizona to nearly 10 inches in the Mazatzal Mountains northeast of Phoenix. A large area of the central mountains received over 5 inches. The main stems of the Gila, Salt, Verde, Agua Fria, Bill Williams, and Little Colorado Rivers, as well as a number of major tributaries, experienced especially large discharges. The flooding areas with the most significant damages included the Little Hollywood District near Safford and major portions of Duncan, Clifton, Winslow, and Williams. Damages were estimated at $39,850,000. 10 people die and thousands are left homeless. Severe damage to roads and bridges. For Maricopa County, 4 deaths, $16.3 million-public and $5 million-agriculture losses estimated. ["Flood Damage Report, Phoenix Metropolitan Area, December 1978 Flood", November 1979, U.S. Army Corps of Engineers, FCDMC Library #802.027]
4/16/1979	Wildfire		$204,207				Statewide	
8/21/1979	Disease		$58				Pima	Movement of Contaminated Food
9/25/1979	Hazardous Materials Incident		$1,118,702				Pima	Tritium Incident, American Atomic Corp
6/2/1980	Wildfire		$298,845				Statewide	
7/6/1980	Search and Rescue		$8,305				Pima	Search and Rescue Operations Refrigerated Trucks for bodies of illegal immigrants
3/31/1981	Hazardous Materials Incident		$492,635				Statewide	
6/26/1981	Wildfire						Statewide	Fire suppression assitance
6/30/1981	Wildfire		$256,904				Statewide	
6/30/1982	Wildfire		$492,635				Statewide	
9/28/1983	Tropical Storm / Huricane		$863,283	10/05/83		$13,446,148	Mohave, Apache, Yavapai, Gila, Graham, Greenlee, Pinal, Pima, Santa Cruz, Cochise, Navajo	The autumn floods of 1983. Tropical storm remains, including those from Hurricane Octave, caused heavy rain over Arizona during a 10-hour period. Southeast Arizona and Yavapai and Mohave Counties are particularly hard hit. Severe flooding occurred in Tucson, Clifton and Safford. Fourteen fatalities and 975 injuries were attributed to the flooding. At least 1000 Arizonans were left temporarily homeless. Damage estimated at $370 million in today's value (2001). Record water levels in the Santa Cruz, Gila, San Pedro and San Francisco Rivers contributed to heavy flooding statewide. Greenlee County was hit hard. Damages in Clifton alone were over $20 million where approximately 41 businesses were destroyed and over 231 homes and 57 businesses suffered major damages. The Corps constructed an emergency dike in the Winkelman Flats area to try and protect 112 homes. There were floodfight activities at Florence to protect a sewage treatment pland and at Safford to protect critical arterial bridge embankment from severe damage.
03/17/1987	Wildfire	EUZSLD					Statewide	Wildland fires statewide
03/31/1987	Hazardous Materials Incident						Statewide	
08/12/1987	Drought	EUZ7AU	$14,941				Maricopa, Pima, Pinal	Southern Arizona drought
12/21/1988	Miscellaneous	EUZHTS	$129,624				Statewide	EUZHTS Homeless Sheltor
03/17/1990	Wildfire	EUFIR					Statewide	Wildland fire contingency
09/07/1990	Flooding / Flash Flooding	EUZ901	$1,175,040	12/06/90	884-DR	$5,875,202	Mohave, Gila, Pima, Pinal, Yavapai, Graham, Coconino, Maricopa	Severe storms caused monsoon rains from July 8 through September 14, 1990. Heavy rains and high winds caused flash flooding and wind damage. Havasupai reservation received heavy flood losses. Three lives were lost.
6/25/1992	Miscellaneous	92004					Statewide	Emergency government state budget
01/08/1993	Flooding / Flash Flooding	93003	$30,072,157	01/19/93	977-DR	$104,069,362	Statewide	During January and February 1993, winter rain flooding damage occurred from winter storms associated with the El Nino phenomenon. These storms flooded watersheds throughout Arizona by dumping excessive rainfall amounts that saturated soils and increased runoff. Warm temperature snowmelt exacerbated the situation over large areas. Erosion caused tremendous damage and some communities along normally dry washes were devastated. Stream flow velocities and runoff volumes exceeded historic highs. Many flood prevention channels and retention reservoirs were filled to capacity and so water was diverted to the emergency spillways or the reservoirs were breached, causing extensive damage in some cases (e.g., Painted Rock Reservoir spillway). Ultimately, the President declared a major federal disaster that freed federal funds for both public and private property losses for all of Arizona's fifteen counties. Damages were widespread and significant, impacting over 100 communities. Total public and private damages exceeded $400 million and eight deaths and 112 injuries were reported to the Red Cross (FEMA, April 1, 1993; ADEM, March, 1998).
09/09/1993	Wildfire	94002	$200,000				Statewide	Statewide wildfire suppression - State Land Department
10/14/1994	Wildfire	95003	$600,000				Statewide	Statewide wildfire suppression - State Land Department
03/13/1996	Infestation	96003	$796,456				Statewide	Wheat (karnal bunt)
05/16/1996	Wildfire	96004	$1,000,729				Statewide	Statewide wildfire suppression - State Land Department
06/07/1996	Drought	96005	$211,499				Statewide	
01/20/1999	Infestation	99001	$177,702				Statewide	Red Imported Fire Ant Emergency
05/06/1999	Wildfire	99004	$4,894				Statewide	Statewide wildland fire emergency

State of Arizona Declaration				Damage Estimates					
Date	**Hazard**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Sources**	**Hazard Look Up**	
2/24/1966	Flooding / Flash Flooding					$0	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php ;	Flooding / Flash Flooding	
6/15/1972	Flooding / Flash Flooding			$8,000,000		$8,000,000	ADEM, 2008	Flooding / Flash Flooding	
4/28/1973	Wildfire					$0	ADEM, 2008	Wildfire	
1/7/1974	Service Interruption					$0	ADEM, 2008	Service Interruption	
4/22/1975	Wildfire					$0	ADEM, 2008	Wildfire	
9/2/1977	Infestation					$0	ADEM, 2008	Disease	
10/9/1977	Tropical Storm / Huricane			$15,200,000		$15,200,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php ;	Flooding / Flash Flooding	
3/2/1978	Flooding / Flash Flooding	4		$65,900,000		$65,900,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php; AFMA Flood Happens, Fall 2003	Flooding / Flash Flooding	
4/21/1978	Wildfire					$0	ADEM, 2008	Wildfire	
11/30/1978	Prison Problem					$0	ADEM, 2008	Prison Problem	
12/16/1978	Flooding / Flash Flooding	10		$39,850,000		$39,850,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php; AFMA Flood Happens, Fall 2003	Flooding / Flash Flooding	
4/16/1979	Wildfire					$0	ADEM, 2008	Wildfire	
8/21/1979	Disease					$0	ADEM, 2008	Disease	
9/25/1979	Hazardous Materials Incident					$0	ADEM, 2008	Hazardous Materials Incident	
6/2/1980	Wildfire					$0	ADEM, 2008	Wildfire	
7/6/1980	Search and Rescue					$0	ADEM, 2008	Search and Rescue	
3/31/1981	Hazardous Materials Incident					$0	ADEM, 2008	Hazardous Materials Incident	
6/26/1981	Wildfire					$0	ADEM, 2008	Wildfire	
6/30/1981	Wildfire					$0	ADEM, 2008	Wildfire	
6/30/1982	Wildfire					$0	ADEM, 2008	Wildfire	
9/28/1983	Tropical Storm / Huricane	14	975	$370,000,000		$370,000,000	ADEM, 2008	Flooding / Flash Flooding	
03/17/1987	Wildfire					$0	ADEM, 2008	Wildfire	
03/31/1987	Hazardous Materials Incident					$0	ADEM, 2008	Hazardous Materials Incident	
08/12/1987	Drought					$0	ADEM, 2008	Drought	
12/21/1988	Miscellaneous					$0	ADEM, 2008	Miscellaneous	
03/17/1990	Wildfire					$0	ADEM, 2008	Wildfire	
09/07/1990	Flooding / Flash Flooding	3				$0	ADEM, 2008	Flooding / Flash Flooding	
6/25/1992	Miscellaneous					$0	ADEM, 2008	Miscellaneous	
01/08/1993	Flooding / Flash Flooding	8	112	$330,000,000	$70,000,000	$400,000,000	ADEM, 2008	Flooding / Flash Flooding	
09/09/1993	Wildfire					$0	ADEM, 2008	Wildfire	
10/14/1994	Wildfire					$0	ADEM, 2008	Wildfire	
03/13/1996	Infestation					$0	ADEM, 2008	Disease	
05/16/1996	Wildfire					$0	ADEM, 2008	Wildfire	
06/07/1996	Drought					$0	ADEM, 2008	Drought	
01/20/1999	Infestation					$0	ADEM, 2008	Disease	
05/06/1999	Wildfire					$0	ADEM, 2008	Wildfire	

State of Arizona Declaration				Federal Presidential Declaration				
Date	**Hazard**	**State PCA No.**	**Expenditures**	**Date**	**ID**	**Expenditures**	**Counties Affected**	**Description**
6/23/1999	Drought	99006					Statewide	PCA 99006; Statewide Drought Emergency, Declared June 23, 1999: Lack of precipitation had significantly reduced surface and ground water supplies and stream flows. The drought continues to endanger crops, property and livestock of the citizens of Arizona. This proclamation has been extended to June 23, 2003, as this is still a threatening situation. USDA Programs offer Arizona Ranchers Drought Relief, (Phoenix) - Federal officials this week announced three programs designed to ease the impact of Arizona's drought on the state's ranching industry and the state's natural resources. Gov. Jane Dee Hull in June issued a drought declaration for the state, initiating a federal review process that culminated in the U.S. Department of Agriculture's determination that Arizona agriculture could qualify for drought assistance. The following are brief descriptions of the three assistance packages for which Arizona ranchers may qualify: Those ranching operations that earlier this year reduced herd sizes in response to poor pasture conditions and lack of water due to the drought can receive capital gains tax deferment if those herds are replaced within two years, according to the Internal Revenue Service. It is recommended that businesses consult their tax specialist or the IRS for further details. For more information, contact Joe Lane, Associate Director of Animal Services Division, at (602) 542-3629. The USDA Natural Resource Conservation Service has received an initial $6 million through its Emergency Watershed Program (EWP) to treat short- and long-term damage to rangeland and cropland due to drought. Ranchers and farmers can receive financial assistance to implement recovery measures that will retard runoff and reduce the threat of future flooding and erosion hazards. For more information, contact Mike Sommerville, State Conservationist, at (602) 280-8810. The USDA Farm Services Agency has emergency drought assistance loans available. For more information, contact George Arredondo, USDA/FSA State Executive Director, at (602) 640-5200. Arizona's dry winter and low snowpack mostly impacted the state's ranching industry due to poor pasture conditions. Summer rains have improved rangelands throughout Arizona. According to the USDA Arizona Agricultural Statistics Service, as of Aug. 15, range and pasture condition was reported as 6 percent poor, 21 percent fair, 39 percent good, and 34 percent excellent. As much as 99 percent of Arizona's crops are irrigated, generally mitigating short-term drought impacts.
8/13/1999	Drought			08/13/99	USDA		Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	GLICKMAN DECLARES PENNSYLVANIA, 13 ARIZONA COUNTIES AS DISASTER AREAS AND ANNOUNCES ADDITIONAL DROUGHT ASSISTANCE Release No. 0334.99, WASHINGTON, August 13, 1999 Agriculture Secretary Dan Glickman today declared all of Pennsylvania and 13 counties in Arizona as agricultural disaster areas due to drought. The declaration makes farmers in those areas and all contiguous counties eligible for emergency low-interest loans and other assistance to help cover losses from the drought. In Arizona, today's disaster declaration applies to Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, and Yuvapai Counties. Also eligible, because they are contiguous, are La Paz and Yuma Counties. Glickman has already declared all or part of Arizona, Connecticut, Maryland, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Virginia, and West Virginia as disaster areas. Due to the close proximity to these states, certain counties in California, Delaware, Indiana, Kentucky, Massachusetts, Michigan, Nevada, Rhode Island, Vermont, and Utah also qualify for emergency loan assistance.
08/16/1999	Flooding / Flash Flooding	20001					Pima	Pima County flash flood emergency
01/05/2000	Service Interruption	20005	$23,073				Statewide	Y2K
07/21/2000	Drought			07/21/00	USDA		Apache, Cochise, Graham, Greenlee, Pima, Pinal, Santa Cruz, Gila, Maricopa, Navajo, Yuma	GLICKMAN DECLARES 7 ARIZONA COUNTIES AGRICULTURAL DISASTER AREAS: Washington, July 17, 2000 - Agriculture Secretary Dan Glickman today declared seven of Arizona's 15 counties as agricultural disaster areas due to drought, making farmers in those areas and 12 neighboring counties, including counties in Utah, New Mexico and Colorado, eligible for emergency low-interest loans. "Farmers and ranchers in Arizona are experiencing real difficulties this year due to drought," said Glickman. "USDA emergency low-interest loans are available to help producers to cover some of their losses." Glickman's disaster declaration covers 7 of Arizona's 15 counties: Apache, Cochise, Graham, Greenlee, Pima, Pinal and Santa Cruz. Four other contiguous Arizona counties also are covered by the declaration (Gila, Maricopa, Navajo and Yuma) and therefore are eligible for the same benefits. Other contiguous counties in New Mexico are Catron, Cibola, Grant, Hidalgo, McKinley, and San Juan counties. San Juan county in Utah and Montezuma county in Colorado are included in the declaration as contiguous counties. This designation makes qualified family-sized farm operators in both primary and contiguous counties eligible for emergency low-interest loans from USDA. Farmers in eligible counties have eight months to apply for the loans. Each loan application is considered on its own merits, taking into account the extent of losses, security available, repayment ability, and other eligibility requirements. USDA previously approved emergency haying and grazing on Conservation Reserve Program acreage, providing assistance to approved producers whose pastures have been decimated by drought. For further information, farmers may contact their local Farm Service Agency offices or visit website: http://www.fsa.usda.gov/pas/disaster/assistance1.htm.
08/17/2001	Thunderstorm / High Wind	22001	$11,805				Maricopa, Pima	A large thunderstorm complex developed over northwest Maricopa County and moved to the south and southwest. The thunderstorm induced gust front, at times over 60 miles long, west to east, caused widespread electric power outages in the Gila Bend area south to Ajo in west Pima County. In the immediate Gila Bend area, thirty-eight 230kv poles downed, and thirty-nine 69kv poles downed. A substation was damaged as well as telephone lines. The reported wind gust of 66 knots was recorded at the Gila Bend municipal airport at 0245. As the gust front moved further to the south and southwest, a total of 140 power poles were blown over as reported by the Arizona Public Service. Electric power services were disrupted up to 5 days.
9/12/2001	Terrorism	22002	$3,070,329	09/12/01			Statewide	September Terrorism Incident, Declared September 12, 2001: Terrorist attacks inflicted in various locations across the United States posed significant threat to the citizens of this country causing us to heighten the level of security throughout the State of Arizona. This proclamation has been extended to November 12, 2002.
10/16/2001	Terrorism	22003	$7,324				Statewide	Military Airport Security
05/17/2002	Drought			05/17/02	USDA		Statewide	VENEMAN DESIGNATES ARIZONA AS DROUGHT DISASTER AREA, Governor Hull and Veneman Tour Fire Areas and Assess Damage in Prescott National Forest Areas: PHOENIX, Ariz., May 17, 2002-- Agriculture Secretary Ann M. Veneman today designated the entire state of Arizona as a drought disaster area. This designation makes Arizona farmers and ranchers immediately eligible for USDA emergency farm loans due to losses caused by drought this year.
5/18/2002	Disease						Statewide	the Arizona Game and Fish Department placed an emergency ban on the importation of live hoofed animals (e.g., deer and elk) into Arizona due to a fear of Chronic Wasting Disease (CWD). CWD is a disease closely related to “mad cow disease” in cattle and scrapie in domestic sheep and goats but affects dear and elk.
07/11/2002	Drought			07/11/02	USDA		Statewide	VENEMAN ANNOUNCES EXPANSION OF CRP EMERGENCY HAYING AND GRAZING PROGRAM FOR WEATHER-STRICKEN STATES, WASHINGTON, July 11, 2002 - Agriculture Secretary Ann M. Veneman today approved 18 states for Conservation Reserve Program emergency haying and grazing statewide, making all CRP participants in these states basically eligible for this emergency measure. Veneman also said USDA will waive rental reduction fees to encourage donation of hay to farmers and ranchers in immediate need. "Drought and severe weather conditions have depleted hay stocks and grazing lands across the country," said Veneman. "This approval provides immediate relief to livestock producers and encourages donations of hay to producers who need immediate assistance." The 18 approved states are: Arizona, Colorado, Georgia, Idaho, Kansas, Minnesota, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Utah, Virginia and Wyoming.ARIZONA FARMERS FACING CATASTROPHE ... Arizona officials are saying that the losses from the livestock industry alone last year will be upward of $300 million. …
07/18/2002	Drought			07/18/02	USDA		Maricopa, Pima, Pinal in the Tohono O'Odham Nation	VENEMAN DESIGNATES COUNTIES IN ARIZONA, CALIFORNIA, TEXAS AND VIRGINIA AS DISASTER AREAS, Decision Allows Farmers and Ranchers to Receive Emergency Farm Loans: WASHINGTON, July 18, 2002 -- In continuing efforts to expedite emergency disaster declarations in areas hit hard by adverse weather conditions, Agriculture Secretary Ann M. Veneman today designated counties in Arizona, California, Texas and Virginia as agricultural disaster areas. This designation makes farmers and ranchers with losses immediately eligible for USDA emergency (EM) farm loans. "These emergency declarations will provide farmers and ranchers with much needed assistance to recover from these natural disasters," said Veneman. "We continue to utilize all existing authorities to provide relief for weather-stricken areas." In Arizona, Maricopa, Pima and Pinal counties in the Tohono O'Odham Nation were named primary disaster areas due to drought.
5/2/2003	Wildfire	23003	$2,378,020				Statewide	Forest Health Emergency - As a result of the on-going drought conditions the forests within our state have been infested with the Pine Bark Beetle. This proclamation will expedite the clearing of dead, dying and diseased trees and other vegetation that interfere with emergency response and evacuation needs.
6/19/2003	Wildfire	23004	$1,181,481	7/14/2003	1477-DR	$5,907,407	Pima, Pinal	Tucson, Arizona, and in the surrounding area. It burned 84,750 acres (343 km²) of land, and destroyed 340 homes and businesses of the town of Summerhaven. Damages to electric lines, phone lines, water facilities, streets and sewers totaled $4.1 million dollars. Firefighting cost was about $17 million, and the Forest Service is spending $2.7
9/23/2004	Infestation	25003	$197,421				La Paz, Pima, Santa Cruz, Yuma	Mediterranean Fruit Fly Emergency
8/15/2005	Border Security	26001	$1,500,000				Cochise, Pima, Santa Cruz, Yuma	The daily threat to public health and safety from the gangs, coyotes and others engaged in dangerous criminal activities is worsening and Arizona can no longer wait for the federal government to do their job. This declaration allows the state agencies and local governments within the counties of Cochise, Pima, Santa Cruz and Yuma to perform projects that will lessen the criminal activities and enhance public health and safety along the international border.
9/3/2005	Miscellaneous	26003		9/12/2005	3241-EM	$5,421,732	Statewide	Emergnecy declaration to provide shelter and assistance to victims of Hurricane Katrina
9/16/2005	Flooding / Flash Flooding	26005	$256,948				Pima	On August 14, 2005 and August 23, 2005 intense heavy rains caused significant damage to public infrastructure throughout Pima County. The severe runoff resulted in damages to numerous roads, traffic lights, water well fields, berms, crossings, and police vehicles. After over an inch of rain fell across a large portion of the Tucson Metro Area, some locations with more than two inches, several roads became flooded, closed, and impassable. In addition to all the flooded roadways, several trailer homes located in the southern portion of the Tucson Metro Area, were flooded and surrounded by rising water. Rescue teams evacuated several people from these homes. Brawley wash wa out of its banks and flooding roadways causing them to be impassable.
2/22/2006	Wildfire	26006	$192,390				Statewide	On February 22, 2006, the Governor declared an emergency due to the driest winter in recorded history coupled with above average temperatures and the earliest recorded start to a wildfire season. The entire state was threatened by extreme wildfire hazards. The 2006 state wildfire presuppression resources strategy required additional financial support. The declaration provided $200,000 for pre-suppression resources to the Arizona State Land Department, Office of State Forester and the Arizona Division of Emergency Management.

State of Arizona Declaration				Damage Estimates					
Date	**Hazard**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Sources**	**Hazard Look Up**	
6/23/1999	Drought					$0	ADEM, 2008	Drought	
8/13/1999	Drought					$0	ADEM, 2008	Drought	
08/16/1999	Flooding / Flash Flooding					$0	ADEM, 2008	Flooding / Flash Flooding	
01/05/2000	Service Interruption					$0	ADEM, 2008	Service Interruption	
07/21/2000	Drought					$0	ADEM, 2008	Drought	
08/17/2001	Thunderstorm / High Wind		2	$230,000		$230,000	ADEM, 2008 NCDC, 2008	Severe Wind	
9/12/2001	Terrorism					$0	ADEM, 2008	Terrorism	
10/16/2001	Terrorism					$0	ADEM, 2008	Terrorism	
05/17/2002	Drought					$0	ADEM, 2008	Drought	
5/18/2002	Disease					$0	ADEM, 2008	Disease	
07/11/2002	Drought				$300,000,000	$300,000,000	ADEM, 2008	Drought	
07/18/2002	Drought					$0	ADEM, 2008	Drought	
5/2/2003	Wildfire					$0	ADEM, 2008	Wildfire	
6/19/2003	Wildfire			$38,100,000		$38,100,000	ADEM, 2008 Wikipedia, 2008 at: http://en.wikipedia.org/wiki/Aspen_Fire	Wildfire	
9/23/2004	Infestation					$0	ADEM, 2008	Disease	
8/15/2005	Border Security					$0	ADEM, 2008	Border Security	
9/3/2005	Miscellaneous					$0	ADEM, 2008	Miscellaneous	
9/16/2005	Flooding / Flash Flooding			$110,000		$110,000	ADEM, 2008 NCDC, 2008	Flooding / Flash Flooding	
2/22/2006	Wildfire					$0	ADEM, 2008	Wildfire	

State of Arizona Declaration				Federal Presidential Declaration				
Date	**Hazard**	**State PCA No.**	**Expenditures**	**Date**	**ID**	**Expenditures**	**Counties Affected**	**Description**
6/23/2006	Infestation	26008	$743,000				Cochise, Maricopa, Pima, Pinal, Santa Cruz, Yuma	Glassy-winged sharpshooter infestation - The Glassy-Winged Sharpshooter is a known vector of Xyella fastidiosa, a bacteria that causes plant diseases such asPierce's disease of grapes, almond leaf scorch, alfalfa dwarf, oleander leaf scorch, and citrus verigated chlorosis, that threaten the viability of wine, citrus and other agricultural and horticultural industries as well as public landscapes. The Glassy-Winged has been detected in Arizona in a small isolated location in the city of Sierra Vista, Cochise County. The Arizona Department of Agriculture has been placing detection traps, monitoring and eradicating the Sharpshooter.
8/8/2006	Flooding / Flash Flooding	27001	$2,726,940	9/7/2006	1660-DR	$13,634,698	Gila, Graham, Greenlee, Pima, Pinal	Several areas of the state were struck by severe storms and flooding during the period of July 25 to August 4, 2006. Several rivers running through the Tucson Metro Area flooded on July 31, 2006. The Rillito River flooded with water over the cement banks near Dodge Boulevard. Additionally, the Rillito River was over bankfull just east of the Swan Road Bridge. River Road near La Cholla Road was flooding from the Rillito River. Sabino Creek was out of its banks and houses were flooded near Sabino Canyon and Bear Canyon. Below is a listing of some of the damage, but not all, caused by the flooding and an estimate for the cost of repairs: Sabino Canyon Recreation area road and facility damaged, $100,000 Forty homes and businesses flooded, $1,200,000 One home destroyed due to flooding, $150,000 Water main broke near the Mt. Lemmon highway, $20,000 Catalina Highway road washed away, $50,000 Agricultural irrigation system damaged, $500,000 Cement plant flooded, $400,000 Gravel pit flooded, $30,000 General infrastructure damage, $500,000 With tropical moisture pouring into Southeast Arizona, several days of rainfall preceded the July 31st event. With grounds saturated at most locations, the additional rainfall that fell on the 31st had a hard time soaking into the ground and mainly stayed as runoff. Rivers and washes quickly filled to and over bankfull, flooding homes and businesses as well as nearby roads. Some roadways were washed away due to the strong flood waters.
2/19/2008	Flooding / Flash Flooding	28003	$200,000				Pima	On February 19, 2008 a state of emergency was declared for Pima County for flooding and damages due to 8.5 inches of precipitation that fell in and around Mt. Lemmon within Pima County in less than a 24-hour period. Damages to roads left residents stranded in their homes, limited access to food and medical assistance and damaged potable water supply lines, which impacted transmission and distribution of potable water to homes. The rainfall and snowmelt created conditions that threatened the health and safety of residents and exceeded the capabilities of Pima County. Several people in Tucson needed to be rescued from flowing washes.
1/21/2010	Winter Storm	20102	$4,497,895	3/18/2010	DR-1888	$14,210,904	Apache, Coconino, Gila, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Yavapai, City of Yuma	January 2010 Severe Winter Storm: On January 21, 2010 the Governor declared an emergency for significant cumulative precipitation coupled with high winds and heavy snow in areas across Arizona from January 18 – 22, 2010. This storm system led to record levels of snowfall and significant flooding posing an extreme danger to public health and safety. On February 11, 2010 an amended declaration was signed to include additional counties. Counties declared were Apache, Coconino, Gila, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal and Yavapai as well as the City of Yuma. On January 24, 2010 the Governor submitted a request to the President for an Emergency Declaration in support of life sustaining efforts to the citizens of the Hopi Tribe and Navajo Nations. This was a complex incident involving two tribes, three counties and a very large geographical area. President Obama declared an emergency on January 24, 2010 and authorized Federal relief and recovery assistance for the affected area. The intensity of this situation overwhelmed local and county emergency responders. The Governor submitted a request for Major Disaster Declaration on February 16, 2010, and the President responded on March 18, 2010 by approving Public Assistance for those counties and tribal nations that met FEMA's per capita impact criteria, which were: Apache, Coconino, Gila, Greenlee, La Paz, Mohave, Navajo and Yavapai Counties and the Gila River Indian Community, Hopi Tribe, Navajo Nation, San Carlos Apache, Tohono O'odham Nation and White Mountain Apache Tribe. The President also approved Arizona's request for the Hazard Mitigation Grant Program. The portion of this program that is made available to all counties and political subdivisions statewide is administered by ADEM. This program is also made available to the Tribal Nations designated under this emergency and they will each administer their program with direct Federal assistance from FEMA. The Governor's request for Individual Assistance Program and Snow Assistance were denied by FEMA as was our final appeal.

State of Arizona Declaration				Damage Estimates					
Date	**Hazard**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Sources**	**Hazard Look Up**	
6/23/2006	Infestation					$0	ADEM, 2008	Disease	
8/8/2006	Flooding / Flash Flooding			$5,000,000		$5,000,000	ADEM, 2008 NCDC, 2008	Flooding / Flash Flooding	
2/19/2008	Flooding / Flash Flooding			$777,000		$777,000	ADEM, 2008 NCDC, 2008	Flooding / Flash Flooding	
1/21/2010	Winter Storm					$0	ADEM, 2010	Flooding / Flash Flooding	

Pima County Undeclared Events
July 1961 to August 2010

Hazard	No. of Records	Recorded Losses		
		Fatalities	Injuries	Damage Costs ($)
Dam Failure	0	0	0	$0
Drought	0	0	0	$0
Earthquake	0	0	0	$0
Fissure	0	0	0	$0
Flooding	68	13	9	$22,052,000
Hazardous Materials Incident	42	28	61	$262,200
Landslide/Mudslide	0	0	0	$0
Levee Failure	0	0	0	$0
Lightning	18	3	16	$511,000
Severe Wind	183	3	101	$28,926,200
Subsidence	0	0	0	$0
Wildfire	20	0	30	$66,100,000
Winter Storm	2	3	0	$0

Notes: Damage Costs include property and crop/livestock losses and are reported as is with no attempt to adjust costs to current dollar values. Furthermore, wildfire damage cost do not include the cost of suppression which can be quite substantial. Sources: ADEM, NCDC, NWCG, NWS, USFS

Date	Hazard	Description
16-Nov-58	Winter Storm	In November 1958, 6.4 inches of snow fell across the Tucson metro area and caused auto accidents, stranded people, dropped power lines, knocked out telephone service, closed highways and paralyzed air travel. Three boy scouts were stranded in snow near Madera Canyon in the Santa Rita Mountains south of Tucson. Their bodies were not found for two weeks. The heavy snow also closed the highway to Mt. Lemmon, marooning about 35 weekend vacationers (NWS Tucson, 2011).
27-Jul-61	Severe Wind	
27-Aug-64	Severe Wind	
16-Aug-69	Severe Wind	
8-Dec-71	Winter Storm	In December 1971, 6.8 inches of snow blanketed the Tucson metro area after midnight. The heavy snow snarled traffic, closed the airport, downed power lines and damaged or destroyed 3000 trees, some of them 20 years old. Slush on the runway forced the closure of the Tucson International Airport and cancellation of flights between 6 AM and 11 AM. At the time, the airport did not own a snow plow (NWS Tucson, 2011).
23-Jun-74	Severe Wind	
23-Jun-74	Severe Wind	
16-Jul-84	Severe Wind	
19-Jul-84	Severe Wind	
7/25/1991	Hazardous Materials Incident	APARTMENT COMPLEX/ EXPLODED APPARENTLY DUE TO NATURAL GAS;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
24-Aug-91	Severe Wind	
1/31/1992	Hazardous Materials Incident	TRUCK / INVOLVED IN ACCIDENT;MOBILE incident;Material was OIL: DIESEL;the amount was 240 GALLON(S)
06-Jul-92	Severe Wind	
07-Jan-93	Flooding	Roads, bridges, homes and businesses suffered considerable damage in Pima County beginning on the 7th. A new all-time record of 4.81 inches fell in Tucson, eclipsing the 4.00 inches in 1916. Numerous rescues were made throughout the county as motorists tried to drive vehicles through creeks, or low spots. Several thousand people were isolated in their homes as flood waters from the Rillito River cut off all roads. A weather-related crash in Tucson left 7 people hospitalized. Phone service in parts of Tucson was interrupted on the 8th. There were at least 15 road closures around Tucson. Two major bridges over the Santa Cruz River were closed.
08-Aug-93	Severe Wind	A 65-foot power pole fell, knocking out power to some 3,600 customers. Some 3,400 residents in Green Valley were also left without power as storms hit that area.
09-Aug-93	Severe Wind	Roofs blown off, trees uprooted, and power interrupted to some 20,000 customers. Power poles were snapped by high winds on the west side of the city. Winds reached as high as 60 mph at the National Weather Service in Tucson.
13-Aug-93	Severe Wind	High winds in south Tucson resulted in power poles downed and some broken windows on W. Valencia. Close to 2 inches of rain fell that resulted in some minor street flooding.
21-Aug-93	Severe Wind	Very strong winds damaged roofs and snapped power poles in the northwest part of the city. Street flooding was also reported.
8/23/1993	Hazardous Materials Incident	AUTOMOBILE DROVE INTO SIDE OF TRAIN STRIKING FRIEGHT CAR RESULTING INEXPLOSION/TYPE OF SIGNALING DEVICES UNKNOWN.;RAILROAD NON-RELEASE incident;Material was ENGINE STARTER FLUID;the amount was 0 UNKNOWN AMOUNT
07-Mar-94	Severe Wind	This weak tornado touched down briefly in the 4800 block of East Third and took off part of a roof. One observer said it sounded like a freight train as it moved through the neighborhood. A trampoline was lifted and carried into the next yard. Trash cans were thrown about, with one landing 10 houses away.
20-Jun-94	Severe Wind	Thunderstorm winds damaged five homes, destroyed a ramada and camper, and snapped large tree limbs on the southwest side of Tucson. Also, a man was bruised by half inch diameter hail during the storm.
28-Jun-94	Severe Wind	Thunderstorm winds ripped off part of a roof, damaged a block wall, and blew down a pine tree.
20-Jul-94	Severe Wind	Severe thunderstorm winds toppled a 64 foot tall ham radio tower that was cemented ten feet into the ground.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
16-Nov-58	Winter Storm	Tucson	3	0	$0	$0	$0	NWS Tucson, 2011
27-Jul-61	Severe Wind		0	1	$250,000	$0	$250,000	NCDC, 2010
27-Aug-64	Severe Wind		2	9	$25,000	$0	$25,000	NCDC, 2010
16-Aug-69	Severe Wind		0	0	$250,000	$0	$250,000	NCDC, 2010
8-Dec-71	Winter Storm	Tucson	0	0	$0	$0	$0	NWS Tucson, 2011
23-Jun-74	Severe Wind		0	0	$2,500	$0	$2,500	NCDC, 2010
23-Jun-74	Severe Wind		1	40	$250,000	$0	$250,000	NCDC, 2010
16-Jul-84	Severe Wind		0	0	$25,000	$0	$25,000	NCDC, 2010
19-Jul-84	Severe Wind		0	1	$0	$0	$0	NCDC, 2010
7/25/1991	Hazardous Materials Incident		1	1		$0	$0	NRC, 2010
24-Aug-91	Severe Wind		0	2	$250,000	$0	$250,000	NCDC, 2010
1/31/1992	Hazardous Materials Incident				$10,000	$0	$10,000	NRC, 2010
06-Jul-92	Severe Wind		0	1	$2,500,000	$0	$2,500,000	NCDC, 2010
07-Jan-93	Flooding	Tucson	0	7	$5,000,000	$0	$5,000,000	NCDC, 2010
08-Aug-93	Severe Wind	Tucson	0	0	$5,000	$0	$5,000	NCDC, 2010
09-Aug-93	Severe Wind		0	0	$5,000,000	$0	$5,000,000	NCDC, 2010
13-Aug-93	Severe Wind	Tucson	0	0	$50,000	$0	$50,000	NCDC, 2010
21-Aug-93	Severe Wind	Tucson	0	0	$500,000	$0	$500,000	NCDC, 2010
8/23/1993	Hazardous Materials Incident		1			$0	$0	NRC, 2010
07-Mar-94	Severe Wind	Tucson	0	0	$50,000	$0	$50,000	NCDC, 2010
20-Jun-94	Severe Wind	Tucson	0	1	$0	$0	$0	NCDC, 2010
28-Jun-94	Severe Wind	Tucson	0	0	$500	$0	$500	NCDC, 2010
20-Jul-94	Severe Wind	Tucson	0	0	$50,000	$0	$50,000	NCDC, 2010

Date	Hazard	Description
28-Jul-94	Severe Wind	Winds from a thunderstorm microburst blew down nearly a dozen power poles, ripped shingles off roofs, downed trees, blew a mobile home off its foundation, and overturned a tractor trailer. An off duty National Weather Service employee recorded wind gusts to 65 mph.
28-Jul-94	Severe Wind	A tornado touched down on the Hill Top area of northwest Tucson. The tornado travelled in a west-northwest direction, and its width varied from about a yard to 50 yards. The 7700 blocks of Soledad and Redwing Circle were particularly hit hard. A back porch and much of the roof of one home was destroyed, an entire roof was removed from another house and scattered in nearby yards, two large evaporative coolers were thrown into a backyard swimming pool, and large trees were uprooted. Also, cars were damaged by flying debris, windows were shattered, and a brick wall was flattened.
01-Sep-94	Severe Wind	A microburst caused damage to two motels in western Tucson. The Days Inn Motel recieved about $100,000 damage when severe winds tore most of the roof off 96 rooms, and knocked a large eucalyptus tree into the corner of the motel. Some water damage from heavy rain was also involved. The Pueblo Motel, a quarter mile south of the Days Inn, sustained about $50,000 damage when a portion of the roof covering four rooms was lost.
25-Sep-94	Lightning	One man was killed, and two others injured by a lightning strike, while camping. The three men were playing cards inside a tent. (M25O)
02-Jun-95	Severe Wind	A dust devil, with winds near 70 mph, overturned a mobile home and slammed a shed into a pickup truck. Damage was near $20,000 and the mobile home was destroyed. Skies were clear during the event.
30-Jul-95	Severe Wind	A thunderstorm rapidly developed north of Tucson on the west side of the Santa Catalina mountains. The storm produced a 60 mph wind gust and one-half inch hail just northwest of Tucson. It proceeded northwest with a downburst occurring near Interstate 10 at the Marana exit. The downburst winds estimated at 60 mph caused near zero visibility in blowing dust and sand. Three separate accidents on both sides of Interstate 10 involved 21 cars, injured 24 people and caused about $70,000 in property damage. All damage was to vehicles on Interstate 10.
07-Aug-95	Severe Wind	Thunderstorms moving through the Avra Valley Airport brought downburst winds that damaged 20 airplanes, two of which were completely destroyed. A 5,000 gallon tank containing 2,000 gallons of water was moved over 2,000 feet. Many hanger doors were blown in. Winds also overturned a mobile home and tore a roof off a second mobile home. Two children in the second mobile home, ages five months and 12 years, were slightly injured. Winds were estimated at 74 mph at the Avra Valley Airport. Damage was estimated at $4 million at the airport and $50 thousand to the mobile homes.
11-Aug-95	Flooding	A series of strong thunderstorms moving through Tucson brought widespread damage. Many power poles were knocked over with roofs torn off some buildings. As much as four inches of rain accompanied these storms. Some areas received three-quarters inch hail. Washes in the area were running near bank full. One woman attempting to drive through a wash was swept to her death. F43VE
11-Aug-95	Severe Wind	A series of strong thunderstorms moving through Tucson brought widespread damage. Many power poles were knocked over with roofs torn off some buildings. As much as four inches of rain accompanied these storms. Some areas received three-quarters inch hail. Washes in the area were running near bank full. One woman attempting to drive through a wash was swept to her death. F43VE
05-Jul-96	Severe Wind	Strong thunderstorm winds caused $350,000 damage to gliders and structures at Avra Valley glider airport.
07-Jul-96	Severe Wind	A thunderstorm moving through a remote area knocked down 25 power poles cutting power to Amado. Power in Amado was out fo 36 hours following the wind damage. A mobile home was also overturned and demolished near Sahuarita.
08-Jul-96	Severe Wind	A strong thunderstorm moved through the Tucson area with wind related damage. A small shed was blown through a fence and destroyed. A roof was blown off a double wide mobile home and carried across neighboring homes. Roofs were blown off and windows blown out of trailers. At Tucson International Airport, 4 airplanes were damaged and the roof was blown off a hanger. One to two feet diameter trees were snapped. A spotter 6SE of Tucson measured a 57 Kt wind. The 82 Kt wind from this storm was recorded at Davis Monthon Air Base.
09-Aug-96	Flooding	Washes flooded and impassable. Tree limbs broken due to high wind in Ajo. Telephone lines down due to high wind in the town of Why. Several people stranded due to roads cut by running water.
14-Aug-96	Severe Wind	Strong winds blew a carport and awning off a mobile home in the Picture Rocks area west of Tucson Mountain. Roof blown off a mobile home on Vegas Drive.
14-Aug-96	Severe Wind	65 to 70 mph wind gusts ripped a roof off a home, caused tree damage and power outages in Tucson.
16-Aug-96	Severe Wind	63 kt wind gust reported near Wilmot and Golf Links road. Roof blown off a home, structural damaged to an Elementary school, tree damage and power lines down. Visibility was near zero in blowing dust across most of southeast Tucson as the storm moved in from the east.
21-Aug-96	Lightning	Woman struck by lightning inside her house while vacuming.
22-Aug-96	Severe Wind	Roof blown off a church and a brick fence blown over on Craycroft road.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
28-Jul-94	Severe Wind	Tucson	0	0	$5,000	$0	$5,000	NCDC, 2010
28-Jul-94	Severe Wind	to 12	0	0	$500,000	$0	$500,000	NCDC, 2010
01-Sep-94	Severe Wind	Tucson	0	0	$500,000	$0	$500,000	NCDC, 2010
25-Sep-94	Lightning		1	2	$0	$0	$0	NCDC, 2010
02-Jun-95	Severe Wind	Tucson	0	0	$20,000	$0	$20,000	NCDC, 2010
30-Jul-95	Severe Wind	Marana	0	24	$70,000	$0	$70,000	NCDC, 2010
07-Aug-95	Severe Wind	Tucson	0	2	$4,100,000	$0	$4,100,000	NCDC, 2010
11-Aug-95	Flooding	Tucson	1	0	$0	$0	$0	NCDC, 2010
11-Aug-95	Severe Wind	Tucson	0	0	$5,000,000	$0	$5,000,000	NCDC, 2010
05-Jul-96	Severe Wind	AVRA VALLEY	0	0	$350,000	$0	$350,000	NCDC, 2010
07-Jul-96	Severe Wind	ARIVACA JCT	0	0	$200,000	$0	$200,000	NCDC, 2010
08-Jul-96	Severe Wind	(DMA)DAVIS MONTHAN A	0	0	$200,000	$0	$200,000	NCDC, 2010
09-Aug-96	Flooding	WESTERN PIMA COUNTY	0	0	$50,000	$0	$50,000	NCDC, 2010
14-Aug-96	Severe Wind	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
14-Aug-96	Severe Wind	TUCSON	0	0	$150,000	$0	$150,000	NCDC, 2010
16-Aug-96	Severe Wind	TUCSON	0	0	$150,000	$0	$150,000	NCDC, 2010
21-Aug-96	Lightning	GREEN VLY	0	1	$0	$0	$0	NCDC, 2010
22-Aug-96	Severe Wind	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010

Date	Hazard	Description
27-Aug-96	Flooding	Heavy rain from thunderstorms hit the Tucson area with flash flooding in many washes. The southwest side and northeast side of Tucson were hit hardest. One fireman was injured while checking if a car that had been washed off Harrison Road had anybody in it. The Ajo and Mission Road areas received 2.5 inches of rain in 45 minutes.
29-Aug-96	Severe Wind	A 52 kt wind gust caused tree damage.
29-Aug-96	Severe Wind	Strong wind blew shingles of roofs at Marana Airport. Three power poles blown down on Trico road.
03-Sep-96	Flooding	Between 0500 and 1000 am very heavy thunderstorm rainfall produced widespread flash flooding over the Tucson Metro area. 35-40 rescues were made of people stranded in flooded washes, and 250 storm related emergencies were reported to city and county Fire Departments. Numerous roads were closed, while some roads and water lines were washed out. One home near River Rd and Dodge Blvd was flooded with 6 inches of water and 2 inches of mud. As much as 5 inches of rain fell in a 2 1/2 hour period in the foothills of the Santa Catalina Mountains.
03-Sep-96	Severe Wind	Thunderstorm winds estimated in excess of 40 mph blow down telephone poles near Country Club and Benson. Five structural fires due to lightning were also reported.
25-Sep-96	Flooding	Several swift water rescues were made of people stranded in the rising waters in streets and washes. Flooding reported at the intersection of Pantano and Irvington.
25-Sep-96	Severe Wind	
25-Sep-96	Severe Wind	Wind related tree damage was reported in Starr Pass. Damage to trees and business signs occurred near Sixth Ave and Ajo Rd.
07-Jul-97	Severe Wind	Thunderstorm winds downed several power lines, blew a stoplight down, snapped a 30-foot Palm tree in half, and split a 15-foot high tree in two.
07-Jul-97	Lightning	Lightning struck a house and started a fire.
7/23/1997	Hazardous Materials Incident	METER STATION / WAS STRUCK BY A VEHICLE;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
28-Jul-97	Severe Wind	Thunderstorm winds blew the roof off of a market, damaged the roof of the First Baptist Church, and uprooted or snapped the limbs off of 5-8 trees.
29-Jul-97	Severe Wind	Thunderstorm winds blew a wall down and bent some metal piping.
07-Aug-97	Lightning	Lightning started a fire at a condominium complex.
08-Aug-97	Severe Wind	Thunderstorm winds blew down several power lines.
08-Aug-97	Severe Wind	Thunderstorm winds caused roof damage to two buildings and several signs were blown over.
13-Aug-97	Lightning	A 72 year old man suffered burns on his right leg and pelvis when lightning struck nearby.
13-Aug-97	Severe Wind	Thunderstorm winds gusting to 78 kts snapped a power pole knocking out power to 1700 customers and toppled a tree onto a house.
01-Sep-97	Severe Wind	Thunderstorm winds damaged the roof of the high school and trees were uprooted throughout town.
13-Sep-97	Severe Wind	Thunderstorm winds blew down several power lines and trees in the east part of Tucson. A 6 foot brick wall was damaged by a falling tree. The winds blew the roof off of one home. A woman was injured when she was struck by lightning. Heavy rains from these thunderstorms caused flooding of several streets in east Tucson with several vehicles trapped in the waters.
13-Sep-97	Severe Wind	Thunderstorm winds blew down several power lines and trees in the east part of Tucson. A 6 foot brick wall was damaged by a falling tree. The winds blew the roof off of one home. A woman was injured when she was struck by lightning. Heavy rains from these thunderstorms caused flooding of several streets in east Tucson with several vehicles trapped in the waters.
12/20/1997	Hazardous Materials Incident	TRACTOR TRAILER (MC305 & PUP TRAILER) ROLLED OVERTANK CAPACITY: 8000 GALLONS TOTAL;MOBILE incident;Material was ETHYLENE GLYCOL;the amount was 0 UNKNOWN AMOUNT
12/20/1997	Hazardous Materials Incident	TRACTOR TRAILER (MC305 & PUP TRAILER) ROLLED OVERTANK CAPACITY: 8000 GALLONS TOTAL;MOBILE incident;Material was GASOLINE: AUTOMOTIVE (UNLEADED);the amount was 4000 GALLON(S)

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
27-Aug-96	Flooding	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
29-Aug-96	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
29-Aug-96	Severe Wind	MARANA	0	0	$30,000	$0	$30,000	NCDC, 2010
03-Sep-96	Flooding	TUCSON	0	2	$500,000	$0	$500,000	NCDC, 2010
03-Sep-96	Severe Wind	TUCSON	0	0	$25,000	$0	$25,000	NCDC, 2010
25-Sep-96	Flooding	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
25-Sep-96	Severe Wind	TUCSON	0	2	$0	$0	$0	NCDC, 2010
25-Sep-96	Severe Wind	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
07-Jul-97	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
07-Jul-97	Lightning	TUCSON	0	0	$40,000	$0	$40,000	NCDC, 2010
7/23/1997	Hazardous Materials Incident			1		$0	$0	NRC, 2010
28-Jul-97	Severe Wind	MARANA	0	0	$7,000	$0	$7,000	NCDC, 2010
29-Jul-97	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
07-Aug-97	Lightning	TUCSON INTL ARPT	0	0	$10,000	$0	$10,000	NCDC, 2010
08-Aug-97	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
08-Aug-97	Severe Wind	AJO	0	0	$3,000	$0	$3,000	NCDC, 2010
13-Aug-97	Lightning	TUCSON	0	1	$0	$0	$0	NCDC, 2010
13-Aug-97	Severe Wind	TUSCON RYAN FLD ARPT	0	0	$7,000	$0	$7,000	NCDC, 2010
01-Sep-97	Severe Wind	SAHUARITA	0	0	$10,000	$0	$10,000	NCDC, 2010
13-Sep-97	Severe Wind	TUCSON	0	1	$0	$0	$0	NCDC, 2010
13-Sep-97	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
12/20/1997	Hazardous Materials Incident			1		$0	$0	NRC, 2010
12/20/1997	Hazardous Materials Incident			1		$0	$0	NRC, 2010

Date	Hazard	Description
12/20/1997	Hazardous Materials Incident	TRACTOR TRAILER (MC305 & PUP TRAILER) ROLLED OVERTANK CAPACITY: 8000 GALLONS TOTAL;MOBILE incident;Material was OIL: DIESEL;the amount was 50 GALLON(S)
1/17/1998	Hazardous Materials Incident	LOCOMOTIVE: SP 8151 STRUCK A VEHICLE / TYPE OF VEHICLE IS UNKNOWNTHE VEHICLE IS ON FIRE UNDERNEATH THE LOCOMOTIVE;RAILROAD NON-RELEASE incident;Material was OIL: DIESEL;the amount was 0 UNKNOWN AMOUNT
3/26/1998	Hazardous Materials Incident	ABANDONED 55GAL DRUM/ 7CUFT OF MATERIAL SPILLED FROM DRUM (WHICH MAYHAVE FALLEN FROM A VEHICLE) AND WAS HIT BY 2 CARS;MOBILE incident;Material was MOLYBDNUM PENTACHLORIDE;the amount was 7 CUBIC FEET
6/11/1998	Hazardous Materials Incident	.5 INCH DISTRIBUTION PIPELINE / CAUSE IS UNDER INVESTIGAION / A FIREAT A MOBILE HOME IGNITED A NATURAL GAS LINE / AN ONG FIRE ENSUED;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
23-Jul-98	Flooding	Three homes sustained water damage and the occupants had to be temporarily evacuated. A couple of streets were also flooded.
09-Aug-98	Flooding	A man was killed when he was caught in a flooded wash and drowned in the east part of Tucson. Street flooding was reported in central Tucson. M35IW
11-Aug-98	Severe Wind	Thunderstorm winds blew down a tree in the eastern portion of Tucson and blew off a portion of a roof. Heavy rains from these thunderstorms caused widespread road closures in the southeast part of Tucson and water was reported up to car doors at 6th street and Tucson boulevard.
21-Aug-98	Severe Wind	Thunderstorm winds estimated at 60-70 mph by fire department personnel blew down several trees, one of which was about 60 feet tall. One of the trees blew onto the patio of a house damaging the patio roof and wall.
28-Aug-98	Severe Wind	Two distinct lines of severe thunderstorms swept through much of southeast arizona from the northeast during the mid-afternoon to early evening hours. A high school student from Rincon High School in Tucson was injured from flying debris and taken to a local hospital. Numerous reports of trees blow down were received, some up to 2 feet in diameter. Eighteen power poles on the southwest side of Tucson were blown down leaving more than 20,000 customers without power and causing the evacuation of about 200 people from homes and businesses along West Ajo Way due to downed power lines. One of the downed power poles sparked a roof fire at Moreliana Fruit Bars causing an estimated $85000 of damage. A roof was blown off a trailer and a 20 foot tree blown onto a truck near Fort Thomas. Several reports of roof damage in tucson were received. Winds blew a shed away and a 15 foot tree down in Benson. A wind gust to 64 mph was recorded at the University of Arizona. Power outages were reported in Rio Rico.
05-Sep-98	Severe Wind	Severe thunderstorms rolling northward through eastern Pima County and southeast Pinal County packed winds estimated up to 65 mph that knocked down some light poles at County Club and Grant roads in Tucson and blew down some trees in Oro Valley.
11/23/1998	Hazardous Materials Incident	HOUSE FIRE / CAUSE UNKNOWN / THE GAS COMPANY WAS CALLED TO TURN OFFLINE / DISTRIBUTION LINE;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
2/3/1999	Hazardous Materials Incident	MOTOR VEHICLE ACCIDENT RESULTING IN THE LOSS OF GASOLINE AND MOTOR OIL;MOBILE incident;Material was GASOLINE: AUTOMOTIVE (UNLEADED);the amount was 10 GALLON(S)
2/3/1999	Hazardous Materials Incident	MOTOR VEHICLE ACCIDENT RESULTING IN THE LOSS OF GASOLINE AND MOTOR OIL;MOBILE incident;Material was OIL, MISC: MOTOR;the amount was 12 QUART(S)
5/13/1999	Hazardous Materials Incident	FILTERING SYSTEM / THE CALLER STATED THE RP HAS HAD SEVERAL RELEASESOF BERYLLIUM IN THE PAST DUE TO FILTER FAILURE / MINOR RELEASES DAILY;FIXED incident;Material was BERYLLIUM;the amount was 0 UNKNOWN AMOUNT
6/18/1999	Hazardous Materials Incident	TANK CAR / CAR IS VENTING;RAILROAD incident;Material was AMMONIA, ANHYDROUS;the amount was 0 UNKNOWN AMOUNT
27-Jun-99	Severe Wind	Trees blown down and minor roof damage on a house

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
12/20/1997	Hazardous Materials Incident			1		$0	$0	NRC, 2010
1/17/1998	Hazardous Materials Incident			1		$0	$0	NRC, 2010
3/26/1998	Hazardous Materials Incident			1		$0	$0	NRC, 2010
6/11/1998	Hazardous Materials Incident				$100,000	$0	$100,000	NRC, 2010
23-Jul-98	Flooding	MARANA	0	0	$5,000	$0	$5,000	NCDC, 2010
09-Aug-98	Flooding	TUCSON	1	0	$0	$0	$0	NCDC, 2010
11-Aug-98	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
21-Aug-98	Severe Wind	GREEN VLY	0	0	$10,000	$0	$10,000	NCDC, 2010
28-Aug-98	Severe Wind	TUCSON	0	1	$150,000	$0	$150,000	NCDC, 2010
05-Sep-98	Severe Wind	TUCSON	0	0	$2,000	$0	$2,000	NCDC, 2010
11/23/1998	Hazardous Materials Incident		1	1		$0	$0	NRC, 2010
2/3/1999	Hazardous Materials Incident			1		$0	$0	NRC, 2010
2/3/1999	Hazardous Materials Incident			1		$0	$0	NRC, 2010
5/13/1999	Hazardous Materials Incident			25		$0	$0	NRC, 2010
6/18/1999	Hazardous Materials Incident			2		$0	$0	NRC, 2010
27-Jun-99	Severe Wind	GREEN VLY	0	0	$10,000	$0	$10,000	NCDC, 2010

Date	Hazard	Description
05-Jul-99	Severe Wind	Winds in the area also blew down small trees and power lines resulting in a few power outages. Lightning strikes were reported to have struck houses, trees, and injured a man talking on the telephone.
06-Jul-99	Flooding	Eleven people needed to be rescued from their cars after flood waters engulfed them.
07-Jul-99	Severe Wind	Strong winds in the Tucson area caused extensive roof damage and knocked out power to a large section of north and northeast Tucson.
10-Jul-99	Severe Wind	Wind damage in the Tucson area downed numerous power lines. Some street flooding reported in Tucson as well as Oro Valley. Storm damage is unknown except for house fire caused by lightning strike.
13-Jul-99	Flooding	Several main streets closed.
15-Jul-99	Flooding	Six to Seven inches of rain fell in the headwaters of Sabino and Bear Canyons on the south slopes of the Catalina mountains early in the morning. At one point 2 inches of rain in 20 minutes was recorded by a remote rain gage. Most of the rain fell over a three hour periof between 3 am and 6am. The river gage on Sabino Creek where the creek comes out of the mountains rose from 214 CFS at 6:15 AM to a peak flow of 10,600 CFS at 8:30 AM. The flow of 10,600 is the highest summer flow recorded by this rain gage which has a history back to 1932. The resulting food washed out much of the recreational facilities along the creek at the Sabino Canyon Recreation area. Between 10 and 20 people were evacuated by helicopter after being trapped when the water rose after they had entered the canyon. A large section of the Catalina Highway was washed out where the highway crosses the headwaters of Bear Canyon. The highway was clsoed for 2 weeks after being washed away. The only other road to the top of the Catalina Mountains is a back country road suitable for 4 wheel drive only. Several hundred campers were trapped on themountain due to the main road being closed including about 170 boy and girl scouts. Arrangements were made to smooth the back country road to allow residents and visitors alike access off the mountain. Several residence along Bear and Sabino Creek were flooded as the water filled the flood plain
24-Jul-99	Severe Wind	
26-Jul-99	Flooding	Many roads impassable with several houses flooded.
27-Jul-99	Lightning	An eleven year old boy was struck while talking on a pay phone, only receiving minor injuries.
19-Aug-99	Severe Wind	High winds blew over a mobile home and tore a roof off of a house. Large hail broke a skylight in another home.
27-Aug-99	Severe Wind	Moisture from Hurricane Bret helped ignite severe thunderstorms in the Tucson International Airport area. These storms produced heavy rain, pea size hail and high winds that knocked over two power poles.
31-Aug-99	Severe Wind	
19-Sep-99	Severe Wind	A severe thunderstorm produced marble sized hail and high winds which uprooted 40-60 foot trees. Also some minor flooding damaged a swimming pool and the interior of a week-old Porsche.
3/15/2000	Hazardous Materials Incident	THE MATERIAL SPILLED FROM A HOLDING TANK DUE TO A RUPTURED SITE GLASS. AN EMPLOYEE WALKED INTO THE SITE GLASS CAUSING IT TO RUPTURE.;STORAGE TANK incident;Material was SODIUM HYPOCHLORITE (15% OR LESS;the amount was 300 GALLON(S)
4/8/2000	Hazardous Materials Incident	V22 OPS SPRAY /AIRCRAFT CRASHED DUE TO UNK CAUSES/ INCIDENT UNDER INVESTIGATION;AIRCRAFT incident;Material was JET FUEL: JP-5 (KEROSENE, HEAVY);the amount was 971 GALLON(S)
22-Jul-00	Flooding	Several cars stranded in low water crossing. Many streets flooded and impassable in Tucson foothills north and northeast of town.
22-Jul-00	Severe Wind	6 power poles snapped in remote area on east side of Tucson. Power out in some areas for 36 hours.
27-Jul-00	Severe Wind	9 power poles toppled on south side of Tucson.
05-Aug-00	Lightning	Lightning started fires in utility poles and a mid town laundry.
05-Aug-00	Severe Wind	Roof damage and trees blown down in Catalina. Blowing dust reduced visibilities and stopped traffic on Interstate 10 near the Pinal county line.
13-Aug-00	Severe Wind	Power lines blown down.
13-Aug-00	Severe Wind	Wind reported at Ryan Airfield. Two aircraft at Ryan airfield suffered damage from the wind.
13-Aug-00	Severe Wind	Several mibile home trailers blown off their foundations. Several totally destroyed.
14-Aug-00	Severe Wind	Power poles blown down near Organ Pipe Cactus National Monument.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
05-Jul-99	Severe Wind	TUCSON	0	1	$100,000	$0	$100,000	NCDC, 2010
06-Jul-99	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
07-Jul-99	Severe Wind	TUCSON	0	0	$200,000	$0	$200,000	NCDC, 2010
10-Jul-99	Severe Wind	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
13-Jul-99	Flooding	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
15-Jul-99	Flooding	TUCSON	0	0	$10,000,000	$0	$10,000,000	NCDC, 2010
24-Jul-99	Severe Wind	DAVIS MONTHAN AFB	0	0	$10,000	$0	$10,000	NCDC, 2010
26-Jul-99	Flooding	TUCSON	0	0	$40,000	$0	$40,000	NCDC, 2010
27-Jul-99	Lightning	TUCSON	0	1	$0	$0	$0	NCDC, 2010
19-Aug-99	Severe Wind	TUCSON	0	0	$80,000	$0	$80,000	NCDC, 2010
27-Aug-99	Severe Wind	TUCSON INTL ARPT	0	0	$20,000	$0	$20,000	NCDC, 2010
31-Aug-99	Severe Wind	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
19-Sep-99	Severe Wind	TUCSON	0	0	$2,500	$0	$2,500	NCDC, 2010
3/15/2000	Hazardous Materials Incident	HAYDEN-UDALL WATER TREATMENT PLANT		1		$0	$0	NRC, 2010
4/8/2000	Hazardous Materials Incident		19			$0	$0	NRC, 2010
22-Jul-00	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
22-Jul-00	Severe Wind	TUCSON	0	0	$75,000	$0	$75,000	NCDC, 2010
27-Jul-00	Severe Wind	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
05-Aug-00	Lightning	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
05-Aug-00	Severe Wind	ORO VLY	0	0	$50,000	$0	$50,000	NCDC, 2010
13-Aug-00	Severe Wind	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
13-Aug-00	Severe Wind	TUSCON RYAN FLD ARPT	0	0	$30,000	$0	$30,000	NCDC, 2010
13-Aug-00	Severe Wind	VAIL	0	0	$100,000	$0	$100,000	NCDC, 2010
14-Aug-00	Severe Wind	AJO	0	0	$20,000	$0	$20,000	NCDC, 2010

Date	Hazard	Description
29-Aug-00	Flooding	Several intersections under water. Part of Costco Roof collpased under weight of water. As much as 2 inches rain fell in less than one hour. Some areas received .5 inches in 10 minutes.
10-Sep-00	Severe Wind	Power lines blown down vicinity Limberlost and Oracle roads. Tree blown down onto three vehicles on west Speedway road. Strong thunderstorms moved through the central and north part of Tucson. Rain amounts exceeded 1 inch in 30 minutes at some locations. Hail from pea size to 1 inch reported as well. The east side of Tucson was untouched by this storm.
11-Oct-00	Flooding	Road closures due to flooding across Tucson area. Primarily Tanque Verde wash and Pantano wash areas. There were potholes caused by heavy rain resulting in several flat tires on E. Valencia Road in Rita Ranch. Also, there were several high water rescues conducted in eastern Tucson. Deep upper level trough over Nevada on the 10th moved over southeast Arizona through the 12th. The system was able to tap into moisture from the remnants of Tropical Storm Olivia which resulted in large amounts of rain and flooding. Early morning on the 11th, deep convection (with -65 to -70C cloud tops) developed. Isolated thunderstorms exploded across southeast Arizona. The low level center of Olivia passed through Cochise county between 09Z and 12Z on the 12th which ended the heavy rain.
10/16/2000	Hazardous Materials Incident	THE MATERIAL WAS RELEASED FROM A TRACTOR TRAILER TRUCK DUE TO A ROLLOVER. THE DRIVER OF THE TRACTOR TRAILER TRUCK FELL ASLEEP AND ROLLED DOWN A CANYON INTO A CREEK.;MOBILE incident;Material was ETHYLENE GLYCOL;the amount was 0 UNKNOWN AMOUNT
10/16/2000	Hazardous Materials Incident	THE MATERIAL WAS RELEASED FROM A TRACTOR TRAILER TRUCK DUE TO A ROLLOVER. THE DRIVER OF THE TRACTOR TRAILER TRUCK FELL ASLEEP AND ROLLED DOWN A CANYON INTO A CREEK.;MOBILE incident;Material was OIL, MISC: MOTOR;the amount was 1 CUP(S)
19-Oct-00	Lightning	Four teenage boys were struck by lightning. They were playing in a park when it started to rain and decided to get cover under a nearby tree. Three of the boys were slightly injured and one boy was in critical condition. Second string of storms that was located west of sothern California on the 17th and moved across Northern Sonora Mexico on the 19th. The ground was already saturated from the previous storm system on the 11th. Heavy rain up to three inches fell across southeast Arizona due to cell training ahead of the system. There were several reports of pea size and dime size hail from Bisbee and Sierra Vista in Cochise county. There waas also pea size hail reported in the Tucson Metro area.
20-Jun-01	Severe Wind	A severe thunderstorm produced damaging winds that brought trees and power poles down on the east side of Tucson. Down trees damaged two cars and portions of a roof from a 4th story building were blown off due to the strong winds.
22-Jun-01	Severe Wind	Trees blown down by thunderstorm wind.
02-Jul-01	Severe Wind	Peak wind gust recorded at Tucson International airport. There was also roof damage reported by a spotter on south side of Tucson.
05-Jul-01	Flooding	Green Valley fire department rescued two cars from flooded areas near Green Valley. One driver and 3 passengers were rescued from car in 2 feet of water on Esperanza Blvd near Interstate 19. The second swift water rescue occured at La Canada and W Esperanza Blvd where 4 people were rescued from a stalled car in a foot of water. The cooperative observing site in Green Valley received 1.92 inches of rain in 40 minutes.
05-Jul-01	Severe Wind	Strong winds from the thunderstorms weakened a roof on West Mossman Road on the southwest side of Tucson. At 1230 MST the roof collapsed from accumulated water and several rooms were flooded with up to 2.0 inches of water. At 1250 MST, a spotter reported peak wind gust of 70 mph using hand held anemometer on the northeast side of Tucson. He also reported pea size hail.
16-Jul-01	Flooding	There was a swift water rescue, when a driver was washed a quarter of a mile downsteam in a wash located north of Kolb Road in Sahuarita. Also, there was a family on Tatanka Lane that had to take refuge in a tree when the home became flooded. Flooding along Sahuarita Road between Houghton and Wilmot was also reported.
7/16/2001	Hazardous Materials Incident	THE CALLER REPORTS THAT THE RESPONSIBLE PARTY IS DUMPING WASTE OIL, GASOLINE, DIESEL, AND CAR BATTERIES ON HIS PROPERTY, CAUSING PEOPLE IN THE AREA TO BECOME SICK. CALLER STATED THAT RESPONSIBLE PARTY IS A VIOLENT PERSON. (OWNS A GUN);FIXED incident;Material was WASTE OIL;the amount was 0 UNKNOWN AMOUNT
7/16/2001	Hazardous Materials Incident	THE CALLER REPORTS THAT THE RESPONSIBLE PARTY IS DUMPING WASTE OIL, GASOLINE, DIESEL, AND CAR BATTERIES ON HIS PROPERTY, CAUSING PEOPLE IN THE AREA TO BECOME SICK. CALLER STATED THAT RESPONSIBLE PARTY IS A VIOLENT PERSON. (OWNS A GUN);FIXED incident;Material was OIL, FUEL: NO. 2-D;the amount was 0 UNKNOWN AMOUNT
7/16/2001	Hazardous Materials Incident	THE CALLER REPORTS THAT THE RESPONSIBLE PARTY IS DUMPING WASTE OIL, GASOLINE, DIESEL, AND CAR BATTERIES ON HIS PROPERTY, CAUSING PEOPLE IN THE AREA TO BECOME SICK. CALLER STATED THAT RESPONSIBLE PARTY IS A VIOLENT PERSON. (OWNS A GUN);FIXED incident;Material was CAR BATTERIES;the amount was 0 UNKNOWN AMOUNT

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
29-Aug-00	Flooding	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
10-Sep-00	Severe Wind	TUCSON	0	0	$75,000	$0	$75,000	NCDC, 2010
11-Oct-00	Flooding	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
10/16/2000	Hazardous Materials Incident	MOLINO CANYON		1		$0	$0	NRC, 2010
10/16/2000	Hazardous Materials Incident	MOLINO CANYON		1		$0	$0	NRC, 2010
19-Oct-00	Lightning	TUCSON	0	4	$0	$0	$0	NCDC, 2010
20-Jun-01	Severe Wind	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
22-Jun-01	Severe Wind	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
02-Jul-01	Severe Wind	(TUS)TUCSON INTL ARPT	0	0	$10,000	$0	$10,000	NCDC, 2010
05-Jul-01	Flooding	GREEN VLY	0	0	$90,000	$0	$90,000	NCDC, 2010
05-Jul-01	Severe Wind	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
16-Jul-01	Flooding	SAHUARITA	0	0	$25,000	$0	$25,000	NCDC, 2010
7/16/2001	Hazardous Materials Incident	RESIDENTIAL		1		$0	$0	NRC, 2010
7/16/2001	Hazardous Materials Incident	RESIDENTIAL		1		$0	$0	NRC, 2010
7/16/2001	Hazardous Materials Incident	RESIDENTIAL		1		$0	$0	NRC, 2010

Date	Hazard	Description
7/16/2001	Hazardous Materials Incident	THE CALLER REPORTS THAT THE RESPONSIBLE PARTY IS DUMPING WASTE OIL, GASOLINE, DIESEL, AND CAR BATTERIES ON HIS PROPERTY, CAUSING PEOPLE IN THE AREA TO BECOME SICK. CALLER STATED THAT RESPONSIBLE PARTY IS A VIOLENT PERSON. (OWNS A GUN);FIXED incident;Material was GASOLINE: AUTOMOTIVE (UNLEADED);the amount was 0 UNKNOWN AMOUNT
7/17/2001	Hazardous Materials Incident	THE CALLER STATED THAT 2 BULK CHEMICALS WERE ACCIDENTLY MIXED TOGETHER WHICH CAUSED A RELEASE OF CHLORINE.;FIXED incident;Material was CHLORINE;the amount was 0 UNKNOWN AMOUNT
18-Jul-01	Severe Wind	A microburst caused 5 power poles to snap and 2 mobile home to collapse between Drexel and Valencia Roads on the south side of Tucson. Also there was minor damge to cars by wind blown construction panels at the Tucson International airport. A spotter near the area recorded a peak wind gust of 60 mph on a hand held anemometer.
24-Jul-01	Severe Wind	Strong winds from a severe thunderstorm in Kohatk, 20 miles west of Eloy, damage caused to 4 homes by tearing the roofs off. A reporter witnessed one roof being hurled 80 yards and injuring one person.
31-Jul-01	Flooding	M14IW Severe thunderstorms produced rainfall rates of half of an inch in 30 minutes which flooded several streets in Tucson Metro area. Spotters in the Tucson Mountains reported 1.46 inches of rain in 25 minutes. At approximately 1300 MST, two boys were playing in a wash on the corner of South Campbell and East Irvington Roads. The 14 year old boy was swept under by the rising waters through a 24 inch diameter pipe a half a mile downstream before rescued 17 minutes later. The boy was in critical condition and died 4 days after the event occurred. Also, there was a swift water rescue on Campbell and Benson Highway at 1345 MST.
31-Jul-01	Severe Wind	At 1230 MST, pima county dispatch reported a 8 inch diamter tree blown down in a residental area. A spotter reported a measured wind gust of 58 mph at 1240 MST. Severe thunderstorms produced rainfall rates of half of an inch in 30 minutes which flooded several streets in Tucson Metro area. Spotters in the Tucson Mountains reported 1.46 inches of rain in 25 minutes. At approximately 1300 MST, two boys were playing in a wash on the corner of South Campbell and East Irvington Roads. The 14 year old boy was swept under by the rising waters through a 24 inch diameter pipe a half a mile downstream before rescued 17 minutes later. The boy was in critical condition and died 4 days after the event occurred. Also, there was a swift water rescue on Campbell and Benson Highway at 1345 MST.
07-Aug-01	Severe Wind	Strong winds from a severe thunderstorm ripped roofs off of 5 homes in the Gu Vo area (40 miles west of Sells).
12-Aug-01	Severe Wind	Damaging winds from a severe thunderstorm downed 4 power poles near Ajo.
13-Aug-01	Flooding	Heavy rains from a severe thunderstorm caused several problems in the Marana, Oro Valley, and northwest Tucson area. At 1535 MST, a spotter reported a foot of water gathering around his home in Marana. Another spotter near Dove mountain reported 3.33 inches of rain for the storm total. By 1540 MST, a spotter in Oro Valley reported .95 inches of rain in 20 minutes. There were also four swift water rescues on Star Pass Blvd. in northwest Tucson at 1545 MST.
13-Aug-01	Severe Wind	This severe thunderstorm also caused strong winds, knocking a 65 foot ham radio tower down on the east side of Marana and there were several reports of pea size hail. Heavy rains from a severe thunderstorm caused several problems in the Marana, Oro Valley, and northwest Tucson area. At 1535 MST, a spotter reported a foot of water gathering around his home in Marana. Another spotter near Dove mountain reported 3.33 inches of rain for the storm total. By 1540 MST, a spotter in Oro Valley reported .95 inches of rain in 20 minutes. There were also four swift water rescues on Star Pass Blvd. in northwest Tucson at 1545 MST.
13-Aug-01	Lightning	The severe thunderstorm that moved through the Marana area produced several lightning strikes. One in particular triggered a house fire on Dove of Peace Place in Marana.
14-Aug-01	Flooding	Thunderstorms developed over the Tucson mountains causing several washes to flood in northwest Tucson. At 1815 MST, a spotter reported that he had to pull his car over due to flooding on Camino del Cerro Road. By 1820 MST, pima county dispatch reported a swift water rescue at the intersection of Sweetwater and Sliverbell roads. At 1845 MST, police closed Sliverbell Road between Ina and Camino del Cerro roads due to overflowing washes. They also closed Davis and Ruthrauff roads.
16-Aug-01	Severe Wind	Strong winds from a severe thunderstorm ripped the roof off a home in Pisinimo and also knocked power lines down.
17-Aug-01	Severe Wind	A severe thunderstorm developed over the Catalina mountains and moved over Oro Valley and northwest portions of Tucson. At 1720 MST a spotter reported measured wind gust of 60 mph. On La Cholla Blvd, 3 power poles were downed from damaging winds and there were tiles blown off a home in Oro Valley. Power was cut off on the northwest side of Tucson throughout most of the night. At 1815 MST, a spotter reported .75 inch diameter hail and various reports of pea size hail.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
7/16/2001	Hazardous Materials Incident	RESIDENTIAL		1		$0	$0	NRC, 2010
7/17/2001	Hazardous Materials Incident			2		$0	$0	NRC, 2010
18-Jul-01	Severe Wind	SOUTH TUCSON	0	0	$58,000	$0	$58,000	NCDC, 2010
24-Jul-01	Severe Wind	KOMELIK	0	1	$50,000	$0	$50,000	NCDC, 2010
31-Jul-01	Flooding	TUCSON	1	0	$15,000	$0	$15,000	NCDC, 2010
31-Jul-01	Severe Wind	TUCSON	0	9	$0	$0	$0	NCDC, 2010
07-Aug-01	Severe Wind	GU VO	0	0	$50,000	$0	$50,000	NCDC, 2010
12-Aug-01	Severe Wind	AJO	0	0	$8,000	$0	$8,000	NCDC, 2010
13-Aug-01	Flooding	TUCSON	0	0	$40,000	$0	$40,000	NCDC, 2010
13-Aug-01	Severe Wind	MARANA	0	0	$1,000	$0	$1,000	NCDC, 2010
13-Aug-01	Lightning	MARANA	0	0	$40,000	$0	$40,000	NCDC, 2010
14-Aug-01	Flooding	TUCSON	0	0	$2,000	$0	$2,000	NCDC, 2010
16-Aug-01	Severe Wind	PISINIMO	0	0	$12,000	$0	$12,000	NCDC, 2010
17-Aug-01	Severe Wind	ORO VLY	0	0	$6,000	$0	$6,000	NCDC, 2010

Date	Hazard	Description
17-Aug-01	Severe Wind	Damaging winds from a severe thunderstorm ripped a roof off of a home in the Sahuarita area. There were also 13 power poles downed by strong winds at Pima Mine Road and Old Nogales Highway.
29-Aug-01	Flooding	Heavy precipitation from a thunderstorm near Vail caused the Pantano Wash to rise 6 feet in less than a hour. At 2330 MST, rapidly rising and moving water reached Harrison Road in southwest Tucson. Harrison Road was flooded with a foot to a foot and a half deep. Around this time, there was a swift water rescue in which a driver was trapped in her car. Rescuers had to smash the window to get the driver out and the car was carried downstream by the rapidly flowing water. Rain gages near Cienga creek and Interstate 10 indicated 2.32 inches of rain had fallen and the rain gage near Vail and Pantano wash received 1.85 inches. Several roads were also closed near Clossal cave which received 2.86 inches of rain in one and a half hours. On the following morning at 0900 MST, water from the Pantano wash flowed into the Rillito wash closing two roads on the northwest side of Tucson.
10/5/2001	Hazardous Materials Incident	THE CALLER IS REPORTING AN OVER PRESSURE SITUATION DUE TO VANDALISM AT A REGULATING STATION.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
20-Apr-02	Wildfire	Center Fire - an unknown caused fire burned an area 45 miles southwest of Tucson, Arizona. The fire started April 20, 2002 and was controlled April 28, 2002, and burned a total of 1,117 acres with over $1,305,000 in fire suppression costs.
14-May-02	Wildfire	Distillery Fire - a lightning caused fire burned an area 5 miles northeast of Vail, Arizona. The fire started June 21, 2008 and burned a total of 7,950 acres with over $1,750,000 in fire suppression costs.
01-Jun-02	Wildfire	The Bullock wildfire started in Bullock Canyon in the Catalina Mountains, part of the Coronado National Forest. The fire started on May 21st and continued through June 10th. It was suspected to be human induced. The fire burned 30,563 acres along with 2 cabins and several outbuildings. The residents of Summerhaven were evacuated on May 25th and Catalina Highway closed on May 22nd. The fire also threatened Mt. Bigelow which had several telecommunication towers and 2 telescopes. However, fire fighters were able to contain the fire a half of a mile away. The entire fire fighting costs was estimated to be 14.3 million dollars.
12-Jul-02	Severe Wind	Thunderstorms moved across central Tucson producing damaging winds. The K-mart store received structural damage due to the strong winds on Broadway and Kolb roads.
14-Jul-02	Severe Wind	A line of thunderstorms extended from Marana, through Tucson, to Green Valley. A majority of the damage from the thunderstorms occurred on the south side of Tucson. First reports of came in from Tucson International Airport with hail size of 3/8 inch in diameter at 530 pm MST. A spotter on the south side of Tucson recorded peak wind gust of 79 mph with an anemometer at 530 pm MST. Between 540 pm and 610 pm several reports of damage flowed into the NWS office. A chimney was blown off the roof of Davis Monthan AFB. Several large trees were blown down in Kennedy Park near Mission Road and west Ajo Road. Another report of a large tree was blocking the intersection of Grant and First Avenue, with a metal parking light pole bent over in the street. A roof was blown off a house on the south side of Tucson. Five power poles were knocked down on North Greasewood Road, with another 10 power poles downed on Valencia and Mission roads. Throughout the city, a total of 25 power poles were reported knocked down by the strong winds. The Tucson International Airport received .96 inches of rainfall throughout the event, with a spotter receiving 1.17 inches on the south side of Tucson. There was only one report of a swift water rescue on Santa Clara near Interstate 10.
7/18/2002	Hazardous Materials Incident	THE CALLER IS REPORTING A SINGLE TRACTOR TRAILER ACCIDENT, DRIVER LOST CONTROL OF VEHICLE.;MOBILE incident;Material was OIL, MISC: LUBRICATING;the amount was 15 GALLON(S)
26-Jul-02	Severe Wind	A severe thunderstorm moved through Green Valley and Sahuarita area, producing damaging winds. The strong winds knocked down a power pole causing a power outage for several hours. The storm also produced over an inch of precipitation. However, there were no reports of flooding.
02-Aug-02	Flooding	Another round of thunderstorms produced heavy rainfall over the town of Arivaca. A spotter reported 3 inches of rain, with water flooding into his house at 410 pm MST. An automated gauge in the area recorded 2.09 inches of rainfall between 330 pm and 430 pm MST.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
17-Aug-01	Severe Wind	SAHUARITA	0	0	$200,000	$0	$200,000	NCDC, 2010
29-Aug-01	Flooding	VAIL	0	0	$4,000	$0	$4,000	NCDC, 2010
10/5/2001	Hazardous Materials Incident	ORACLE RD. AND RANCHO VISTOSO BLVD.			$50,000	$0	$50,000	NRC, 2010
20-Apr-02	Wildfire							GACC, 2010
14-May-02	Wildfire							GACC, 2010
01-Jun-02	Wildfire	MT LEMMON	0	0	$100,000	$0	$100,000	NCDC, 2010; GACC,2010
12-Jul-02	Severe Wind	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
14-Jul-02	Severe Wind	TUCSON	0	0	$72,000	$0	$72,000	NCDC, 2010
7/18/2002	Hazardous Materials Incident	I-10 WESTBOUND AT MILEPOST 234		1		$0	$0	NRC, 2010
26-Jul-02	Severe Wind	GREEN VLY	0	0	$2,000	$0	$2,000	NCDC, 2010
02-Aug-02	Flooding	ARIVACA	0	0	$5,000	$0	$5,000	NCDC, 2010

Date	Hazard	Description
05-Aug-02	Flooding	A merger of two storms created a severe thunderstorm producing heavy rainfall across Tucson as it moved northwest at 10 mph. This storm not only produced damaging winds but also was one of the largest flash flooding events during the monsoon season. At 459 pm MST, Davis Monthan AFB recorded a peak wind gust of 69 mph. Between 500 and 530 pm MST, several reports of wind damage flowed into the NWS office. Reports of power poles downed in locations such as Limberlost Road and Oracle, Tanque Verde and Sabino Canyon were mentioned. In all 8 power poles were downed across Tucson causing a loss of power for 18,000 people, including Tucson International Airport. There were 22 reports of toppled trees, including one that fell on top of a mobile home. There was roof damage to the El Dorado Hospital, portions of a roof ripped off of Bobo's Restaurant, and restaurant sign blown down at Grant and County Club. Not only was this storm severe but it also caused flash flooding. Rainfall amounts ranged from .79 inches at Tucson International Airport to 2.21 inches at Alamo Wash at Glenn Avenue. Most of the rain fell within one hour. A NWS employee reported flooding at Craycroft south of Sunrise, Synder and Ventana wash, and Sunrise at Sabino Canyon. A spotter reported five feet of water at the intersection of Grant and Dodge, with stores being flooded. Another spotter reported two feet of water
05-Aug-02	Severe Wind	A merger of two storms created a severe thunderstorm producing heavy rainfall across Tucson as it moved northwest at 10 mph. This storm not only produced damaging winds but also was one of the largest flash flooding events during the monsoon season. At 459 pm MST, Davis Monthan AFB recorded a peak wind gust of 69 mph. Between 500 and 530 pm MST, several reports of wind damage flowed into the NWS office. Reports of power poles downed in locations such as Limberlost Road and Oracle, Tanque Verde and Sabino Canyon were mentioned. In all 8 power poles were downed across Tucson causing a loss of power for 18,000 people, including Tucson International Airport. There were 22 reports of toppled trees, including one that fell on top of a mobile home. There was roof damage to the El Dorado Hospital, portions of a roof ripped off of Bobo's Restaurant, and restaurant sign blown down at Grant and County Club. Not only was this storm severe but it also caused flash flooding. Rainfall amounts ranged from .79 inches at Tucson International Airport to 2.21 inches at Alamo Wash at Glenn Avenue. Most of the rain fell within one hour. A NWS employee reported flooding at Craycroft south of Sunrise, Synder and Ventana wash, and Sunrise at Sabino Canyon. A spotter reported five feet of water at the intersection of Grant and Dodge, with stores being flooded. Another spotter reported two feet of water
07-Aug-02	Flooding	A slow moving thunderstorm produced heavy rainfall in the Tucson area. Automated gauges reported 1.25 to 1.5 inches of rainfall near Kolb and Golf Links. A swift water rescue occurred on Broadway and Prudence on the east side of Tucson at 1242 am MST.
09-Aug-02	Severe Wind	A severe thunderstorm produced damaging winds across northeast side of Tucson. A spotter reported mail boxes blown down and several tree tops snapped near Catalina Highway and Houghton Road at 515 pm MST. This storm also produced pea size hail.
28-Aug-02	Severe Wind	A significant increase in moisture moved over southeast Arizona from Tucson east. The 12Z KTUS sounding indicated a precipitable water value of 1.75 inches, which increased from .81 inches from the 00Z sounding. The cape was also very impressive, with the sounding indicating 5900 J/kg at 12Z. Combining the extremely unstable atmosphere with significant moisture increase and a 90 knot jet streak moving over the area between 18Z and 00Z, severe weather exploded over the greater Tucson area by 100 pm MST. The first weather report of the day was a 58 mph peak wind gust from a thunderstorm over Ryan Field Airport. By 150 pm MST, the first reports of one inch diameter in size hail was reported in central Tucson. Reports then started flowing into the office of hail ranging from .75 to 3.0 inches in diameter. Several cars were damaged due to the large hail. One spotter reported 3.0 inch in diameter size hail broke the car windshield at 230 pm MST. Flash flooding also occurred on the northwest side of Tucson and also in Marana. Several thunderstorms were developing one right after the other over the same area between 400 and 600 pm MST. Tangerine Road was barricaded at 600 pm through 700 pm MST due to the rapidly flowing water across several of the low lying dips in the road. After 800
06-Sep-02	Severe Wind	A severe thunderstorm moved over Tucson producing damaging winds and flash flooding. Strong winds knocked down a line of power poles along Kolb Street between 22nd Street and Speedway. Winds also toppled a 100 foot eucalyptus tree onto a house located on East Broadway and Kolb Street. Along with damaging winds, this storm also produced heavy precipitation. Rainfall amounts ranged from near an inch at several gages in central Tucson to .20 inches on the northeast and northwest portions of the city. Most of the precipitation fell within the first 30 minutes of the event. Tucson International Airport also recorded .66 inches of precipitation for the entire event. Tucson dispatch reported several streets flooded.
10-Sep-02	Severe Wind	A severe thunderstorm developed over the greater Tucson area producing damaging winds, hail, and flash flooding. Hail size ranged from 1.5 inches in diameter at the University of Arizona to one inch in diameter across Tucson and Marana. A spotter in central Tucson recorded a peak wind gust of 60 mph and the ASOS at the Tucson International Airport recorded a peak wind gust of 54 mph. The strong winds also knocked down a power pole which left 2300 customers without power. The winds also overturned a mobile home located on Old Vail Road. There was also widespread flash flooding, with rainfall rates of greater than a half of an inch in 30 minutes. Several roads were closed due to flooding which included Sahuarita, Overton and La Cholla roads at Canada del Oro wash, and Davidson.
11/5/2002	Hazardous Materials Incident	THE CALLER STATED THAT THERE WAS AN EXPLOSION IN A MOBILE HOME PARK AND THERE ARE THREE TRAILERS THAT IS INVOLVED.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
05-Aug-02	Flooding	SOUTH TUCSON	0	0	$25,000	$0	$25,000	NCDC, 2010
05-Aug-02	Severe Wind	SOUTH TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
07-Aug-02	Flooding	TUCSON	0	0	$3,000	$0	$3,000	NCDC, 2010
09-Aug-02	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
28-Aug-02	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
06-Sep-02	Severe Wind	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
10-Sep-02	Severe Wind	TUCSON	0	0	$64,000	$0	$64,000	NCDC, 2010
11/5/2002	Hazardous Materials Incident	3333 NORTH FLOWING WELLS		3	$50,000	$0	$50,000	NRC, 2010

Date	Hazard	Description
1/9/2003	Hazardous Materials Incident	THE CALLER REPORTED EMPLOYEE COMPLAINED OF IHALATION OF RELEASE FROM TANK CAR THAT LAST CONTAINED TOLUENE.;RAILROAD incident;Material was TOLUENE;the amount was 0 UNKNOWN AMOUNT
2/8/2003	Hazardous Materials Incident	CALLER IS REPORTING MATERIAL RELEASED FROM A FUEL TANK ON A TANKER TRUCK DUE TO A TRANSPORT ACCIDENT.;MOBILE incident;Material was MIXTURE OF DIESEL AND OIL;the amount was 8000 GALLON(S)
3/16/2003	Hazardous Materials Incident	THE CALLER STATED THAT AN APARTMENT FIRE WAS THE RESULT OF A NATURAL GAS LEAK.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
13-May-03	Wildfire	AZ-AZS-03-0181 Fire - a human caused fire burned an area near the Town of Redington, Arizona. The fire started May 13, 2003 and was controlled May 20, 2003, and burned a total of 153 acres with over $75,000 in fire suppression costs.
20-May-03	Wildfire	Anvil Fire - an unknown caused fire burned an area by Highway 286 north of Three Points. The fire started May 20, 2003 and was controlled May 21, 2003, and burned a total of 160 acres with over $10,000 in fire suppression costs.
17-Jun-03	Wildfire	Aspen Fire - a human caused fire that burned an area northeast of Tucson, Arizona to Mt. Lemmon; including Pusch Ridge Wilderness Area. The fire started June 17, 2003, and burned a total of 86,000 acres with over $16,400,000 in fire suppression costs. Three hundred residences and seven commercial structures were destroyed.
17-Jun-03	Wildfire	Helen's 2 Fire - a lightning caused fire burned an area in or near Tucson, Arizona. The fire started June 17, 2003 and expected containment was June 30, 2003, and burned a total of 3,498 acres with over $3,636,000 in fire suppression costs.
01-Jul-03	Wildfire	The Aspen wildfire started on June 17th in the Catalina Mountains by an unknown hiker on the Marshall Gulch and Aspen Loop trail. The Fire was first observed on the south face portion of Marshall Peak around 7000 feet. On June 19th, winds increased across Southeast Arizona with the highest winds recorded at Hopkins RAWS site (south of Catalina Mountains). Sustained winds of 23 knots (26 mph) and gusts up to 42 knots (48 mph) were recorded at this site for one hour during the afternoon. The combination of strong winds and low relative humidity pushed the fire northeast into the town of Summerhaven on top of Mt. Lemmon. Numerous structures were destroyed including the Alpine Lodge, Pima county transportation facility, Post Office, and many others. In all the fire consumed a total of 84,750 acres and 333 structures lost. Damage estimates indicated total poperty damage was $66 million, supression costs were $16 milliion, and loss of trees and resources were $33 million.
12-Jul-03	Severe Wind	A severe thunderstorm produced damaging winds. A spotters reported an awning blown off an apartment building on 5th Street and Alvernon Road. Several large trees were also blown down on 22nd Street and Columbus Road. A spotter recorded 63 mph wind gust on Old Spanish Trail and Freeman Road. Interstate 10 was closed for four hours near Kolb Road due to downed power poles. Scattered thunderstorms developed over the White Mountains early in the afternoon. Outflow from these thunderstorms helped initiate convection over the Catalina and Rincon Mountains, on the north and east side of Tucson. These storms then moved west across the city, producing damaging winds and flash flooding.
13-Jul-03	Severe Wind	A line of severe thunderstorms moved across Tucson producing damaging winds. The strongest wind gust of 64 mph was recorded at Davis Monthan AFB at 759 pm MST. The Tucson International Airport recorded 58 mph and the anemometer located at the rooftop of the University of Arizona building recorded 78 mph wind gust. Damage reports included an awning torn off a house at 5th Street and Alvernon and several houses reported roof damage. Tucson City of Communications reported 2 downed power poles along Bear Canyon near Golf Links and Houghton Roads.
20-Jul-03	Severe Wind	A strong thunderstorm developed over the Rincon Mountains and moved west across Tucson. Strong winds knocked down 10 power poles along Houghton Road between Broadway and Speedway.
24-Jul-03	Severe Wind	A severe thunderstorm developed east of Oro Valley during the evening and moved northwest across the town. The thunderstorm produced damaging winds, which knocked down several trees in the Oro Valley area.
25-Jul-03	Flooding	Severe thunderstorms developed over the area and produced damaging winds and flash flooding. Tucson city of communication reported 15 downed power poles on West Manville Road near North Reservation Road adn Sauguaro National Park West. The newspaper also reported a mobile home blown of stands and several buildings with roof damage. This storm also produced heavy rain. There was 2 feet of waster on Magee and La Cholla Roads and was closed. Two care were stranded in the Canada del Oro Wash near La Cholla and the Omni Tucson National Golf Resort. Another car was swept near a mile down the Canada del Oro Wash near La Cholla. There were no injuries reported.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
1/9/2003	Hazardous Materials Incident	RAILYARD		1		$0	$0	NRC, 2010
2/8/2003	Hazardous Materials Incident	STATE ROUTE 86, MILEPOST 131.4	1			$0	$0	NRC, 2010
3/16/2003	Hazardous Materials Incident	APARTMENT		1	$50,000	$0	$50,000	NRC, 2010
13-May-03	Wildfire							GACC, 2010
20-May-03	Wildfire							GACC, 2010
17-Jun-03	Wildfire			15				GACC, 2010
17-Jun-03	Wildfire			9				GACC, 2010
01-Jul-03	Wildfire	SUMMERHAVEN	0	0	$66,000,000	$0	$66,000,000	NCDC, 2010
12-Jul-03	Severe Wind	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
13-Jul-03	Severe Wind	TUCSON	0	0	$12,000	$0	$12,000	NCDC, 2010
20-Jul-03	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
24-Jul-03	Severe Wind	ORO VLY	0	0	$5,000	$0	$5,000	NCDC, 2010
25-Jul-03	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010

Date	Hazard	Description
25-Jul-03	Severe Wind	Severe thunderstorms developed over the area and produced damaging winds and flash flooding. Tucson city of communication reported 15 downed power poles on West Manville Road near North Reservation Road adn Sauguaro National Park West. The newspaper also reported a mobile home blown of stands and several buildings with roof damage. This storm also produced heavy rain. There was 2 feet of waster on Magee and La Cholla Roads and was closed. Two care were stranded in the Canada del Oro Wash near La Cholla and the Omni Tucson National Golf Resort. Another car was swept near a mile down the Canada del Oro Wash near La Cholla. There were no injuries reported.
28-Jul-03	Severe Wind	Pima dispatch reported strong winds, from a nearby thunderstorm, pushed a vehicle off the road along Interstate 19 and Arivaca Road.
28-Jul-03	Severe Wind	A severe thunderstorm moved across Vail during the evening, producing damaging winds. A spotter reported 70 mph winds and half of an inch rain in 30 minutes. Tucson police reported several down power poles along Interstate 10 near Vail and Wentworth.
29-Jul-03	Flooding	A thunderstorm moved through the town of Ajo around 800 pm MST, producing heavy rain which resulted in a flash flood. Ajo police reported 2.75 inches of precipitation after the event occurred. It was estimated that near 4.0 inches of precipitation feel in 45 minutes over the Phelps Dodge area. Most damage occurred near Gibson Wash, with 2nd Avenue bridge overtopped by 3 feet of water. The railroad was also overtopped. Fences were downed due to rushing water and several road were washed out. In all 673 land parcels were flooded and one swift water rescue performed.
29-Jul-03	Flooding	A severe thunderstorm moved across the city of Tucson during evening, producing strong winds and heavy rain. Tucson police reported several roads closed due to flooding. Tucson International Airport recorded 1.49 inches of rain during this event. Drexel fire department reported 10 swift water rescues. One swift water rescue occurred near Ajo Highway and Old Ajo Highway, when a vehicle was swept away in 5-7 foot deep water. There was only one home flooded near Drexel Heights. Precipitation gages across the city ranged from 0.50 inches to 1.5 inches.
29-Jul-03	Severe Wind	A severe thunderstorm moved through the city of Tucson, producing damaging wind. Tucson city of Communication reported two power poled downed. There were several reports of tree down across the city, with one near Grant Road and Park Avenue and another at 1st Avenue and Tangerine. The newspaper reported a 12x60 foot mobile home flipped on its side.
23-Aug-03	Flooding	Sever thunderstorms moved through the Tucson area also produced heavy rain that caused flooding. The automatic gage at Ventana Canyon and Sunrise Road recorded 1.03 inches during the event. A spotter reported the golf course at Loew's Ventana Canyon Resort had considerable damage due to the flooding. The wash overtopped it's banks and flooded cart paths and fairways.
23-Aug-03	Severe Wind	Severe thunderstorms moved west across Tucson metro area producing damaging winds. Several spotters reported 60 mph wind gusts across Tucson. A spotter on the northwest side of Tucson reported a 30 foot tree knocked.
24-Aug-03	Flooding	Thunderstorms produced heavy rain in the late evening in Tucson. Some areas received .75 to 1.5 inches of precipitation in 20 minutes. At 1015 pm MST, Pima County dispatch reported multiple cars stalled in the underpass at Stone Ave. due to the six feet of water. A swift water rescue was performed with no injuries reported.
26-Aug-03	Severe Wind	A severe thunderstorm developed over the Rincon Mountains and moved west into Tucson. Eight power poles were downed at Ft. Lowell Road. One of the poles fell on a car traveling on the road, but no injuries were reported.
22-Jun-04	Severe Wind	A microburst near the crossroads of Speedway and Pantano caused a roof to be partially torn off of a home and blown several hundred feet onto the roof of a neighboring home. A weak low pressure system off the western coast of Baja pulled moisture from Mexico northward into southeast Arizona. This increase in moisture lead to the development of isolated showers and thunderstorms over the eastern zones of southeast Arizona, including eastern pima county, in the afternoon and evening of June 22nd.
11-Jul-04	Severe Wind	A power pole was downed by thunderstorm wind gusts near the intersection of River and Oracle. High pressure east of Arizona forced moisture into the area from the east and south, which led to the development of isolated afternoon and evening thunderstorms.
7/17/2004	Hazardous Materials Incident	CALLER STATED THAT DRIVER OF SEMI TANKER TRUCK SWERVED TO AVOID AN ONCOMING VEHICLE CAUSING THE TRUCK TO OVERTURN AND CATCH ON FIRE AND RELEASE GASOLINE.;MOBILE incident;Material was GASOLINE: AUTOMOTIVE (UNLEADED);the amount was 8900 GALLON(S)
19-Jul-04	Severe Wind	Fire department reported that roofing had been blown off of a building and a power pole was downed near the intersection of Silverbell and El Camino Del Cerro.
24-Jul-04	Severe Wind	Law enforcement reported that thunderstorm wind gusts up to 55 knots had downed 5 power poles on Route 85 between mile marker 45 and 47. An outflow from a large complex that developed in Northern Mexico pushed moisture north into southeastern Arizona. This moisture helped to promote the development of heavy raining thunderstorms across the area.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
25-Jul-03	Severe Wind	TUCSON	0	0	$55,000	$0	$55,000	NCDC, 2010
28-Jul-03	Severe Wind	ARIVACA	0	0	$6,000	$0	$6,000	NCDC, 2010
28-Jul-03	Severe Wind	VAIL	0	0	$6,000	$0	$6,000	NCDC, 2010
29-Jul-03	Flooding	AJO	0	0	$25,000	$0	$25,000	NCDC, 2010
29-Jul-03	Flooding	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
29-Jul-03	Severe Wind	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
23-Aug-03	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
23-Aug-03	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
24-Aug-03	Flooding	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
26-Aug-03	Severe Wind	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
22-Jun-04	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
11-Jul-04	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
7/17/2004	Hazardous Materials Incident	STATE ROUTE 85 MP 70		1		$0	$0	NRC, 2010
19-Jul-04	Severe Wind	TUCSON	0	0	$3,000	$0	$3,000	NCDC, 2010
24-Jul-04	Severe Wind	AJO	0	0	$5,000	$0	$5,000	NCDC, 2010

Date	Hazard	Description
27-Jul-04	Severe Wind	Law Enforcement reported about 5 power poles had been downed on the northwest side of Tucson. Newspapers reported that the same storm caused a tree to be downed on a home on Ederbrooke Road, and an NWS employee reported that another tree was uprooted and across Ina Road between La Cholla Road and La Canada Road. With a jet diving into northern portions of Arizona, moisture and dynamics were sufficient for strong storm development. The storm prediction center had issued a severe thunderstorm watch for portions of Southeast Arizona due to these favorable conditions. A weak impulse was embedded in the flow overhead, along with better shear which all helped to lead to severe thunderstorm development. The storms were producing heavy rain and gusty winds in excess of 55 MPH. The winds were strong enough to knock down power poles and uproot trees in Northern Pima County.
28-Jul-04	Severe Wind	Law Enforcement reported power lines downed just to the west of downtown Tucson and 3 miles SW of Tucson.
01-Aug-04	Severe Wind	Strong thunderstorm winds caused the power lines at the 39th block of 16th Avenue to be downed.
03-Aug-04	Flooding	High water in the Canada Del Oro wash caused several low lying roads to be flooded. A vehicle was stuck in one of these low lying areas due to the high water.
05-Aug-04	Flooding	Significant rainfall over the southeastern side of Tucson caused normally dry washes to be filled with water and low lying roadways to be flooded. Two vehicles (one truck and one motorcycle) where stuck in the Pantano wash at Harrison Road. Both drivers were rescued by the Tucson Fire Department.
13-Aug-04	Severe Wind	Trained spotter reported that power lines had been blown down by a thunderstorm wind gust.
13-Aug-04	Severe Wind	Law enforcement reported that several power poles were downed by thunderstorm wind gusts on Orange Grove Road near Thornydale Road.
16-Aug-04	Severe Wind	Mobile home was turned over and damaged by strong thunderstorm winds in Three Points.
4/15/2005	Hazardous Materials Incident	A PASSENGER CAR STRUCK A NATURAL GAS METER CAUSING A RELEASE OF NATURAL GAS TO THE ATMOSPHERE.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
4/29/2005	Hazardous Materials Incident	SULFURIC ACID RELEASED FROM A RAIL CAR DUE TO A BAD GASKET RESULTING IN A EMPLOYEE INJURY.;RAILROAD incident;Material was SULFURIC ACID;the amount was 0 UNKNOWN AMOUNT
5/4/2005	Hazardous Materials Incident	DUE TO A MOTOR VEHICLE ACCIDENT DIESEL RELEASED FROM A DUMP TRUCK ONTO THE ROADWAY.;MOBILE incident;Material was OIL, FUEL: NO. 2-D;the amount was 120 GALLON(S)
5/27/2005	Hazardous Materials Incident	THE CALLER IS REPORTING A HOUSE EXPLOSION CAUSED BY A RELEASE OF NATURAL GAS.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
28-May-05	Lightning	The body of a 70-year-old man was found in a Cemetery in Tucson on Sunday, May 29, 2005. The man was killed by lightning on Saturday night while visiting a gravesite at the cemetery. Moisture moving into Arizona from northern Mexico helped to generate thunderstorms across portions of Southeast Arizona throughout a 5 day period towards the end of the month of May. Severe storms developed along several boundaries that moved through Southeast Arizona throughout the 5 day time frame. M70UT
23-Jun-05	Severe Wind	High pressure centered over the southern plains helped to maintain enough moisture across Southeast Arizona to prompt the development of showers and thunderstorms. Although most storms stayed over higher terrain and were non-threatening, one thunderstorm that developed in Central Pima County caused wind damage and produced significant rainfall in the community of Queens Well (which is about 27 miles to the Northeast of the community of Sells). The Queens Well rain gage reported 0.74 inch of rain in 25 minutes as the thunderstorm moved through the area. Additionally, several residents reported wind damage to their property including; damage to a screen door, an uprooted tree, roofing damage on several homes, and damage to a ramada. Based on the above damage reports the wind gusts was most likely not in the severe criteria and was estimated to be about 43 knots (49 mph). The thunderstorm was shorted lived lasting only about 25 minutes.
07-Jul-05	Severe Wind	A thunderstorm that moved through the Southeast side of the Tucson Metro Area caused some damage as estimated wind gusts of 50 mph (43 knots) moved across the area. The winds blew a power line off its pole as well as blew a street sign down.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
27-Jul-04	Severe Wind	TUCSON	0	0	$8,000	$0	$8,000	NCDC, 2010
28-Jul-04	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
01-Aug-04	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
03-Aug-04	Flooding	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
05-Aug-04	Flooding	TUCSON	0	0	$8,000	$0	$8,000	NCDC, 2010
13-Aug-04	Severe Wind	MARANA	0	0	$1,000	$0	$1,000	NCDC, 2010
13-Aug-04	Severe Wind	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
16-Aug-04	Severe Wind	THREE PTS	0	0	$15,000	$0	$15,000	NCDC, 2010
4/15/2005	Hazardous Materials Incident			2		$0	$0	NRC, 2010
4/29/2005	Hazardous Materials Incident	MILEPOST 985.7 / GILA SUBDIVISION		1		$0	$0	NRC, 2010
5/4/2005	Hazardous Materials Incident			1		$0	$0	NRC, 2010
5/27/2005	Hazardous Materials Incident			1		$0	$0	NRC, 2010
28-May-05	Lightning	TUCSON	1	0	$0	$0	$0	NCDC, 2010
23-Jun-05	Severe Wind	SELLS	0	0	$4,500	$0	$4,500	NCDC, 2010
07-Jul-05	Severe Wind	TUCSON	0	0	$2,000	$0	$2,000	NCDC, 2010

Date	Hazard	Description
17-Jul-05	Severe Wind	A thunderstorm on the Northeast Side of the Tucson Metro Area caused high winds, up to 58 mph, which blew a large tree over at the intersection of Swan Road and Sunrise Road.
18-Jul-05	Severe Wind	A large tree was downed by strong thunderstorm winds onto the roadway south of River Road on 1st Avenue. Also large tree limbs fell onto the roadway along 1st Avenue for several blocks.
18-Jul-05	Severe Wind	Thunderstorm associated winds blew down three power poles near Grant Road and Interstate 10 in Tucson.
18-Jul-05	Severe Wind	Strong thunderstorm winds caused power poles and power lines to be downed at the intersection of 1st Avenue and Limberlost Road. Also a large tree was blown down causing damage to an apartment complex.
18-Jul-05	Severe Wind	Thunderstorm winds associated with a severe thunderstorm caused a large Eucalyptus tree to be blown over onto a home causing severe roof damage to that home. Another home nearby which was under construction also had wind damage.
19-Jul-05	Severe Wind	Thunderstorm winds caused numerous large tree limbs (6 inches in diameter) to be downed on the roadway near Harrison Road and Catalina Highway.
20-Jul-05	Severe Wind	Strong thunderstorm winds (most likely a microburst) caused severe damage to several trailer homes and several vehicles in the Town of Marana near Avra Valley Road. Three trailers had damage, while three others were completely destroyed, including one being thrown onto a vehicle, and another being wrapped around a telephone phone. There were no injuries.
21-Jul-05	Severe Wind	Two large tree branches broke off of an Eucalyptus tree due to strong winds (estimated 50 mph) in the Picture Rocks area.
25-Jul-05	Severe Wind	A severe thunderstorms rolled across the southeast side of the City of Tucson causing several power poles to be downed, trees to be blown down, and an estimated wind gusts of 75 mph (65 knots). Three of the power poles were along South Wilmot Road.
27-Jul-05	Flooding	Flash flooding caused several roads to flood on the Southwest side of the Tucson Metro area. This flooding caused several road closures including: Camino Verde Road at Valencia Road Camino de La Tierra Road at Valencia Road Valencia Road and Ajo Highway Westover Road from Valencia Road to Drexel Road Mission Road from Valencia Road to Drexel Road Due to the flooded roadways there were also four swift water rescues performed during this flash flood event. The Drexel Heights Fire Department pulled two cars out of the intersection of South Camino Verde Road and West Valencia Road; a sport utility vehicle out of the flood waters at South Camino Verde Road at West Ajo Way; and a car with a man and child inside out at South Camino Verde Road and West Arrow Road. There were no injuries.
27-Jul-05	Severe Wind	A large tree was blown down by strong thunderstorm winds (estimated to be 60 mph) at the Tucson Mall on North Oracle Road in Tucson.
27-Jul-05	Severe Wind	Strong winds, estimated to be 65 mph (56 knots) caused four power poles to be downed at Manville Road and Reservation Road.
29-Jul-05	Flooding	A swift water rescue was performed by the Tucson Fire Department on South Highland Avenue near the University of Arizona after a woman's car got stuck in the flooded roadway. The water was more than 2 feet deep when the woman attempted to drive through the flooded area. Rainfall amounts over three quarters of an inch and pea size hail were reported with this storm.
29-Jul-05	Severe Wind	Strong thunderstorm winds, estimated to be about 60 mph (52 knots) downed a power pole on Wetmore Road near Oracle Road in Tucson.
02-Aug-05	Flooding	Two to four inches of rainfall near the Village of Sells, caused several of the washes in the area to flood. A vehicle entered into the Artesa wash, which at the time was running very high with water, and became stuck. Family members tried to get everyone out of the car and to safety but a one-year-old girl could not be rescued and was later found downstream. F1VE
04-Aug-05	Flooding	Heavy rain across the Tucson Metro Area caused several roads to be flooded and closed. Wilmot Road between Andrada Road and Sahuarita Road was closed due to flooding. There were four swift water rescues across the City of Tucson.
04-Aug-05	Severe Wind	A severe thunderstorm over the Tucson Metro Area caused damage in several areas, including a power pole snapping near North Pantano Road and East Speedway Boulevard, leaving 10,000 customers without power. Additionally, power lines were downed at the intersection of Oracle Road and Wetmore Road.

					Damage Estimates			
Date	Hazard	Location	Fatalities	Injuries	Property	Crop/Livestock	Total	Data Source
17-Jul-05	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
18-Jul-05	Severe Wind	TUCSON	0	0	$1,200	$0	$1,200	NCDC, 2010
18-Jul-05	Severe Wind	TUCSON	0	0	$22,500	$0	$22,500	NCDC, 2010
18-Jul-05	Severe Wind	TUCSON	0	0	$23,500	$0	$23,500	NCDC, 2010
18-Jul-05	Severe Wind	TUCSON	0	0	$26,000	$0	$26,000	NCDC, 2010
19-Jul-05	Severe Wind	TUCSON	0	0	$1,500	$0	$1,500	NCDC, 2010
20-Jul-05	Severe Wind	MARANA	0	0	$175,000	$0	$175,000	NCDC, 2010
21-Jul-05	Severe Wind	MARANA	0	0	$1,000	$0	$1,000	NCDC, 2010
25-Jul-05	Severe Wind	TUCSON	0	0	$38,500	$0	$38,500	NCDC, 2010
27-Jul-05	Flooding	TUCSON	0	0	$40,000	$0	$40,000	NCDC, 2010
27-Jul-05	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
27-Jul-05	Severe Wind	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
29-Jul-05	Flooding	TUCSON	0	0	$6,000	$0	$6,000	NCDC, 2010
29-Jul-05	Severe Wind	TUCSON	0	0	$7,500	$0	$7,500	NCDC, 2010
02-Aug-05	Flooding	SELLS	1	0	$5,000	$0	$5,000	NCDC, 2010
04-Aug-05	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
04-Aug-05	Severe Wind	TUCSON	0	0	$15,000	$0	$15,000	NCDC, 2010

Date	Hazard	Description
8/5/2005	Hazardous Materials Incident	THE CALLER IS REPORTING A 55 GALLON DRUM OF CONCRETE SEALER SPILLED OUT OF THE BACK OF A TRAILER DUE TO UNKNOWN CAUSES. TWO EASTBOUND LANES OF I-10 WERE SHUT DOWN FOR A MAXIMUM OF 2 HOURS. THE HAS BEEN REOPENED. ONE INDIVIDUAL WAS SENT TO THE HOSPITAL;STORAGE TANK incident;Material was CONCRETE SEALER;the amount was 480 POUND(S)
06-Aug-05	Severe Wind	An off duty NWS employee reported that several large trees had been uprooted and broken at their bases by strong thunderstorm winds. Also two structures had shingles taken off their roofs.
07-Aug-05	Severe Wind	A severe thunderstorm which moved across the Tucson Metro Area caused several large trees and power lines to be downed across the city. Also there were multiple reports of roof damage.
09-Aug-05	Flooding	Significant rainfall across the Tucson Metro Area caused several roads to be flooded requiring several swift water rescues. A few of the roads that were closed due to flooding included but were not limited to: Wilmot Road from Sahuarita Road to Andrada Road Old Vail Connection east of Old Nogales Highway Summit Road east of Old Nogales Highway Old Ajo Highway from San Joaquin Road to Ajo Highway Overton Road at the Canada Del Oro Wash Three swift water rescues were performed throughout the Tucson Metro Area which included rescues at the following locations: The Rillito Wash near the Tucson Mall St. Mary's Road near Interstate 10
14-Aug-05	Flooding	Heavy rain caused flooded roadways which led to a swift water rescue in a flooded wash near the Village of Sells. There were no injuries.
14-Aug-05	Flooding	Road flooding in Town of Three Points caused a vehicle to become stuck in a flooded roadway, leading to a swift water rescue and the drowning of a 3 year-old little boy. Also, mud and water flooded a residential garage, and Brawley Wash flooded Mile Wide Road. M3VE
14-Aug-05	Severe Wind	A strong thunderstorm caused a large fence to be blown down.
15-Aug-05	Severe Wind	Strong thunderstorm wind gusts (possibly a microburst) knocked down 15 power poles along Grant Road, one woman was caught in her vehicle with energized wires on top of it.
22-Aug-05	Flooding	A car became stuck in the intersection of La Canada Road and Casa Verde Road in the City of Green Valley due to flooding.
23-Aug-05	Flooding	Heavy rainfall across the southern portion of the Tucson Metro Area as well as in midtown, caused several roads to be flooded. A car was stuck in a wash under the Stone Avenue underpass, and the Stone Avenue underpass was then closed due to high flood waters. Another car was stuck in a flooded roadway near Campbell Road and Drexel Road.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
8/5/2005	Hazardous Materials Incident	I-10 EASTBOUND, 1.1 MILE SE OF DAVIS MONTHAN AFB		1		$0	$0	NRC, 2010
06-Aug-05	Severe Wind	TUCSON	0	0	$7,000	$0	$7,000	NCDC, 2010
07-Aug-05	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
09-Aug-05	Flooding	TUCSON	0	0	$15,000	$0	$15,000	NCDC, 2010
14-Aug-05	Flooding	SELLS	0	0	$5,000	$0	$5,000	NCDC, 2010
14-Aug-05	Flooding	THREE PTS	1	0	$10,000	$0	$10,000	NCDC, 2010
14-Aug-05	Severe Wind	MARANA	0	0	$2,000	$0	$2,000	NCDC, 2010
15-Aug-05	Severe Wind	TUCSON	0	0	$120,000	$0	$120,000	NCDC, 2010
22-Aug-05	Flooding	GREEN VLY	0	0	$5,000	$0	$5,000	NCDC, 2010
23-Aug-05	Flooding	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010

Date	Hazard	Description
23-Aug-05	Flooding	After over an inch of rain fell across a large portion of the Tucson Metro Area, some locations with more than two inches, several roads became flooded, closed, and impassable. In addition to all the flooded roadways, several trailer homes located in the southern portion of the Tucson Metro Area, were flooded and surrounded by rising water. Rescue teams evacuated several people from these homes. Brawley wash was out of its banks and flooding roadways causing them to be impassable. Below is a list of some, but not all, of the roads that were closed due to flooding: Kinney Road from McCain Loop Road to north of the Desert Museum Pump Station Road from Avra Valley Road to Silverbell Road El Trio Road from Cocio Road to Pump Station Road Mission Road between Valencia Road and Drexel Road Old Ajo Highway from San Joaquin Road to Ajo Highway Overton Road at the Canada Del Oro Wash Bonney Avenue north of Benson Highway Andrada Road at Wentworth Road Wilmot Road from Sahuarita Road to Andrada Road Fort Lowell Road at the Agua Caliente Wash Snyder Hill Road between Sandario Road and San Joaquin Road Soliders Trail at the Agua Caliente Wash Limberlost Road at the Agua Caliente Wash Avra Valley Road at Trico Road
01-Sep-05	Flooding	Heavy rain over Central Pima County caused Route 19 to be closed from milepost 10 to 20. Additionally, a vehicle was stuck in a wash along Route 19.
06-Oct-05	Severe Wind	A thunderstorm producing strong winds moved through the southwest side of Tucson causing six power poles to be knocked down along Old Nogales Highway at Airport Road. Over 4000 people were without power for over an hour due to the downed power poles.
11/5/2005	Hazardous Materials Incident	CALLER STATED THERE WAS A RELEASE OF MATERIALS FROM A GAS METER DUE TO A TRUCK THAT HIT THE BUILDING DUE TO OPERATOR ERROR FROM THE TRUCK DRIVER. TRUCK INFORMATION UNKNOWN, ALSO UNKNOWN IF TRUCK DRIVER WAS ADMITTED TO THE HOSPITAL.;PIPELINE incident;Material was NATURAL GAS;the amount was 0 UNKNOWN AMOUNT
02-Jun-06	Severe Wind	A dry microburst caused 7 power poles to snap and damaged 2 others forcing a dozen homes to be evacuated as power lines draped across them. No one was injured and there was minimal damage to the homes.
03-Jun-06	Severe Wind	A thunderstorm complex developed over the city of Tucson knocking down and damaging power poles in three separate locations. The storm also produced blowing dust reducing visibility to near zero in many locations. Approximately 30 power poles were damaged or snapped causing more than 24,000 customers to lose power. Fortunately, there were no major injuries reported.
06-Jun-06	Severe Wind	A series of thunderstorms marched across the greater Tucson metropolitan area knocking down power poles, producing golf ball sized hail and creating blowing dust. Approximately 10 power poles fell in 5 different locations damaging two vehicles and closing a portion of Interstate 10. Neither the large hail nor the reduced visibility from blowing dust sparked any reports of injury or damage.
25-Jun-06	Severe Wind	A thunderstorm outflow caused power lines to be knocked down leaving about 2600 homes without power.
27-Jun-06	Severe Wind	A thunderstorm outflow caused power lines to be knocked down leaving the entire town of Ajo without power.
29-Jun-06	Severe Wind	A thunderstorm outflow caused damage to paneling of a mobile and adjacent fencing.
01-Jul-06	Severe Wind	A strong thunderstorm wind gust caused a 2 foot diameter, 40 foot tall tree to be snapped in half 5 miles west southwest of the Town of Catalina.
7/2/2006	Hazardous Materials Incident	THE CALLER REPORTED THAT FOUR LOCOMOTIVES AND SIX RAILCARS DERAILED DUE TO UNKNOWN REASONS. ALL FOUR LOCOMOTIVES ARE IN THE UPRIGHT POSITION AND THE RAILCARS ARE LYING ON THEIR SIDES. THE LOCAL FIRE DEPARTMENT IS REPORTING THAT HYDROCHLORIC ACID IS LEAK;RAILROAD incident;Material was HYDROCHLORIC ACID;the amount was 0 UNKNOWN AMOUNT

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
23-Aug-05	Flooding	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
01-Sep-05	Flooding	SELLS	0	0	$5,000	$0	$5,000	NCDC, 2010
06-Oct-05	Severe Wind	TUCSON	0	0	$45,000	$0	$45,000	NCDC, 2010
11/5/2005	Hazardous Materials Incident			1	$200	$0	$200	NRC, 2010
02-Jun-06	Severe Wind	TUCSON	0	0	$90,000	$0	$90,000	NCDC, 2010
03-Jun-06	Severe Wind	TUCSON	0	0	$300,000	$0	$300,000	NCDC, 2010
06-Jun-06	Severe Wind	TUCSON	0	0	$105,000	$0	$105,000	NCDC, 2010
25-Jun-06	Severe Wind	TUCSON	0	0	$25,000	$0	$25,000	NCDC, 2010
27-Jun-06	Severe Wind	AJO	0	0	$75,000	$0	$75,000	NCDC, 2010
29-Jun-06	Severe Wind	TUCSON	0	0	$3,500	$0	$3,500	NCDC, 2010
01-Jul-06	Severe Wind	ORO VLY	0	0	$1,000	$0	$1,000	NCDC, 2010
7/2/2006	Hazardous Materials Incident	UNION PACIFIC RAILROAD MILE POST 1000		1		$0	$0	NRC, 2010

Date	Hazard	Description
04-Jul-06	Severe Wind	A strong thunderstorm on the Southeast side of the Tucson Metro area downed several trees due to strong winds. The Tucson Fire Department reported trees downed at the intersection of Irvington Road and Kolb Road as well as near Vail Road at Interstate 10.
05-Jul-06	Severe Wind	An intense thunderstorm over the south and southeast portion of the Tucson Metro Area brought strong winds that caused several areas of damage. Four 15 to 20 foot tall trees were downed near Kolb Road and Golf Links Road. Large trees were also downed causing roof damage near Wilmont Road and 29th Street. Additionally, three power poles were snapped along North Larrea Lane near the intersection of Cloud Road and Pantano Road. About 7,000 customers where without power.
05-Jul-06	Severe Wind	A thunderstorm over eastern portions of the Tucson Metro area produced strong winds which downed a large (125 foot tall) tree onto an apartment complex on Speedway Boulevard near Kolb Road. There were no injuries but eight families were evacuated from the apartment complex so that repairs could be made. Damage was estimated at the time to be about 350,000 dollars.
07-Jul-06	Flooding	Several members of the public along with trained spotters reported numerous streets flooded and several railroad underpasses flooded and closed due to very heavy rainfall. Additionally, the broadcast media reported a vehicle was trapped in rising water in Arroyo Chico wash. Also, a car was submerged in water at the Stone Avenue railroad underpass.
07-Jul-06	Severe Wind	Strong thunderstorm winds caused several 5 to 10 foot trees to be downed in the City of Oro Valley.
07-Jul-06	Severe Wind	A strong thunderstorm wind gust caused power lines to be downed near Speedway Boulevard and Wilmot Road.
07-Jul-06	Severe Wind	A thunderstorm wind gust over the Tucson Metro Area caused a metal roof to be torn off of a building which in turn sliced through a nearby power line.
13-Jul-06	Severe Wind	Very strong thunderstorm winds caused several power poles to be downed in the Village of Sells, along with several trees.
14-Jul-06	Severe Wind	Thunderstorm wind gusts on the south side of the Tucson Metro Area caused an awning to be blown off a home and onto nearby power lines. Additionally, debris that was picked up by the wind caused damage to an exposed gas line.
18-Jul-06	Lightning	Local Tucson Law Enforcement reported that lightning had started several trees on fire in an east side neighborhood. An upper level high over the four corners region kept Arizona in a moist flow. This influx of moisture helped to enhance thunderstorm activity on the 18th of July 2006. Pantano Wash at Houghton Road recorded 0.75 of an inch of rainfall on this day.
18-Jul-06	Severe Wind	A member of the local public reported a large tree downed by a strong thunderstorm wind gust on the southeast side of the Tucson Metro Area.
18-Jul-06	Severe Wind	The local broadcast media reported that strong thunderstorm wind gusts downed several power poles in the Community of Avra Valley. Additionally, a car window was blown in while driving along Interstate 10 near the Cortaro Road exit in the Town of Marana.
29-Jul-06	Flooding	Numerous roads were closed due to flooding across the Tucson Metro Area. There was also a report that there were several swift water rescues on the east side of the Tucson Metro Area due to vehicles becoming stuck in flooded roadways.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
04-Jul-06	Severe Wind	TUCSON	0	0	$2,000	$0	$2,000	NCDC, 2010
05-Jul-06	Severe Wind	TUCSON	0	0	$23,000	$0	$23,000	NCDC, 2010
05-Jul-06	Severe Wind	TUCSON	0	0	$350,000	$0	$350,000	NCDC, 2010
07-Jul-06	Flooding	TUCSON	0	0	$20,000	$0	$20,000	NCDC, 2010
07-Jul-06	Severe Wind	ORO VLY	0	0	$1,000	$0	$1,000	NCDC, 2010
07-Jul-06	Severe Wind	TUCSON	0	0	$2,000	$0	$2,000	NCDC, 2010
07-Jul-06	Severe Wind	TUCSON	0	0	$4,000	$0	$4,000	NCDC, 2010
13-Jul-06	Severe Wind	SELLS	0	0	$30,000	$0	$30,000	NCDC, 2010
14-Jul-06	Severe Wind	TUCSON	0	0	$3,000	$0	$3,000	NCDC, 2010
18-Jul-06	Lightning	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
18-Jul-06	Severe Wind	TUCSON	0	0	$1,000	$0	$1,000	NCDC, 2010
18-Jul-06	Severe Wind	MARANA	0	0	$24,000	$0	$24,000	NCDC, 2010
29-Jul-06	Flooding	TUCSON	0	0	$40,000	$0	$40,000	NCDC, 2010

Date	Hazard	Description
31-Jul-06	Flooding	Lots of flash flooding throughout the Tucson Metro Area due to saturated grounds and extremely heavy rainfall. Numerous road were closed due to flooding throughout the entire Metro Area for many hours. A United States Geological Society stream gage was destroyed by flood waters in Rincon Creek. Additionally, there were numerous swift water rescues and car stranded in flooded roadways. It was estimated that nearly 100 vehicles were flooded. Below is a list of some, but not all, of the roads that were closed due to flooding: Alvernon Way south of Sahuarita Road Camino De La Tierra north of Valencia Road Camino Loma Alta north of Old Spanish Trail El Tiro Road west of Cocio Road Fort Lowell Road at the Agua Caleinte Wash Hartman Lane from Linda Vista Boulevard to Cortaro Farms Road La Cholla Boulevard at the Canada Del Oro Wash Limberlost Road at the Agua Caleinta Wash Linda Vista Boulevard from Hartman Lane to Camino De Manana Manville Road between Reservation Road and Avra Valley Road Manville Road west of Sandario Road east of Reservation Road Old Spanish Trail at Thunderhead Ranch Road east of Colossal Cave Overton Road at the Canada Del Oro Wash Pump Station Road between Avra Valley Road and El Tiro Road Pump Station Road between Silvebell Road and Avra Valley Road River Road west of Alvernon Way Sahuarita Road from Alvernon Way to Houghton Road Sandario Road from Ajo Highway to Manville Road Silvebell Road west of Cocio Road Snyder Road between Kolb Road and Sabino Canyon Road Soliders Trail at the Agua Calienta Wash

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
31-Jul-06	Flooding	TUCSON	0	0	$750,000	$0	$750,000	NCDC, 2010

Date	Hazard	Description
31-Jul-06	Flooding	Several rivers running through the Tucson Metro Area flooded on July 31, 2006. The Rillito River flooded with water over the cement banks near Dodge Boulevard. Additionally, the Rillito River was over bankfull just east of the Swan Road Bridge. River Road near La Cholla Road was flooding from the Rillito River. Sabino Creek was out of its banks and houses were flooded near Sabino Canyon and Bear Canyon. Below is a listing of some of the damage, but not all, caused by the flooding and an estimate for the cost of repairs: Sabino Canyon Recreation area road and facility damaged, $100,000 Forty homes and businesses flooded, $1,200,000 One home destroyed due to flooding, $150,000 Water main broke near the Mt. Lemmon highway, $20,000 Catalina Highway road washed away, $50,000 Agricultural irrigation system damaged, $500,000 Cement plant flooded, $400,000 Gravel pit flooded, $30,000 General infrastructure damage, $500,000 With tropical moisture pouring into Southeast Arizona, several days of rainfall preceded the July 31st event. With grounds saturated at most locations, the additional rainfall that fell on the 31st had a hard time soaking into the ground and mainly stayed as runoff. Rivers and washes quickly filled to and over bankfull, flooding homes and businesses as well as nearby roads. Some roadways were washed away due to the strong flood waters. Below is a listing of rainfall amounts for some locations: U OF A CAMPUS 1.17 DAVIS-MONTHAN AFB 1.23 TUCSON INTERNATIONAL AIRPORT 1.90 AVRA VALLEY AIRPARK 1.07 SANTA CRUZ RIVER AT INA RD 0.67 SANTA CRUZ R/VALENCIA RD 1.26 CDO WASH/CORONADO CAMP 1.50 DAN SADDLE 1.06
08-Aug-06	Flooding	Severe storms moved through the Tucson Metro Area starting around 7 pm MST (1900 MST). These storms dropped over an inch of rain at the Tucson International Airport. Around 8:40 pm MST (2040 MST) reports of flooded roadways became widespread. A National Weather Service Employee reported roadway flooding at the intersection of Park Avenue and 6th Street. The broadcast media reported flooding along Sahuarita Road, South of Tucson, with a couple of cars stuck in the flood waters. Additionally, another five cars became stuck in the flooded intersection of East 22nd Street and South Tyndall Avenue where the water was reported to be over a foot deep and moving very rapidly. Also, a newspaper article reported that two homes were flooded due to an over flowing wash at South 2nd Avenue.
08-Aug-06	Severe Wind	Strong thunderstorm wind gusts over the City of Tucson caused four power poles to be downed at 36th Street and Forgeus Avenue.
08-Aug-06	Severe Wind	A severe thunderstorm over the City of Tucson produced strong winds that caused significant damage. Roof damage was reported on a home near the intersection of Park Avenue and 36th Street. Large trees were downed along Ajo Road. Roof damage was also sustained on six apartments on South 7th Avenue. Additionally, a roof collapsed on a home at 32nd Street and 7th Avenue.
08-Aug-06	Severe Wind	A strong thunderstorm over southwest Tucson caused significant damage due to strong winds. A trained spotter reported that several trees were uprooted at Country Club Road and Valencia Road. Additionally, the media reported that 7 seven power poles were down along Old Nogales Highway. Also, 5 trees were reported being uprooted along Aviation Highway at Country Club Road.
13-Aug-06	Severe Wind	A strong (60 mph, 52 knot) thunderstorm wind knocked down five power poles in the Town of Ajo at a sub station causing a widespread power outage. The power was reported to be out in the Towns of Ajo, Whey, and Lukeville.
14-Aug-06	Flooding	The intersection of Snyder Road and Catalina Highway was flooded and impassable. A vehicle became stuck on the intersection and a swift water rescue was performed to rescue the occupants of the vehicle.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
31-Jul-06	Flooding	TUCSON	0	0	$3,000,000	$0	$3,000,000	NCDC, 2010
08-Aug-06	Flooding	TUCSON	0	0	$75,000	$0	$75,000	NCDC, 2010
08-Aug-06	Severe Wind	TUCSON	0	0	$30,000	$0	$30,000	NCDC, 2010
08-Aug-06	Severe Wind	TUCSON	0	0	$50,000	$0	$50,000	NCDC, 2010
08-Aug-06	Severe Wind	TUCSON	0	0	$62,000	$0	$62,000	NCDC, 2010
13-Aug-06	Severe Wind	AJO	0	0	$37,000	$0	$37,000	NCDC, 2010
14-Aug-06	Flooding	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010

Date	Hazard	Description
16-Aug-06	Flooding	Lee Street at the Alamo Wash was closed due to flooding of the roadway. Water was two feet deep at crest. Additionally, a car was stalled in the intersection of 5th Street and Sahara Street due to flooding.
21-Aug-06	Severe Wind	The local newspaper reported that three large trees were uprooted in the Town of Green Valley. One of the large trees fell onto a car, causing damage to the car. One of the other trees fell onto a building, causing some damage to the building.
21-Aug-06	Severe Wind	Strong thunderstorm wind gusts caused a large billboard and power lines to be downed onto cars near the intersection of 22nd Street and Kolb Road.
23-Aug-06	Severe Wind	A severe thunderstorm produced very strong wind gusts. These wind gusts caused significant damage, with eight power poles being downed on Mission Road. Additionally, several mobile homes were damaged and some were knocked off their foundations on Ajo Way near Mission Road.
02-Sep-06	Flooding	Law Enforcement reported that two cars were stuck in a wash crossing just north of Organ Pipe Cactus National Monument due to fast moving flood waters.
07-Sep-06	Flooding	A county official reported that Highway 86 was closed at the Sikul Himath Wash due to flooding. The bridge at this wash was overtopped causing large volumes of water to flow across Highway 86. Additionally, a swift water rescue was performed on Route 19 due to a flooded roadway.
07-Sep-06	Flooding	Extremely heavy rainfall across the Tucson Metro Area on the morning on September 7th prompted widespread flash flooding. Numerous roads across the Tucson Metro Area were impassable and closed due to flooding. Additionally, at least ten vehicles became stuck in different low water crossings throughout the city. Numerous swift water rescues were performed. One man was killed when he was swept downstream by flood waters. The man was first spotted in the Rodeo Wash at the intersection of South Fletcher Avenue and East Irvington Road. His body was later discovered 15 miles downstream. Rainfall amounts throughout the Tucson Metro Area ranged from three quarters of an inch to almost two inches. The Tucson International Airport recorded 1.14 inches of rain. M?IW
08-Oct-06	Severe Wind	A nearly stationary tornado caused damage to a trailer, parked at a residence on Avra Valley Road in Marana, AZ, by blowing it onto its side. Also, a few homes near the intersection of West Avra Valley Road and North Anway Road close to the Town of Marana, AZ experienced minor damage.Upper level cut-off low pressure centered over San Diego, CA pulled sub-tropical moisture northward into Arizona which resulted in scattered showers and thunderstorms across southeastern Arizona.
27-Dec-06	Severe Wind	A microburst caused power lines to be knocked down and damaged a shed in Kinney Estates.An isolated severe thunderstorm developed along the leading edge of an upper level low pressure approaching Arizona.
17-Mar-07	Severe Wind	A microburst brought down seven power poles in Tucson along Irvington Road between Camino Seco and Harrison leaving about 2675 structures without power.A weak mid level disturbance combined with record heat caused a storm which produced a microburst.
28-Apr-07	Wildfire	Fagan Fire - a lightning caused fire burned an area 2 miles south of Corona de Tucson. The fire started April 28, 2007 and was controlled May 6, 2007, and burned a total of 536 acres with over $160,000 in fire suppression costs.
16-May-07	Flooding	Flash flooding from thunderstorms caused a vehicle to be swept into fast moving water at North Bobcat Ridge Trail and West Ina Road on the northwest side of Tucson. The vehicle was washed downstream for about 200 feet before coming to a stop on a bank.An increase in low level moisture combined with a weak upper level disturbance and generated isolated thunderstorms across the Tucson area. These storms produced heavy rainfall and flash flooding.
17-Jun-07	Wildfire	Buena Fire - a human caused fire burned an area 9.5 miles northeast of Highway 286/Arivaca Road Junction. The fire started June 17, 2007 and containment expected June 18, 2007, and burned a total of 1,151 acres with over $110,000 in fire suppression costs.
27-Jun-07	Wildfire	Mansfield Fire - a lightning caused fire burned an area 8 miles northwest of Patagonia, Arizona. The fire started June 27,2007 and expected containment was July 4, 2007, and burned a total of 860 acres with over $500,000 in fire suppression costs.
05-Jul-07	Severe Wind	A strong thunderstorm caused damage on the north side of Tucson. Winds caused damage at the Rillito racetrack to stable roofs and bent beams on the grandstand. Power lines were also blown over at the intersections of Campbell Road and Roger Road, Stone Road and Roger Road and at Stone Road and Country Club Road.Moist easterly monsoonal flow caused isolated thunderstorms over the city of Tucson.
7-Jul-07	Wildfire	Alambre Fire - a lightning caused fire that burned an area 12 miles east of Sells, Arizona. The fire started July 7, 2008 and was controlled July 24, 2007, and burned a total of 7,267 acres with over $2,340,000 in fire suppression costs.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
16-Aug-06	Flooding	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
21-Aug-06	Severe Wind	GREEN VLY	0	0	$30,000	$0	$30,000	NCDC, 2010
21-Aug-06	Severe Wind	TUCSON	0	0	$45,000	$0	$45,000	NCDC, 2010
23-Aug-06	Severe Wind	TUCSON	0	0	$105,000	$0	$105,000	NCDC, 2010
02-Sep-06	Flooding	AJO	0	0	$15,000	$0	$15,000	NCDC, 2010
07-Sep-06	Flooding	SELLS	0	0	$5,000	$0	$5,000	NCDC, 2010
07-Sep-06	Flooding	TUCSON	1	0	$80,000	$0	$80,000	NCDC, 2010
08-Oct-06	Severe Wind	MARANA	0	0	$13,000	$0	$13,000	NCDC, 2010
27-Dec-06	Severe Wind	TUCSON	0	0	$15,000	$0	$15,000	NCDC, 2010
17-Mar-07	Severe Wind	WILMOT JCT	0	0	$56,000	$0	$56,000	NCDC, 2010
28-Apr-07	Wildfire			1				GACC, 2010
16-May-07	Flooding	CORTARO	0	0	$2,000	$0	$2,000	NCDC, 2010
17-Jun-07	Wildfire							GACC, 2010
27-Jun-07	Wildfire							GACC, 2010
05-Jul-07	Severe Wind	TUCSON	0	0	$75,000	$0	$75,000	NCDC, 2010
7-Jul-07	Wildfire							GACC, 2010

Date	Hazard	Description
18-Jul-07	Severe Wind	Approximately 100 trees were uprooted and knocked down at Oro Valley Country Club on Greenock Road due to a wet microburst. An additional 30 trees were uprooted at a nearby shopping plaza at Oracle Road and 1st Avenue. The uprooted trees caused roof damage to several houses. The storms also blew off part of a roof at the Blue Moon stables in Oro Valley.A moist easterly flow due to high pressure over the four corners combined with daytime heating to cause severe thunderstorms with strong winds.
19-Jul-07	Severe Wind	A tree was downed across Tanque Verde Road near the Pantano Wash.Abundant monsoonal moisture caused numerous thunderstorms across much of Southeast Arizona.
19-Jul-07	Severe Wind	Power lines were knocked down along Miracle Mile Strip in Tucson.Abundant monsoonal moisture caused numerous thunderstorms across much of Southeast Arizona.
19-Jul-07	Severe Wind	A trained spotter reported an estimated wind gust to 60 mph in Green Valley. On Abrego drive in Green Valley there were two downed trees and a huge pecan tree was uprooted near the entrance to La Posada off Continental Road. In addition, five power poles were downed on Hawk Road east of Canoa Road in Green Valley.Abundant monsoonal moisture caused numerous thunderstorms across much of Southeast Arizona.
20-Jul-07	Severe Wind	A tin roof was blown off of a Carport at Santa Rosa Ranch on the Tohono O'odham Nation due to strong winds from thunderstorms.Runoff from excessive rainfall on July 19th caused washes to flow across the Tucson Metro area. In addition, new thunderstorms developed later in the day across Cochise County.
21-Jul-07	Severe Wind	Two mobile homes were destroyed and a traditional home partially destroyed in the Ventana Section of the Tucson Foothills. There were two uprooted trees at Grant Road and Kolb Road in Tucson and an estimated 60 mph gust due to thunderstorms in Tucson. A roof also collapsed at a furniture store near 22nd street and Wilmot road. In addition, these thunderstorms knocked down about 20 power poles near Palo Verde Road and Irvington Road. There were 18,000 customers without power in the Tucson area.Daytime heating in combination with a moist flow caused thunderstorms to develop across Southeast Arizona.
23-Jul-07	Flooding	Localized areas in the midtown of Tucson had over one inch of rainfall causing flash flooding. A car had been swept nearly 100 yards down Rodeo Wash east of North Avenue and West Irvington Road. One stalled car was trapped under several feet of water in the Stone Avenue underpass near downtown. There was also a swift water rescue near Kleindale and Tucson Boulevard. At Fort Lowell Road and North Mountain Avenue several vehicles were trapped in flooding washes.Strong thunderstorms caused high winds and excessive rainfall throughout the Tucson Metro area and a dust storm in Pinal County.
23-Jul-07	Severe Wind	Microburst near Tangerine and Interstate 10 in the Gladden Farms neighborhood caused some tree and roof damage.Strong thunderstorms caused high winds and excessive rainfall throughout the Tucson Metro area and a dust storm in Pinal County.
23-Jul-07	Severe Wind	Twelve power poles were knocked down due to strong winds along Houghton Road north of Valencia Road leaving 1400 customers without power. There was also a 60 foot tree uprooted in Tucson due to a wet microburst.Strong thunderstorms caused high winds and excessive rainfall throughout the Tucson Metro area and a dust storm in Pinal County.
24-Jul-07	Severe Wind	Thunderstorms across the city of Tucson caused scattered wind damage including:|Several trees down on Golf Links Road between Swan Road and Craycroft Road. |A downed power line at Grant Road and Alvernon Road. |A downed tree which fell on a car at Williams Center near Broadway Boulevard and Rosemont Road. |Several large trees downed on Swan Road north of Sunrise Road. |A 70 foot tree blew down onto the side of the Broadway East Community Center near Broadway and Wilmot.|Moist southerly tropical flow over Arizona due to an area of low pressure off the California coast caused thunderstorms and flash flooding across Southeast Arizona.
27-Jul-07	Severe Wind	Power poles down near Golf Links and Prudence in Tucson.Strong and slow moving thunderstorms with heavy rain and strong winds moved through portions of the Tucson area causing flash flooding and wind damage.
27-Jul-07	Severe Wind	Strong winds from a thunderstorm knocked down about 20 large power poles along North 11th Avenue south of Speedway Blvd. in Tucson.Strong and slow moving thunderstorms with heavy rain and strong winds moved through portions of the Tucson area causing flash flooding and wind damage.
28-Jul-07	Flooding	Sinkhole in road occurred at River Road and Craycroft Road.Strong and slow moving thunderstorms caused excessive rainfall, flash flooding and wind damage across portions of Southeast Arizona.
28-Jul-07	Severe Wind	Over a dozen trees and at least two power lines were downed near Fort Lowell and Dodge Blvd.Strong and slow moving thunderstorms caused excessive rainfall, flash flooding and wind damage across portions of Southeast Arizona.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
18-Jul-07	Severe Wind	ORO VLY	0	0	$150,000	$0	$150,000	NCDC, 2010
19-Jul-07	Severe Wind	FLECHA CAIDA ESTATES	0	0	$1,000	$0	$1,000	NCDC, 2010
19-Jul-07	Severe Wind	TUCSON	0	0	$10,000	$0	$10,000	NCDC, 2010
19-Jul-07	Severe Wind	GREEN VLY	0	0	$40,000	$0	$40,000	NCDC, 2010
20-Jul-07	Severe Wind	SELLS	0	0	$1,000	$0	$1,000	NCDC, 2010
21-Jul-07	Severe Wind	TUCSON	0	0	$225,000	$0	$225,000	NCDC, 2010
23-Jul-07	Flooding	TUCSON	0	0	$5,000	$0	$5,000	NCDC, 2010
23-Jul-07	Severe Wind	RILLITO	0	0	$25,000	$0	$25,000	NCDC, 2010
23-Jul-07	Severe Wind	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
24-Jul-07	Severe Wind	TUCSON	0	0	$25,000	$0	$25,000	NCDC, 2010
27-Jul-07	Severe Wind	TUSCON COUNTRY CLUB	0	0	$20,000	$0	$20,000	NCDC, 2010
27-Jul-07	Severe Wind	TUCSON	0	0	$200,000	$0	$200,000	NCDC, 2010
28-Jul-07	Flooding	FLECHA CAIDA ESTATES	0	0	$100,000	$0	$100,000	NCDC, 2010
28-Jul-07	Severe Wind	TUCSON	0	0	$17,000	$0	$17,000	NCDC, 2010

Date	Hazard	Description
31-Jul-07	Flooding	Numerous streets flooded in downtown Tucson including the 4th avenue shopping district with many businesses flooded. Six people were rescued at Alvernon Road and Interstate 10 in flood waters. Isolated rainfall amounts of 2-3 inches occurred from Davis-Monthan Air Force Base to the South side of Tucson.Strong thunderstorms in Eastern and Central Pima County due to abundant monsoon moisture extensive flash flooding.
31-Jul-07	Flooding	One person drowned in a car that got swept into Rodeo Wash near east Irvington Road.Strong thunderstorms in Eastern and Central Pima County due to abundant monsoon moisture extensive flash flooding.
04-Aug-07	Flooding	Large wall of water moved down seven falls in Bear Canyon. About 50 people sought higher ground and many of those needed to be rescued by helicopter.Strong thunderstorms produced heavy rainfall over the higher terrain of the Catalina Mountains. This heavy rainfall produced a flash flood which moved downstream into Bear Canyon and the popular Seven Falls area causing two fatalities. Flash flooding also occurred in the Whetstone area of Cochise County.
10-Aug-07	Severe Wind	Power lines were reported down at Oracle road and River road.Severe thunderstorms occurred across Eastern Pima County producing considerable wind damage and flash flooding on the northwest side of Tucson.
10-Aug-07	Severe Wind	Seven to ten trees downed at Ina road and La Canada road. Trees were up to 12 inches in diameter.Severe thunderstorms occurred across Eastern Pima County producing considerable wind damage and flash flooding on the northwest side of Tucson.
10-Aug-07	Severe Wind	Numerous trees were downed due to strong thunderstorm winds in the vicinity of Oracle road and Ina road. Largest tree was about 6 inch diameter and the others 4 to 5 inches in diameter.Severe thunderstorms occurred across Eastern Pima County producing considerable wind damage and flash flooding on the northwest side of Tucson.
11-Aug-07	Severe Wind	Roof blown off house in Topawa.Monsoon thunderstorms produced a microburst over the Tohono O'odham Nation.
13-Aug-07	Lightning	A suspected illegal immigrant was struck and injured by lightning while traveling through the desert of the Altar Valley near Sasabe. Three of his companions were also shocked when the bolt hit the man who suffered minor injuries.A severe thunderstorm caused extensive damage to a neighborhood near Eloy in Pinal County. Meanwhile, southwest of Tucson, lightning struck a suspected illegal immigrant in the Altar Valley.
15-Aug-07	Severe Wind	A roof was blown off a house near Irvington road and sunset road.An early morning thunderstorm caused wind damage on the Southwest side of Tucson.
24-Aug-07	Severe Wind	Several power poles and a tree were reported down near 22nd street between Swan Road and Columbus Road.Scattered thunderstorms across Southeast Arizona caused hail and wind damage in Tucson and flash flooding in Nogales.
01-Sep-07	Severe Wind	An off duty National Weather Service employee reported several large tree limbs broken near Ina Road and Mona Lisa Road.Monsoonal moisture produced severe thunderstorms with wind damage on the Northwest side of Tucson and east of Ajo in Western Pima County.
01-Sep-07	Severe Wind	Power lines were downed east of Ajo causing a complete power outage across Western Pima County.Monsoonal moisture produced severe thunderstorms with wind damage on the Northwest side of Tucson and east of Ajo in Western Pima County.
27-Jan-08	Flooding	Localized amounts of rainfall in excess of 8 inches occurred on Mt. Lemmon causing extensive flooding and rock slides. Several people in Tucson needed to be rescued from flowing washes.A trough of low pressure off the Western U.S. coast helped transport abundant moisture into Southeast Arizona. Heavy rainfall occurred in the mountains causing flooding in the Catalinas and stream flooding in Greenlee County.
9-May-08	Wildfire	Solano Fire - a human caused fire burned an area 20 miles east of Sells, Arizona. The fire started May 9, 2009 and burned a total of 2,545 acres with over $1,325,000 in fire suppression costs.
23-Jun-08	Wildfire	White Tank Fire - an unknown caused fire burned an area 10 miles east of Town of Arivaca, Arizona. The fire started June 23, 2008 and expected containment was June 29, 2008, and burned a total of 8,135 acres with over $777,300 in fire suppression costs.
26-Jun-08	Wildfire	Chimenea WFU Fire - a lightning caused fire burned an area 12 miles east of Tucson, Arizona and 13 miles northeast5 of Vail, Arizona. The fire started June 26, 2008 and burned a total of 120 acres with over $75,000 in fire suppression costs.
12-Jul-08	Flooding	Two to three inches of rainfall occurred in the border town of Lukeville, Arizona. This caused flooding and damage to private property, businesses and government offices with water several feet high. A report from officials at Organ Pipe Cactus National Monument stated a recently built fence along the international border exacerbated the flooding as a result of the fence acting like a dam and stopping the normal progression of water through the border.
13-Jul-08	Severe Wind	Davis Monthan Air Force Base recorded a gust to 64 mph as the result of a wet microburst. Nearby damage just east of the base included 13 power poles downed and a roof blown off a home and onto several cars in the vicinity of Escalante Road just to the east of Kolb Road.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
31-Jul-07	Flooding	TUCSON	0	0	$100,000	$0	$100,000	NCDC, 2010
31-Jul-07	Flooding	TUCSON	1	0	$0	$0	$0	NCDC, 2010
04-Aug-07	Flooding	TUCSON	2	0	$0	$0	$0	NCDC, 2010
10-Aug-07	Severe Wind	CASAS ADOBES	0	0	$10,000	$0	$10,000	NCDC, 2010
10-Aug-07	Severe Wind	CASAS ADOBES	0	0	$10,000	$0	$10,000	NCDC, 2010
10-Aug-07	Severe Wind	CASAS ADOBES	0	0	$50,000	$0	$50,000	NCDC, 2010
11-Aug-07	Severe Wind	TOPAWA	0	0	$15,000	$0	$15,000	NCDC, 2010
13-Aug-07	Lightning	SASABE	0	4	$0	$0	$0	NCDC, 2010
15-Aug-07	Severe Wind	DREXEL HGTS	0	0	$15,000	$0	$15,000	NCDC, 2010
24-Aug-07	Severe Wind	TUCSON	0	0	$15,000	$0	$15,000	NCDC, 2010
01-Sep-07	Severe Wind	CASAS ADOBES	0	0	$1,000	$0	$1,000	NCDC, 2010
01-Sep-07	Severe Wind	AJO	0	0	$25,000	$0	$25,000	NCDC, 2010
27-Jan-08	Flooding	SUMMERHAVEN	0	0	$777,000	$0	$777,000	NCDC, 2010
9-May-08	Wildfire							GACC, 2010
23-Jun-08	Wildfire							GACC, 2010
26-Jun-08	Wildfire							GACC, 2010
12-Jul-08	Flooding	Lukeville	0	0	$25,000	$0	$25,000	NCDC, 2010
13-Jul-08	Severe Wind	1 Mile East of (dma)davis Monthan A	0	0	$135,000	$0	$135,000	NCDC, 2010

Date	Hazard	Description
19-Jul-08	Flooding	A vehicle was found near 15th Avenue and Mable Street where a man had been swept away due to flash flooding. EPISODE NARRATIVE: A mesoscale convective system developed across Southeast Arizona resulting in heavy rainfall and flash flooding.
22-Jul-08	Lightning	An 18 year old man was struck by lightning and injured while working on the roof of a house. EPISODE NARRATIVE: Strong to severe thunderstorms developed across portions of Southeast Arizona resulting in large hail and flash flooding.
3-Aug-08	Flooding	Swift water rescue was attempted at Sells Wash near Sells. The vehicle was washed away attempting to cross wash. Three people died and two were rescued.
3-Aug-08	Severe Wind	A roof was partially blown off a house east of Sells.
7-Aug-08	Lightning	Lightning sparked a fire in a vacant home on the southwest side of Tucson near West Valencia and South Mission Roads. EPISODE NARRATIVE: Strong thunderstorms with locally heavy rainfall developed across Southeast Arizona resulting in flash flooding, sporadic wind and lightning damage.
13-Aug-08	Severe Wind	Extensive wind damage occurred on the north side of Tucson due to a microburst. Damage reported included 28 power poles knocked down including a dozen at River Road and Dodge Blvd resulting in 35,000 customers without power, some for an extended period as much as two days. Damage was also reported at the Jewish Community Center near River Road and Alvernon Way. There was also roof damage to numerous businesses and hundreds of trees knocked down.
8/23/2008	Hazardous Materials Incident	CALLER REPORTED THAT THERE WAS A TWO VEHICLE COLLISION BETWEEN A TRACTOR TRAILER AND ANOTHER VEHICLE. THE TRACTOR TRAILER WAS A HAZMAT CHARACTER. THE SECOND VEHICLE WAS A TOW TRUCK. THE TRACTOR TRAILER SWERVED AROUND THE TOW TRUCK CAUSING THE ACCIDENT.;MOBILE incident;Material was OIL: DIESEL;the amount was 100 GALLON(S)
8/23/2008	Hazardous Materials Incident	CALLER REPORTED THAT THERE WAS A TWO VEHICLE COLLISION BETWEEN A TRACTOR TRAILER AND ANOTHER VEHICLE. THE TRACTOR TRAILER WAS A HAZMAT CHARACTER. THE SECOND VEHICLE WAS A TOW TRUCK. THE TRACTOR TRAILER SWERVED AROUND THE TOW TRUCK CAUSING THE ACCIDENT.;MOBILE incident;Material was NITRIC ACID;the amount was 1 GALLON(S)
31-Aug-08	Flooding	A swift water rescue occurred along Highland ave. at Arroyo Chico. Numerous streets in the city of Tucson were also impassable.
11-Sep-08	Flooding	A swift water rescue occurred on Sahuarita Road between Wilmot Road and Kolb Road.
16-Feb-09	Lightning	A suspected illegal immigrant in the Altar valley was struck by lightning and suffered minor injuries.
28-Mar-09	Wildfire	Fresnal Fire - a human caused fire burned an area 15 miles southeast of Sells, Arizona. The fire started March 28, 2009 and expected containment was April 1, 2009, and burned a total of 237 acres with over $75,000 in fire suppression costs.
29-May-09	Wildfire	Melendrez Pass Fire - a lightning caused fire burned an area 10 miles east of Green Valley, Arizona. The fire started May 29, 2009 and was controlled June 6, 2009, and burned a total of 5,800 acres with over $450,000 in fire suppression costs.
11-Jun-09	Wildfire	Elk Horn Fire - a human caused fire burned an area 26 miles southwest of Three Points, Arizona. The fire started June 11, 2009 and expected containment was June 22, 2009, and burned a total 23,440 acres with over $1,070,000 in fire suppression costs.
29-Jun-09	Severe Wind	Severe thunderstorm outflow winds tore a portion of the roofing material off a strip mall store near the intersection of Grant and Campbell. The debris from the roof blew into the parking lot, but resulted in no injuries. Winds from the same thunderstorm uprooted trees at the intersection of Pantano and 22nd Street, and damaged an awning on a mobile home. One woman and one child received minor injuries after a tree limb fell on them on the 1800 block of Mission Road. A large tree also fell onto two vehicles.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
19-Jul-08	Flooding	1 Miles North East of Emery Park	1	0	$0	$0	$0	NCDC, 2010
22-Jul-08	Lightning	1 Mile North of Sahuarita	0	1	$0	$0	$0	NCDC, 2010
3-Aug-08	Flooding	1 Miles South West of Wickchoupai	3	0	$0	$0	$0	NCDC, 2010
3-Aug-08	Severe Wind	1 Mile East South East of Chiawuli Tak	0	2	$15,000	$0	$15,000	NCDC, 2010
7-Aug-08	Lightning	3 Miles South of Drexel Hgts	0	0	$210,000	$0	$210,000	NCDC, 2010
13-Aug-08	Severe Wind	4 Miles North North East of Tucson	0	0	$2,500,000	$0	$2,500,000	NCDC, 2010
8/23/2008	Hazardous Materials Incident	I 10 WEST BOUND, AT CORTARO ROAD	2			$0	$0	NRC, 2010
8/23/2008	Hazardous Materials Incident	I 10 WEST BOUND, AT CORTARO ROAD	2			$0	$0	NRC, 2010
31-Aug-08	Flooding	5 Miles South of Pantano	0	0	$15,000	$0	$15,000	NCDC, 2010
11-Sep-08	Flooding	5 Miles North North West of Helvetia	0	0	$15,000	$0	$15,000	NCDC, 2010
16-Feb-09	Lightning	8 Miles North West of Las Guijas	0	1	$0	$0	$0	NCDC, 2010
28-Mar-09	Wildfire							GACC, 2010
29-May-09	Wildfire							GACC, 2010
11-Jun-09	Wildfire			5				GACC, 2010
29-Jun-09	Severe Wind	1 Mile North West of Tucson	0	2	$16,000	$0	$16,000	NCDC, 2010

Date	Hazard	Description
30-Jun-09	Flooding	Heavy thunderstorm rainfall of 1 to 2 inches fell in only a 30 minute period near State Highway 86 and Three Points. Significant flooding of washes and low water crossings occurred. The Three Points fire department reported several roads were washed out and impassable in the Three Points area. The local law enforcement reported a swift water rescue was performed near the intersection of California and Worden Roads at approximately 9 PM MST.
30-Jun-09	Severe Wind	Severe thunderstorm downburst winds caused significant damage at Three Points. Several mobile homes and nearby sheds were either heavily damaged or destroyed. A more substantial brick veneer building was also damaged, with varying degrees of roof damage reported to several homes in Three Points. Several large trees were uprooted completely. Winds from this severe thunderstorm were estimated to be near 85 mph. Three Points Fire reported one injury was received by flying glass, after winds blew out a house window.
15-Jul-09	Wildfire	San Juan Fire - a human caused fire burned an area south of Kitt Peak, west of Sells, Arizona. The fire started July 15, 2009 and was controlled July 21, 2009, and burned a total of 9,200 acres with over $305,000 in fire suppression costs.
7/24/2009	Hazardous Materials Incident	CALLER REPORTED A TRACTOR TRAILER CAUGHT ON FIRE HAULING HAZARDOUS MATERIAL DUE TO UNKNOWN REASONS.;MOBILE incident;Material was UNKNOWN MATERIAL;the amount was 0 UNKNOWN AMOUNT
9/10/2009	Hazardous Materials Incident	ASPHALT SPILL FROM TANKER TRUCK (INFORMATION PROVIDED VIA WEB REPORT). MATERIAL ENTERED A STORM DRAIN WHICH IS A TRIBUTARY OF THE SANTA CRUZ RIVER. HOWEVER, NO MATERIAL REACHED THE RIVER.;MOBILE incident;Material was ASPHALT;the amount was 500 GALLON(S)
26-Oct-09	Wildfire	Three Peaks Fire - a human caused fire burned an area 10 miles northwest of Sasabe, Arizona. The fire started October 26, 2009 and was controlled November 6, 2009, and burned a total of 5,750 acres with over $195,000 in fire suppression costs.
21-Jan-10	Flooding	Sixteen hikers were trapped on Sabino Canyon Trail at approximately 11 AM on January 21st after the stream rose above its banks, covering low water crossings. The San Simon and Vamori Washes in the Tohono Oodham Nation rose 1-2 feet out of their banks during the evening of January 21st. Several other washes flowed out of their banks, resulting in barricaded roadways near Saguaro National Park East and West, including East Tucson and Avra Valley. A motorist was trapped in the Canada del Oro Wash near Rancho del Lago at approximately 7 AM on January 22nd. A swift water rescue was performed to rescue the stranded motorist. EPISODE NARRATIVE: An exceptionally strong Pacific storm system impacted southeast Arizona, producing a wide variety of weather. Widespread heavy valley rain and higher elevation snow affected all of southeast Arizona. Additionally, the storm produced a significant wind event, with strong and damaging winds reported at many locations, along with areas of blowing dust. Heavy rainfall and melting snowpack produced some flooding of area streams and washes, and the combination of heavy snow and strong winds produced blizzard conditions on the highest elevations at times. Also, several severe thunderstorms produced wind damage during the evening of the 21st.
10-Jul-10	Lightning	Two men were injured due to a lightning strike on a golf course. One man suffered life threatening injuries, which he later died from. Another man was about 50 feet away, and received a milder shock from the lightning strike.
17-Jul-10	Severe Wind	Severe thunderstorm winds caused damage across southern portions of Tucson. A trained spotter reported several trees downed near Rita Ranch at 5 PM MST. Power lines were reported down by the winds at two different locations near the Tucson International Airport. Thunderstorm winds ripped the roof off a mobile home near the intersection of Interstate 19 and Valencia Road. In addition, several other trees and power lines were downed by the thunderstorm winds across southwest portions of Tucson. One of these trees was downed on a residence.
20-Jul-10	Lightning	A lightning strike caused a house fire during the early morning hours of July 20th. The lightning strike likely occurred around 1 AM as storms impacted north Tucson, with the sparks smoldering in the roof's insulation until a neighbor noticed the fire spreading around 5 AM. The fire resulted in extension damage to the home before the fire was extinguished. EPISODE NARRATIVE: High pressure aloft was centered over central Arizona on July 19th. Numerous thunderstorms rotated around this upper high, and affected much of southeast Arizona during the afternoon and evening hours. Afternoon and early evening storms impacted mainly Cochise and Santa Cruz counties, with late evening and early morning storms impacting the Tucson metro area.
30-Jul-10	Flooding	Heavy rain caused poor visibility and ponding of water on Interstate 10. The driver of an automobile lost control of vehicle in the rain and crashed into a semi-tractor trailer which had slowed to under 15 mph because of the rain. The driver of the automobile died at the scene. In addition, heavy rain caused a berm to breach, which flooded an equestrian center. Hay and feed used for horses at the facility was ruined.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
30-Jun-09	Flooding	2 Miles North West of Three Pts	0	0	$50,000	$0	$50,000	NCDC, 2010
30-Jun-09	Severe Wind	Three Pts	0	1	$150,000	$0	$150,000	NCDC, 2010
15-Jul-09	Wildfire							GACC, 2010
7/24/2009	Hazardous Materials Incident	I10 EASTBOUND	1			$0	$0	NRC, 2010
9/10/2009	Hazardous Materials Incident	I-10 WB @ EXIT 252 @ TUCSON, AZ			$2,000	$0	$2,000	NRC, 2010
26-Oct-09	Wildfire							GACC, 2010
21-Jan-10	Flooding	25 Miles South East of Tucson	0	0	$10,000	$0	$10,000	NCDC, 2010
10-Jul-10	Lightning	3 Miles East of (dma)davis Monthan A	1	1	$0	$0	$0	NCDC, 2010
17-Jul-10	Severe Wind	5 Miles North West of Vail	0	0	$55,000	$0	$55,000	NCDC, 2010
20-Jul-10	Lightning	2 Miles South South East of Casas Adobes	0	0	$80,000	$0	$80,000	NCDC, 2010
30-Jul-10	Flooding	1 Mile South South West of Naviska	0	0	$20,000	$0	$20,000	NCDC, 2010

Date	Hazard	Description
30-Jul-10	Flooding	Torrential rainfall across portions of eastern Pima county resulted in numerous reports of flash flooding in the Tucson metro area. Flash flooding was observed on Tanque Verde Creek. The flow of the creek peeked at 11.69 feet at Tanque Verde Guest Ranch, resulting in the flooding of approximately 30 homes on Barbary Coast Road, Gold Dust Road, and Kitt Carson. Additionally, numerous swift water rescues were performed in the Tucson metro area, near the county fairgrounds, in the Recon Valley area, and on the Old Spanish Trail in the Hilton Head Ranch area. EPISODE NARRATIVE: Numerous thunderstorms formed within a very moist atmosphere over southeast Arizona, producing heavy flooding rainfall at many locales. Many creeks, washes and rivers experienced heavy runoff and elevated flows.
15-Aug-10	Severe Wind	Local broadcast media reported up to 3 dozen trees damaged or uprooted in Rancho Vistoso neighborhood. A few ceramic roof tiles were also blown off homes. In addition, a NWS Employee reported several trees down in Dove Mountain with one tree leaning up against a home. There was only slight tile damage to the home. Also, local broadcast media reported trees and power lines down in Marana at Interstate 10 and Marana/Trico Road as well as a roof ripped off a mobile home. The Marana Airport also sustained damage. Two small airplanes were ripped from their tie down chains and were flipped over while another plane was blown into a field. A large hangar door was blown off its tracks and a few other hangars also sustained light damage. In the same area, several power poles and lines were downed on Twin Peaks Road east of N. Sandario Road.
24-Aug-10	Lightning	After a majority of the thunderstorm activity had started to wind down, lightning struck a house in Oro Valley. The house then caught fire causing extensive damage.
24-Aug-10	Severe Wind	Thunderstorms developed over eastern portions of the Tucson area around 2:30 pm MST. Storms slowly moved to the east at around 5 to 10 mph dropping heavy rainfall and putting out thunderstorm winds in excess of 60 mph. The first reports of damage were received at 3 pm on the east side of Tucson. Several tree limbs were downed on Columbus Blvd, with a few power poles down on 6th street. At 3:09 pm, reports were received of several street signs down in the La Paloma Estates. By 3:15 pm, reports were coming in from the media about several roofs damaged in eastern sections of Tucson. Also around 3:15 pm, spotters reported several large trees downed in east Tucson, including trees down on 22nd St and Broadway Blvd. A large was blown into an election polling station building near S. Alvernon and E. Benson Highways in southern Tucson.

					Damage Estimates			
Date	**Hazard**	**Location**	**Fatalities**	**Injuries**	**Property**	**Crop/Livestock**	**Total**	**Data Source**
30-Jul-10	Flooding	22 Miles East North East of Tucson	0	0	$500,000	$0	$500,000	NCDC, 2010
15-Aug-10	Severe Wind	2 Miles North North West of Oro Vly	0	0	$100,000	$0	$100,000	NCDC, 2010
24-Aug-10	Lightning	4 Miles North East of Oro Vly	0	0	$100,000	$0	$100,000	NCDC, 2010
24-Aug-10	Severe Wind	4 Miles South of Sabino	0	0	$85,000	$0	$85,000	NCDC, 2010

Appendix E

Plan Maintenance Review Memorandums