

ORDINANCE No. 2017-58

AN ORDINANCE AMENDING THE CITY OF LEON VALLEY CODE OF ORDINANCES, CHAPTER 1, ARTICLE 1: EMERGENCY MANAGEMENT; CREATING DIVISION 3. HAZARD MITIGATION PLAN.

WHEREAS, natural hazards in the City of Leon Valley area historically have caused significant disasters with losses of life and property and natural resources damage; and

WHEREAS, the Federal Disaster Mitigation Act of 2000 and Federal Emergency Management Agency (FEMA) require communities to adopt a hazard mitigation action plan to be eligible for the full range of pre-disaster and post-disaster federal funding for mitigation purposes; and

WHEREAS, FEMA requires that communities update hazard mitigation action plans every five years in order to be eligible for the full range of pre-disaster and post-disaster federal funding for mitigation purposes; and

WHEREAS, the City of Leon Valley has assessed the community's potential risks and hazards and is committed to planning for a sustainable community and reducing the long-term consequences of natural and man-caused hazards; and

WHEREAS, the Bexar County Hazard Mitigation Plan outlines a mitigation vision, goals and objectives; assesses risk from a range of hazards; and identifies risk reduction strategies and actions for hazards that threaten the community. **NOW, THEREFORE,**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEON VALLEY, TEXAS, THAT:

Section 1. The Bexar County Hazard Mitigation Plan attached hereto and incorporated herein as Attachment 1 is hereby approved in its entirety.

Section 2. Available funding opportunities for implementation of the proposals designated therein is hereby authorized, and upon acceptance and receipt of such funding or other necessary resources, is hereby authorized to implement the actions contained in the mitigation strategies.

Section 3. The Mayor of the City of Leon Valley is hereby vested with the responsibility, authority, and means to inform all parties of this action; assure that the Hazard Mitigation Plan will be reviewed at least annually; and that any necessary adjustments will be presented to the City Council for consideration.

Section 4. All ordinances or parts of ordinances in conflict with this ordinance are

hereby repealed to the extent of the conflict. All provisions, sections and sub-sections set forth in Appendix "A" Fee Schedule not revised or amended herein shall remain in effect.

Section 5. This Resolution shall become effective immediately upon passage by four (4) or more affirmative votes of the entire City Council; otherwise, said effective date shall be ten (10) days from the date of passage.

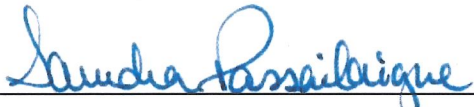
PASSED, ADOPTED AND APPROVED by the City Council of the City of Leon Valley this the 19th day of September 2017.

APPROVED

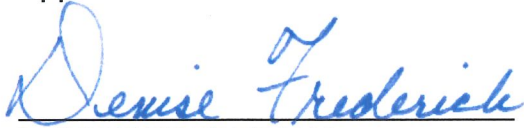

CHRIS RILEY
MAYOR



Attest:


SAUNDRA PASSAILAIGUE, TRMC
City Secretary

Approved as to Form:


DENISE FREDERICK
City Attorney

Bexar County

Hazard Mitigation Plan 2017



Mitigating Risk for a Safe, Secure, and Sustainable Future

APA: June 22, 2017



For more information, visit our website at:

www.bexar.org

Written comments should be forwarded to:

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Background

Bexar County, located in south-central Texas, is the fourth largest County in Texas and the 17th largest County nationally. Bexar County was created in December 1836, and was named for San Antonio de Béxar, one of the 23 Mexican municipalities of Texas at the time of its independence.

Bexar County is bounded by Kendall County and Comal County to the north, Guadalupe County to the northeast, Wilson County to the south east, Atascosa County to the south, Medina County to the west, and Bandera County to the northwest. The County is about 190 miles west of Houston and 140 miles from both the U.S.-Mexican border to the southwest and the Gulf of Mexico to the southeast. The county seat is the City of San Antonio, which is the second-most populous city in Texas and the seventh-largest city in the United States.

Texas is prone to extremely heavy rains and flooding with half of the world record rainfall rates (48 hours or less).¹ While flooding is a well-known risk, Bexar County is susceptible to a wide range of natural hazards, including but not limited to extreme heat, drought, hail, and winter storms. These life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for individuals.

While it is impossible to prevent an event from occurring, the effect from many hazards to people and property can be lessened. This concept is known as hazard mitigation, which is defined by the Federal Emergency Management Agency (FEMA) as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.*² Communities participate in hazard mitigation by developing hazard mitigation plans. The Texas Division of Emergency Management (TDEM) and FEMA have the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000.

Hazard mitigation activities are an investment in a community's safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A hazard mitigation plan addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that a plan identify projected patterns of how future development will increase or decrease a community's overall hazard vulnerability.

¹ http://floodsafety.com/texas/regional_info/regional_info/sanantonio_zone.htm

² <http://www.fema.gov/hazard-mitigation-planning-resources>

Section 1: Introduction

Scope and Participation

Bexar County's Plan is a multi-jurisdictional Plan. The participating jurisdictions include Bexar County, the City of Alamo Heights, the City of Balcones Heights, the City of Castle Hills, the City of China Grove, the City of Converse, the City of Elmendorf, the City of Fair Oaks Ranch, the City of Grey Forest, the City of Helotes, the City of Hill Country Village, the Town of Hollywood Park, the City of Kirby, the City of Leone Valley, the City of Live Oak, the City of Olmos Park, the City of Saint Hedwig, the City of Sandy Oaks, the City of Schertz, the City of Shavano Park, the City of Somerset, the City of Terrell Hills, the City of Universal City, the City of Von Ormy, and the City of Windcrest. These jurisdictions provided valuable input into the planning process. Throughout the plan "Bexar County planning area" refers to the entire planning area including all participating jurisdictions. Similarly, the term "countywide" refers to the entire planning area including all participating jurisdictions.

The focus of the Plan is to identify activities to mitigate hazards classified as "high" or "moderate" risk, as determined through a detailed hazard risk assessment conducted for Bexar County and the participating jurisdictions. The hazard classification enables the County and participating jurisdictions to prioritize mitigation actions based on hazards which can present the greatest risk to lives and property in the geographic scope (i.e., planning area).

Purpose

The Plan was prepared by Bexar County, participating jurisdictions, and H2O Partners, Inc. The purpose of the Plan is to protect people and structures and to minimize the costs of disaster response and recovery. The goal of the Plan is to minimize or eliminate long-term risks to human life and property from known hazards by identifying and implementing cost-effective hazard mitigation actions. The planning process is an opportunity for Bexar County, the participating jurisdictions, stakeholders, and the general public to evaluate and develop successful hazard mitigation actions to reduce future risk of loss of life and damage to property resulting from a disaster in the Bexar County planning area.

The Mission Statement of the Plan is, *"Maintaining a secure and sustainable future through the revision and development of targeted hazard mitigation actions to protect life and property."*

Bexar County, participating jurisdictions, and planning participants identified ten natural hazards to be addressed by the Plan. The specific goals of the Plan are to:

- Minimize disruption to Bexar County and the participating jurisdictions following a disaster;
- Streamline disaster recovery by articulating actions to be taken before a disaster strikes to reduce or eliminate future damage;
- Demonstrate a firm local commitment to hazard mitigation principles;
- Serve as a basis for future funding that may become available through grant and technical assistance programs offered by the State or Federal government. The Plan will enable Bexar County and participating jurisdictions to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Bexar County and participating jurisdictions maintain eligibility for the full range of future Federal disaster relief.

Section 1: Introduction

Authority



The Plan is tailored specifically for Bexar County, participating jurisdictions, and plan participants including Planning Team members, stakeholders, and the general public who participated in the Plan development process. The Plan complies with all requirements promulgated by the Texas Division of Emergency Management (TDEM) and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390), and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108-264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Additionally, the Plan complies with the Interim Final Rules for the Hazard Mitigation Planning and Hazard Mitigation Grant Program (44 CFR, Part 201), which specify the criteria for approval of mitigation plans required in Section 322 of the DMA 2000 and standards found in FEMA’s “Local Mitigation Plan Review Guide” (October 2011), and the “Local Mitigation Planning Handbook” (March 2013). Additionally, the Plan is developed in accordance with FEMA’s Community Rating System (CRS) Floodplain Management Plan standards and policies.

Summary of Sections

Sections 1 and 2 of the Plan outline the Plan’s purpose and development, including how Planning Team members, stakeholders, and members of the general public were involved in the planning process. Section 3 profiles the planning area’s population and economy.

Sections 4 through 14 present a hazard overview and information on individual natural hazards in the planning area. The hazards generally appear in order of priority based on potential losses to life and property, and other community concerns. For each hazard, the Plan presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 15 presents hazard mitigation goals and objectives. Mitigation actions for Bexar County and the participating jurisdictions are presented in Section 16, while Section 17 identifies Plan maintenance mechanisms.

The list of planning team members and stakeholders is located in Appendix A. Public survey results are analyzed and presented in Appendix B. Appendix C contains a detailed list of critical facilities for the area, and Appendix D is dam locations. Appendix E contains information regarding workshops and meeting documentation. Capability Assessment results for Bexar County and participating jurisdictions are located in Appendix F.³

³ Information contained in some of these appendices are exempt from public release under the Freedom of Information Act (FOIA).

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Plan Preparation and Development

Hazard mitigation planning involves coordination with various constituents and stakeholders to develop a more disaster-resistant community. Section 2 provides an overview of the planning process including the identification of key steps and a detailed description of how stakeholders and the public were involved.

Overview of the Plan

Bexar County hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Plan. The Consultant Team used the FEMA “Local Mitigation Plan Review Guide” (October 1, 2011), and the Local Mitigation Planning Handbook” (March 2013) to develop the Plan. The overall planning process is shown in Figure 2-1 below.

Section 2: Planning Process

Figure 2-1. Mitigation Planning Process



Bexar County, participating jurisdictions, and the Consultant Team met in May 2016 to begin organizing resources, identify Planning Team members, and conduct a Capability Assessment.

Planning Team

Key members of H2O Partners, Inc. developed the Plan in conjunction with the Planning Team. The Planning Team was established using a direct representation model. Some of the responsibilities of the Planning Team included: completing Capability Assessment surveys, providing input regarding the identification of hazards, identifying mitigation goals, and developing mitigation strategies. An Executive Planning Team consisting of key personnel from each of the participating jurisdictions as well as Bexar County, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table 2-2 reflects the Advisory Planning Team, consisting of additional representatives from area organizations and departments from the participating jurisdictions and Bexar County that participated throughout the planning process.

Table 2-1. Executive Planning Team

DEPARTMENTS	TITLE
Bexar County Office of Emergency Management	Emergency Management Coordinator
Bexar County Office of Emergency Management	Assistant Emergency Management Coordinator
City of Alamo Heights	Deputy Chief
City of Balcones Heights	Fire Chief
City of Castle Hills	Fire Department Chief

Section 2: Planning Process

DEPARTMENTS	TITLE
City of China Grove	Mayor
City of Converse	Assistant Fire Chief
City of Elmendorf	Chief of Police
City of Fair Oaks Ranch	Manager of Engineering Services
City of Grey Forest	Police Chief
City of Helotes	Emergency Management Coordinator
City of Hill Country Village	Chief of Police
Town of Hollywood Park	Fire Chief
City of Kirby	Emergency Management Coordinator
City of Leon Valley	Assistant Fire Chief
City of Live Oak	Lieutenant Police Department
City of Olmos Park	Captain
City of St. Hedwig	Mayor
City of Sandy Oaks	Fire Marshal
City of Schertz	Captain Emergency Manager
City of Schertz	Assistant Emergency Manager
City of Shavano Park	Assistant Chief Bexar-Bulverde Volunteer Fire Department
City of Somerset	City Administrator
City of Terrell Hills	Fire Chief
City of Universal City	Fire Marshal
City of Universal City	Lieutenant
City of Von Ormy	Zoning Chairman
City of Windcrest	Lieutenant Special Operations

Section 2: Planning Process

Table 2-2. Advisory Planning Team

DEPARTMENTS	TITLE
Bexar County	Project Coordinator
Bexar County Community Resources Department	Director
Bexar County Environmental	Director
Bexar County Environmental	Investigator Bexar County
Bexar County Flood Control	Project Manager
Bexar County Office of Emergency Management	CERT Regional Coordinator
Bexar County Office of Emergency Management	Intern
Bexar County Public Works	Wildland Urban Interface Coordinator
Bexar County Public Works	Project Coordinator
City of Castle Hills	Shift Captain Fire Department
City of Converse	Assistant Police Chief
City of Helotes	Public Works Director
Town of Hollywood Park	Fire Department Lieutenant
City of Live Oak	Emergency Manager
City of Live Oak	Corporal Police Department
City of Sandy Oaks	City Alderman
City of Universal City	Fire Marshal

Additionally, a Stakeholder Group was invited to participate in the planning process via e-mail. The Consultant Team, Planning Team, and Stakeholder Group coordinated to identify mitigation goals, and develop mitigation strategies and actions for the Plan. Appendix A provides a complete listing of all participating Planning Team members and stakeholders by organization and title.

Based on results of completed Capability Assessment, Bexar County and participating jurisdictions described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, several of the cities have an emergency manager on staff but no emergency operations plan or post disaster recovery plan in place. Other options for improving capabilities include the following:

- Establishing Planning Team members with the authority to monitor the Plan and identify grant funding opportunities for expanding staff.
- Identifying opportunities for cross-training or increasing the technical expertise of staff by attending free training available through FEMA and the Texas Division of Emergency Management (TDEM) by monitoring classes and availability through preparetexas.org.

Section 2: Planning Process

- Reviewing current floodplain ordinances for opportunities to increase resiliency such as modifying permitting or building codes.
- Developing ordinances that will require all new developments to conform to the highest mitigation standards.

Sample hazard mitigation actions developed with similar hazard risk were shared at the meetings. These important discussions resulted in development of multiple mitigation actions that are included in the Plan to further mitigate risk from natural hazards in the future.

The Planning Team developed hazard mitigation actions for mitigating risk from all of the hazards including potential flooding, hail, and extreme heat. The actions include but are not limited to drainage improvement projects, raising flood-prone low water crossings, installing warning systems at low water crossings, implementing policies for new building construction that encourages the incorporation of hail resistant and heat reflective materials, and educating citizens to practice hazard mitigation techniques.

Planning Process

The process used to prepare the Plan followed the four major steps included at Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kick-Off Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Bexar County's identified vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop. Finally, Plan maintenance and implementation procedures were developed and are included in Section 17. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix E.

At the Plan development workshops held throughout the planning process described herein, the following factors were taken into consideration:

- The nature and magnitude of risks currently affecting the community;
- Hazard mitigation goals to address current and expected conditions;
- Whether current resources will be sufficient for implementing the Plan;
- Implementation problems, such as technical, political, legal, and coordination issues that may hinder development;
- Anticipated outcomes; and
- How Bexar County, participating jurisdictions, agencies, and partners will participate in implementing the Plan.

Kickoff Workshop

The Kickoff Workshop was held at Bexar County Elections Building on May 4, 2016. The initial workshop informed County officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities and engaged stakeholder groups including, but not limited to the American Red Cross, the Port of San Antonio, the San Antonio Airport Fire and Police departments, and several universities. In addition to the kickoff presentation, participants received the following information:

- Project overview regarding the planning process;
- Public survey access information;
- Hazard Ranking form; and
- Capability Assessment survey for completion.

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A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Participants ranked hazards high to low in terms of perceived level of risk, frequency of occurrence, and potential impact.

Hazard Identification

At the Kickoff Workshop, and through e-mail and phone correspondence, the Planning Team conducted preliminary hazard identification. The Planning Team in coordination with the Consultant Team reviewed and considered a full range of natural hazards. Once identified, the teams narrowed the list to significant hazards by reviewing hazards affecting the area as a whole, the 2013 State of Texas Hazard Mitigation Plan Update, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the teams identified a total of ten natural hazards which pose a significant threat to the planning area.

Risk Assessment

An initial risk assessment for Bexar County and the participating jurisdictions was completed in August 2016 and results were presented to Planning Team members at the Risk Assessment Workshop held on August 31, 2016. At the workshop, the characteristics and consequences of each hazard were evaluated to determine the extent to which the planning area would be affected in terms of potential danger to property and citizens.

Potential dollar losses from each hazard were estimated using the Federal Emergency Management Agency's Hazards U.S. Multi-Hazards (MH) Model (HAZUS-MH) and other HAZUS-like modeling techniques. The assessments examined the impact of various hazards on the built environment, including general building stock (e.g., residential, commercial, industrial), critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events, provided information on previous occurrences, estimated probability of future events, and detailed the spatial extent and magnitude of impact on people and property. Each participant at the Risk Assessment Workshop was provided a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area.

The assessments were also used to set priorities for hazard mitigation actions based on potential loss of lives and dollar losses. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 14.

Mitigation Review and Development

Developing the Mitigation Strategy for the Plan involved identifying mitigation goals and new mitigation actions. A Mitigation Workshop was held at Bexar County Emergency Operations Center on November 1, 2016. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, Workshop participants emphasized the desire for flood and hurricane projects. Additionally, the County and participating jurisdictions were proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan.

An inclusive and structured process was used to develop and prioritize new hazard mitigation actions for the Plan. The prioritization method was based on FEMA's STAPLE+E criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result, each Planning Team Member assigned an overall priority to each hazard mitigation action. The overall priority of each action is reflected in the hazard mitigation actions found in Section 16.

Section 2: Planning Process

Planning Team Members then developed action plans identifying proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources.

Specifically the process involved:

- Listing optional hazard mitigation actions based on information collected from previous plan reviews, studies, and interviews with federal, state, and local officials. Workshop participants reviewed the optional mitigation actions and selected actions that were most applicable to their area of responsibility, cost-effective in reducing risk, easily implemented, and likely to receive institutional and community support.
- Workshop participants inventoried federal and state funding sources that could assist in implementing the proposed hazard mitigation actions. Information was collected, including the program name, authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and a point of contact.
- Planning Team Members considered the benefits that would result from implementing the hazard mitigation actions compared to the cost of those projects. Although detailed cost-benefit analyses were beyond the scope of the Plan, Planning Team Members utilized economic evaluation as a determining factor between hazard mitigation actions.
- Planning Team Members then selected and prioritized mitigation actions.

Hazard mitigation actions identified in the process were made available to the Planning Team for review. The draft Plan was made available to the general public for review on Bexar County's website with the chance to comment via responding to Bexar County's Office of Emergency Management's email.

Review and Incorporation of Existing Plans

Review

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas State Data Center, Texas Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans. Section 4 and the hazard-specific sections of the Plan (Sections 5-14) summarize the relevant background information.

Specific background documents, including those from FEMA, provided information on hazard risk, hazard mitigation actions currently being implemented, and potential mitigation actions. Previous hazard events, occurrences, and descriptions were identified through NOAA's National Center for Environmental Information (NCEI). Results of past hazard events were found through searching the NCEI. The USACE studies were reviewed for their assessment of risk and potential projects in the region. State Data Center documents were used to obtain population projections. The State Demographer webpages were reviewed for population and other projections and included in Section 3 of the Plan. Information from the Texas Forest Service was used to appropriately rank the wildfire hazard, and to help identify potential grant opportunities. Materials from FEMA and TDEM were reviewed for guidance on Plan development requirements.

Section 2: Planning Process

Incorporation of Existing Plans into the HMAP Process

A Capability Assessment was completed by key Bexar County and participating jurisdictions' departments which provided information pertaining to existing plans, policies, ordinances and regulations to be integrated into the goals and objectives of the Plan. The relevant information was included in a master Capability Assessment, Appendix F.

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For example, the City of Helotes completed a hydrologic and hydraulic study in 2013 of the French Creek Tributary B to identify modifications to the drainage infrastructure along Bandera Road near the intersection with Cedar Trail. Using the results and recommendations of the study, an action to install five (5) box culverts at the Bandera Road crossing of French Creek was included for the City of Helotes to alleviate flooding. Additionally, policies and ordinances were reviewed by several of the participating jurisdictions. These jurisdictions have included actions to develop and implement policies for new building construction that encourage wind, hail, and fire resistant building materials, and the inclusion of safe rooms to be required in new construction. Other plans were reviewed, such as Floodplain Management Plans and Storm Water Management Plans, to identify any additional mitigation actions. Finally, the 2013 State of Texas Mitigation Plan Update, developed by TDEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The 2013 State Plan Update was also used as a guidance document, along with FEMA materials, in the development of the Bexar County Plan.

Incorporation of the HMAP into Other Planning Mechanisms

Planning Team members will integrate implementation of the Plan with other planning mechanisms for Bexar County, such as the Emergency Operations Plan. Existing plans for Bexar County will be reviewed and incorporated into the Plan, as appropriate. This section discusses how the Plan will be implemented by Bexar County and the participating jurisdictions. It also addresses how the Plan will be evaluated and improved over time, and how the public will continue to be involved in the hazard mitigation planning process.

Bexar County and the participating jurisdictions will be responsible for implementing hazard mitigation actions contained in Section 16. Each hazard mitigation action has been assigned to a specific County and City department that is responsible for tracking and implementing the action.

A funding source has been listed for each identified hazard mitigation action and may be utilized to implement the action. An implementation time period has also been assigned to each hazard mitigation action as an incentive and to determine whether actions are implemented on a timely basis.

Bexar County and the participating jurisdictions will integrate hazard mitigation actions contained in the Plan with existing planning mechanisms such as Storm Water Management Plans and ordinances, Emergency Operations or Management Plans, Evacuation Plans, and other local and area planning efforts. Bexar County will work closely with area organizations to coordinate implementation of hazard mitigation actions that benefit the planning area in terms of financial and economic impact.

Upon formal adoption of the Plan, Planning Team members from Bexar County and the participating jurisdictions will review existing plans along with building codes to guide development and ensure that hazard mitigation actions are implemented. Each of the jurisdictions will be responsible for coordinating periodic review of the Plan with members of the Advisory Planning Team to ensure integration of hazard mitigation strategies into these planning mechanisms and codes. The Planning Team will also conduct periodic reviews of various existing planning mechanisms and analyze the need for any amendments or updates in light of the approved Plan. Bexar County and the participating jurisdictions will ensure that future long-term planning objectives will contribute to the goals of the Plan to reduce the long-term risk to life and property from

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moderate and high risk hazards. Within one year of formal adoption of the Plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the Plan.

Planning Team members will review and revise, as necessary, the long-range goals and objectives in its strategic plan and budgets to ensure that they are consistent with the Plan.

Furthermore, Bexar County will work with neighboring jurisdictions to advance the goals of the Plan as it applies to ongoing, long-range planning goals and actions for mitigating risk to natural hazards throughout the planning area.

Table 2-3 identifies types of planning mechanisms and examples of methods for incorporating the Plan into other planning efforts.

Table 2-3. Examples of Methods of Incorporation

Planning Mechanism	Incorporation of Plan
Grant Applications	The Plan will be evaluated by Bexar County and participating jurisdictions when grant funding is sought for mitigation projects. If a project is not in the Plan, an amendment may be necessary to include the action in the Plan.
Annual Budget Review	Various departments and key personnel that participated in the planning process for Bexar County and participating jurisdictions will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Regulatory Plans	Currently, Bexar County and participating jurisdictions have regulatory plans in place, such as Emergency Management Plans, Continuity of Operations Plans, Economic Development, and Evacuation Plans. The Plan will be consulted when County and City departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.
Capital Improvement Plans	Bexar County and participating jurisdictions have a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, County and City departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plans	Bexar County has a Long-term Comprehensive Development Plan in place. Since comprehensive plans

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Planning Mechanism	Incorporation of Plan
	involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management Plans	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding, and information found in Section 7 of this Plan discussing the people and property at risk to flood, will be reviewed and revised when Bexar County updates their management plans or develops new plans.

Appendix F provides an overview of Planning Team members’ existing planning and regulatory capabilities to support implementation of mitigation strategy objectives. Appendix F also provides further analysis of how each intends to incorporate hazard mitigation actions into existing plans, policies, and the annual budget review as it pertains to prioritizing grant applications for funding and implementation of identified hazard mitigation projects.

Plan Review and Plan Update

As with the development of Plan, Bexar County will oversee the review and update process for relevance and to necessary make adjustments. At the beginning of each fiscal year, Planning Team Members will meet to evaluate the Plan and review other planning mechanisms to ensure consistency with long-range planning efforts. In addition, planning participants will also meet twice a year, by conference call or presentation, to re-evaluate prioritization of the hazard mitigation actions.

Timeline for Implementing Mitigation Actions

Both the Executive Planning Team (Table A-1, Appendix A) and the Advisory Planning Team (Table A-2, Appendix A) will engage in discussions regarding a timeframe for how and when to implement each hazard mitigation action. Considerations include when the action will be started, how existing planning mechanisms’ timelines affect implementation, and when the action should be fully implemented. Timeframes may be general, and there will be short, medium, and long term goals for implementation based on prioritization of each action, as identified on individual Hazard Mitigation Action worksheets included in the Plan for Bexar County and participating jurisdictions.

Both the Executive and Advisory Planning Team will evaluate and prioritize the most suitable hazard mitigation actions for the community to implement. The timeline for implementation of actions will partially be directed by Bexar County’s comprehensive planning process, budgetary constraints, and community needs. Bexar County and the participating jurisdictions are committed to addressing and implementing hazard mitigation actions that may be aligned with and integrated into the Plan.

Overall, the Planning Team is in agreement that goals and actions of the Plan shall be aligned with the timeframe for implementation of hazard mitigation actions with respect to annual review and updates of existing plans and policies.

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Public and Stakeholder Involvement

An important component of hazard mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole provides the Planning Team with a greater understanding of local concerns and increases the likelihood of successfully implemented hazard mitigation actions. If citizens and stakeholders, such as local businesses, non-profits, hospitals, and schools are involved, they are more likely to gain a greater appreciation of the risks that hazards may present in their community and take steps to reduce or mitigate their impact.

The public was involved in the development of Bexar County’s Plan at different stages prior to official Plan approval and adoption. Public input was sought using three methods: (1) open public meetings; (2) survey instruments; and (3) making the draft Plan available for public review at Bexar County’s website.

The draft Plan was made available to the general public for review and comment on the Bexar County’s website. The public was notified at the public meetings that the draft Plan would be available for review. No feedback was received on the draft Plan, although it was given on the public survey, and all relevant information was incorporated into the Plan.

The Plan will be advertised and posted on Bexar County’s website upon approval from FEMA.

Stakeholder Involvement

Stakeholder involvement is essential to hazard mitigation planning since a wide range of stakeholders can provide input on specific topics and from various points of view. Throughout the planning process, members of community groups, local businesses, neighboring jurisdictions, schools, and hospitals were invited to participate in development of the Plan. The Stakeholder Group (Table A-3 in Appendix A, and Table 2-4, below), included a broad range of representatives from both the public and private sector and served as a key component in Bexar County’s outreach efforts for development of the Plan. Documentation of stakeholder meetings is found in Appendix E. A list of organizations invited to attend via e-mail is found in Table 2-4.

Table 2-4. Stakeholder Working Group

AGENCY	TITLE	PARTICIPATED
American Red Cross	Assistant Director	
American Red Cross	Local Program Coordinator	
Angel Staffing	Director	
Association of Contingency Planner – Alamo Chapter/Security Service Federal Credit Union	Planning Coordinator	
AT&T	Regional Manager	
Baptist Child and Family Services	Assistant Director	
Bexar County Sheriff’s Office	Sheriff	
Bexar Metro 9-1-1 Network District	Coordinator	
Brooks Development Authority	Operations Supervisor	

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AGENCY	TITLE	PARTICIPATED
Center for Health Care Services	Assistant Director	
Chamber of Commerce	Executive Director	
Christus Health System	Director	
Community Emergency Response Teams	Emergency Management Coordinator	
Department of State Health Services	Program Manager	
Education Service Center, Region 20	Assistant Director	
Family Endeavors	Assistant Director	
Federal Bureau of Investigation	Regional Bureau Chief	
Federal Executive Board	Manager	
HAM Operators	Volunteer	
Haven for Hope	Volunteer	
HEB	Business Development	
Joint Base San Antonio	Assistant Director	
Port San Antonio	Port Chief	
Port San Antonio	Program Coordinator	
Randolph Brooks	Director of Programs	
San Antonio Airport Fire (SAFD) – Airport	Fire Chief	
San Antonio Airport Police (SAPD) – Airport	Police Chief	
San Antonio Aviation Department	Aviation Administrator	
San Antonio Food Bank	Director	
San Antonio Library	Senior Librarian	
San Antonio Metropolitan Health District	District Supervisor	
San Antonio Solid Waste Management	Assistant Director	
San Antonio Transportation & Capital Improvements (TCI)	Director	
South Texas Blood and Tissue Center	Operations Manager	
Southwest Texas Regional Advisory Council	Council President	
St. Mary's University	Risk Manager	

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AGENCY	TITLE	PARTICIPATED
Telemundo	Chief Photographer	X
Texas A&M Forest Service	Biologist	
Texas A&M University – San Antonio	Risk Manager	
Texas Commission on Environmental Quality	San Antonio Region Environmental Investigator	X
Texas Division of Emergency Management	District Coordinator	X
Texas State Senators	State Senator	
Texas State Representatives	State Representatives	
United States Marshals Service	Regional Director	
United States Postal Service	Program Coordinator	
United States Secret Service	Regional Director	
University Health System	Emergency Manager	
University of North Texas	Undergraduate Student (Emergency Administration and Disaster Planning)	
University of Texas at San Antonio	Risk Manager/EMC	
University of Texas Health Science Center at San Antonio	Emergency Management Coordinator	
United Services Automobile Association	Program Administrator	
VIA Metropolitan Transit	Supervisor	

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, drought was one of the major concerns to the stakeholders, so the County included an action to implement a policy that all new landscaping at City- and County-owned buildings to be as drought tolerant as possible, and existing unsuitable vegetation to be replaced with drought tolerant landscaping. Additionally, many jurisdictions added an action to educate their citizens of water conservation actions to reduce the waste of water during times of drought.

Public Meetings

A series of public meetings were held throughout the planning area to collect public and stakeholder input. Topics of discussion included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards. Representatives from area neighborhood associations and area residents were invited to participate. Additionally, Bexar County utilized social media sources including Facebook, Twitter, and the local media to increase public participation in the Plan development process. Documentation on the public meetings are found in Appendix E.

Public meetings were held on the following dates and locations:

- May 4, 2016, Bexar County Elections Building

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- August 31, 2016, Bexar County Emergency Operations Center
- November 1, 2016, Bexar County Emergency Operations Center

Public Participation Survey

In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders and to obtain data regarding the identification of any potential hazard mitigation actions or problem areas. The survey was promoted by local officials and a link to the survey was posted on Bexar County's website. A total of 114 surveys were completed online. The survey results are analyzed in Appendix B. Bexar County reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, many citizens mentioned concerns about flooding and suggested runoff/flood mitigation as potential steps the jurisdictions could take to reduce or eliminate the risk of future hazard damages. In response to public input several hazard mitigation actions were added to the Plan to implement drainage improvements and flood control measures throughout the County and participating jurisdictions, including detention ponds, flood diversion improvements, and conveyance improvements. Programs for routinely cleaning debris from support bracing under bridges and drainage waterways to reduce debris in waterways were also added to the Plan.

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Overview

Bexar County was formed in December 1836 when Texas was an independent republic. Texas was formally admitted to the United States as its 28th state in December 1845, and in the 1860, the state partitioned Bexar County into 128 separate counties, including present-day Bexar County. The County has a total area of 1,256 square miles, of which 1,240 square miles is land and 16 square miles (1.3%) is water.

The County consists of several cities and towns, a few census-designated places, and unincorporated areas. The following cities and towns are participating within this plan and are considered part of the planning area: the City of Alamo Heights, the City of Balcones Heights, the City of Castle Hills, the City of China Grove, the City of Converse, the City of Elmendorf, the City of Fair Oaks Ranch, the City of Grey Forest, the City of Helotes, the City of Hill Country Village, the Town of Hollywood Park, the City of Kirby, the City of Leon Valley, the City of Live Oak, the City of Olmos Park, the City of Saint Hedwig, the City of Sandy Oaks, the City of Schertz, the City of Shavano Park, the City of Somerset, the City of Terrell Hills, the City of University City, the City of Von Ormy, and the City of Windcrest. The City of San Antonio is also located within Bexar County, but they have written their own Hazard Mitigation Action Plan; therefore, the City of San Antonio is not a participating jurisdiction within the Bexar County Hazard Mitigation Action Plan.

The Balcones Escarpment bisects the county from west to northeast, and to the north of the escarpment are the rocky hills, springs, and canyons of the Texas Hill Country. South of the escarpment are Blackland Prairie and the South Texas plains. The San Antonio River rises from springs north of downtown San Antonio and flows southward and southeastward through the county.

Figure 3-1 shows the general location of Bexar County, along with the Cities that are located within the County.



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Figure 3-1. Location of Bexar County Planning Area

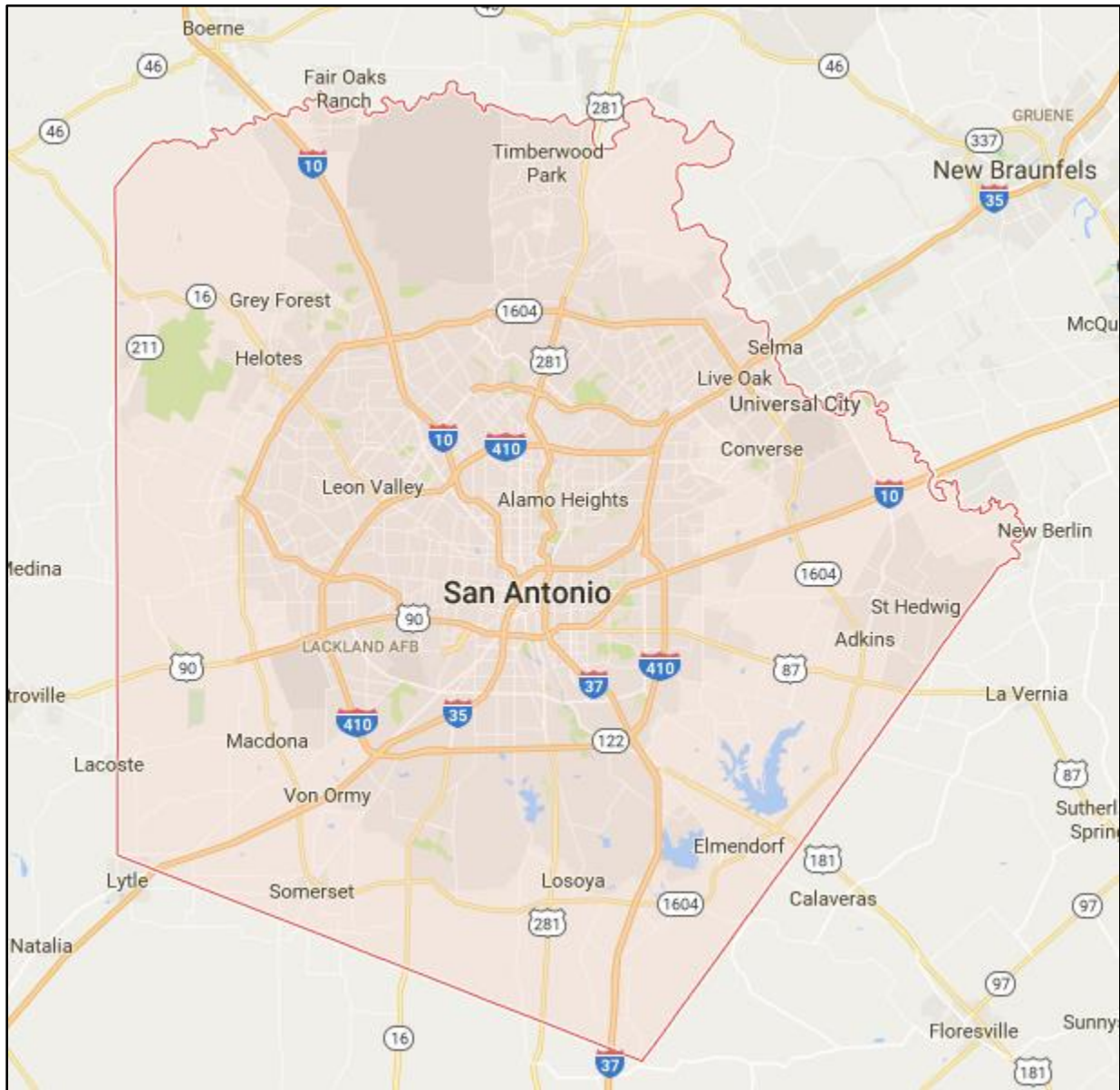
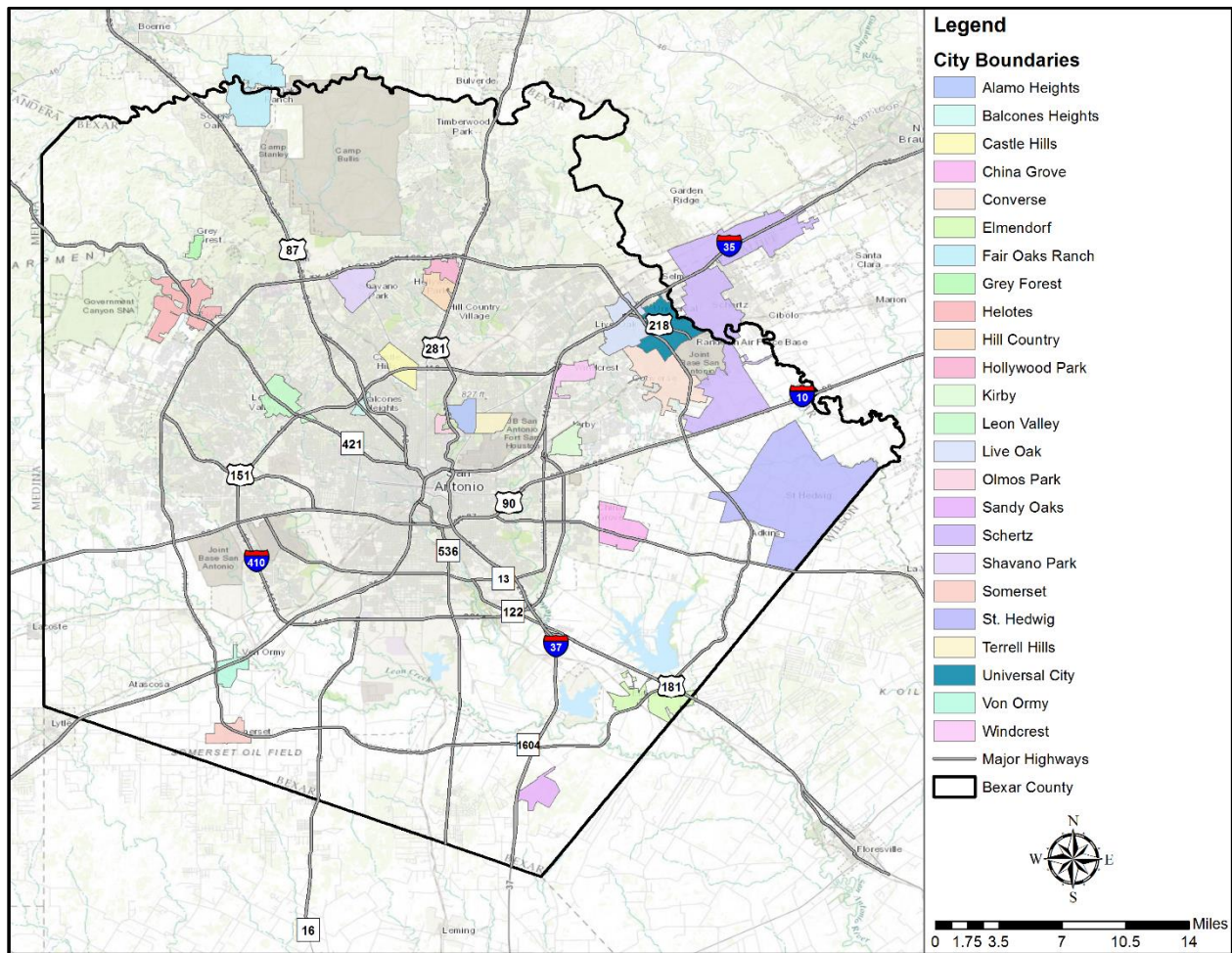


Figure 3-2 shows the Bexar County Study Area, including the participating jurisdictions that are covered in the risk assessment analysis of the Plan.

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Figure 3-2. Bexar County Study Area



Provided in Table 3-1 below is a listing of the jurisdictions in Bexar County that participated in the Hazard Mitigation Plan.

Table 3-1. Participating Jurisdictions

PARTICIPATING JURISDICTIONS			
Bexar County	Fair Oaks Ranch	Live Oak	Terrell Hills
Alamo Heights	Grey Forest	Olmos Park	Universal City
Balcones Heights	Helotes	Saint Hedwig	Von Ormy
Castle Hills	Hill Country Village	Sandy Oaks	Windcrest
China Grove	Hollywood Park	Schertz	
Converse	Kirby	Shavano Park	
Elmendorf	Leon Valley	Somerset	

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Population and Demographics

In the official Census population count, as of April 1, 2010, Bexar County had a population of 1,714,773 residents. By July 2014, the number had grown to 1,860,274, and by July 2015, the population was 1,897,753. Table 3-2 provides the population distribution by jurisdiction within Bexar County.¹

Between official U.S. Census population counts, the estimate uses a formula based on new residential building permits and household size. It is simply an estimate and there are many variables involved in achieving an accurate estimation of people living in a given area at a given time.

Table 3-2. Population Distribution by Jurisdiction

JURISDICTION	TOTAL 2010 POPULATION	PERCENTAGE	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS	
			Elderly (Over 65)	Below Poverty Level
Alamo Heights	7,031	0.41%	1,280	373
Balcones Heights	2,941	0.17%	225	685
Castle Hills	4,116	0.24%	1,351	338
China Grove	1,179	0.07%	192	37
Converse	18,198	1.06%	1,351	1,984
Elmendorf	1,488	0.09%	151	226
Fair Oaks Ranch	5,986	0.35%	1,371	30
Grey Forest	483	0.03%	93	21
Helotes	7,341	0.43%	793	162
Hill Country Village	985	0.06%	182	21
Hollywood Park	3,062	0.18%	867	43
Kirby	8,000	0.47%	1,056	960
Leon Valley	10,151	0.59%	1,716	924
Live Oak	13,131	0.77%	1,484	1,615
Olmos Park	2,237	0.13%	330	105
St. Hedwig	2,094	0.12%	313	82
Sandy Oaks ²	(2,275)	(0.13%)	-	-
Schertz	31,465	1.83%	3,618	2,265
Shavano Park	3,035	0.18%	594	137
Somerset	1,631	0.10%	198	325
Terrell Hills	4,878	0.28%	741	63
Universal City	18,530	1.08%	2,350	1,890

¹ Source: <http://www.census.gov/quickfacts/table/PST045215/48029,00>

² The City of Sandy Oaks was incorporated on May 10, 2014, therefore there is no data for the 2010 census. The total population is from a 2009-2013 American Community Survey Estimate, and has been subtracted from the Unincorporated Bexar County total population.

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JURISDICTION	TOTAL 2010 POPULATION	PERCENTAGE	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS	
			Elderly (Over 65)	Below Poverty Level
Von Ormy	1,085	0.06%	117	167
Windcrest	5,364	0.31%	1,786	166
San Antonio ³	1,327,407	77.41%	138,050	235,481
Unincorporated Bexar County	230,680	13.45%	16,413	19,405
BEXAR COUNTY TOTAL	1,714,773	100%	176,622	267,505

Population Growth

The official 2010 Bexar County population is 1,714,773. Overall, Bexar County experienced an increase in population between 1980 and 2010 by 73.39%, or an increase by 725,802 people. Castle Hills and Hollywood Park experienced a decrease in their population from 1980 to 2010, while the rest of the jurisdictions experienced a population growth. Between 2000 and 2010, sixteen jurisdictions experienced a population growth, while eight jurisdictions experienced a decrease in the population. Table 3-3 provides historic growth rates in Bexar County.

Table 3-3. Population for Bexar County, 1980-2010⁴

JURISDICTIONS	1980	1990	2000	2010	POP CHANGE 1980-2010	PERCENT OF CHANGE	POP CHANGE 2000-2010	PERCENT OF CHANGE
Alamo Heights	6,252	6,502	7,319	7,031	779	12.46%	-288	-3.93%
Balcones Heights	2,640	3,022	3,016	2,941	301	11.40%	-75	-2.49%
Castle Hills	4,773	4,198	4,202	4,116	-657	-13.76%	-86	-2.05%
China Grove	434	872	1,247	1,179	745	171.66%	-68	-5.45%
Converse	5,150	8,887	11,508	18,198	13,048	253.36%	6,690	58.13%
Elmendorf	492	568	664	1,488	996	202.44%	824	124.10%
Fair Oaks Ranch	-	1,860	4,695	5,986	-	-	1,291	27.50%
Grey Forest	442	425	418	483	41	9.28%	65	15.55%
Helotes	-	1,535	4,285	7,341	-	-	3,056	71.32%
Hill Country Village	972	1,038	1,028	985	13	1.34%	-43	-4.18%
Hollywood Park	3,231	2,870	2,983	3,062	-169	-5.23%	79	2.65%
Kirby	6,435	8,326	8,673	8,000	1,565	24.32%	-673	-7.76%
Leon Valley	9,088	9,581	9,239	10,151	1,063	11.70%	912	9.87%

³ The City of San Antonio is not participating in the Bexar County Hazard Mitigation Plan, but has been included on the Population Distributed by Jurisdiction table.

⁴ Not enough data was available to show the population growth from 1980 for the City of Fair Oaks Ranch, the City of Helotes, and the City of St. Hedwig. Not enough data was available for the City of Sandy Oaks, and the City of Von Ormy to show the population growth. Data was analyzed when available.

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JURISDICTIONS	1980	1990	2000	2010	POP CHANGE 1980-2010	PERCENT OF CHANGE	POP CHANGE 2000-2010	PERCENT OF CHANGE
Live Oak	8,183	10,023	9,156	13,131	4,948	60.47%	3,975	43.41%
Olmos Park	2,069	2,161	2,343	2,237	168	8.12%	-106	-4.52%
St. Hedwig	-	1,443	1,875	2,094	-	-	219	11.68%
Sandy Oaks	-	-	-	-	-	-	-	-
Schertz	28	585	1,372	31,465	31,437	112,275%	30,093	2,193.37%
Shavano Park	1,448	1,708	1,754	3,035	1,587	109.60%	1,281	73.03%
Somerset	1,102	1,144	1,550	1,631	529	48.00%	81	5.23%
Terrell Hills	4,644	4,592	5,019	4,878	234	5.04%	-141	-2.81%
Universal City	10,720	13,057	14,849	18,530	7,810	72.85%	3,681	24.79%
Von Ormy	-	-	-	1,085	-	-	-	-
Windcrest	5,332	5,331	5,105	5,364	32	0.60%	259	5.07%
San Antonio ⁵	785,940	935,933	1,144,646	1,327,407	541,467	68.89%	182,761	15.97%
Unincorporated Bexar County	129,596	159,733	145,985	232,955	103,359	79.75%	86,970	59.57%
COUNTY TOTAL	988,971	1,185,394	1,392,931	1,714,773	725,802	73.39%	321,842	24.11%

Future Development

To better understand how future growth and development in the County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. This section includes an analysis of the projected population change, the number of permits that have been issued throughout the county, and economic impacts.

Population projections from 2010 to 2040 are listed in Table 3-4, as provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Population projections are based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate that occurred during 2000-2010. This information is only available at the County level; however, the population projection shows an increase in population density for the County, which would mean overall growth for the County.

⁵ The City of San Antonio is not participating in the Bexar County Hazard Mitigation Plan, but has been included on the Population for Bexar County, 1980-2010 table.

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Table 3-4. Bexar County Population Projections

County	LAND AREA (SQ MI)	2010		2020		2030		2040	
		Population							
		Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)
Bexar	1,256	1,714,773	1365	1,967,590	1567	2,216,912	1765	2,442,098	1944

Economic Impact

Building and maintaining infrastructure depends on the economy, and therefore, protecting infrastructure from risk due to natural hazards in the planning area is important to Bexar County. Whether it's expanding culverts under a road that washes out during flash flooding, shuttering a fire station, or flood-proofing a wastewater facility, infrastructure must be mitigated from natural hazards in order to continue providing essential utility and emergency response services in a fast-growing planning area.

Major employers in the area are critical to the health of the economy, as well as effective transportation connectivity.

Bexar County has a Department of Community Resources (DCR) that invests and leverages federal, state, and local resources in order to ensure that citizens receive the services that will improve their quality of life while making an economic impact in Bexar County. The Community Development and Housing Division of the Department of Community Resources administers funds that can be used in the unincorporated areas of Bexar County and participating jurisdictions. The County funds are used to improve infrastructure, provide public services, build affordable housing and rehabilitate existing housing that meets eligibility criteria. 18 of the participating jurisdictions of this plan participate in this Division.

Existing and Future Land Use and Development Trends

The Office of the County Manager for Bexar County has begun identifying the demand for new services that the projected population growth of the County will create while identifying, preserving, and highlighting the number of County-owned historic and cultural assets. Additionally, a comprehensive funding approach for the development of several transportation projects in the region has been collaborated upon to address much needed congestion relief in several highly traveled corridors within the County.

The following jurisdictions have a Master or Comprehensive Plan in place: the City of Alamo Heights, the City of Converse, the City of Elmendorf, the City of Grey Forest, the City of Helotes, the City of Hill Country Village, the City of Leon Valley, the City of Olmos Park, the City of Saint Hedwig, the City of Schertz, the City of Shavano Park, the City of Somerset, the City of Terrell Hills, the City of Universal City, the City of Von Ormy, and the City of Windcrest. These plans are part of a continuous process to provide an environment for the citizens and to consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans are used to guide individuals in making decisions which affect the jurisdiction with the understanding of the long term effects.

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Building Permits

Building permits indicate what types of buildings are being constructed and their relative uses. Table 3-5 lists the number of residential building permits for Bexar County that have been granted between 1996 and 2015. The data includes all sizes of family homes for reported permits, as well as the construction costs, to show the potential increase in vulnerability of structures to the various hazards reviewed in the risk assessment. The increase in vulnerability can be attributed to the higher construction costs that would be factored into repairing or replacing a structure using current market values. Permits are reported annually in September; data reflects permits for consecutive years from 2010 to 2015 to demonstrate growth rates.

Table 3-5. County Residential Building Permits⁶

Bexar County			
Year	Buildings	Units	Construction Cost
1996	5,594	7,986	\$442,267,880
2000	7,073	8,978	\$683,592,967
2005	10,767	17,808	\$2,088,801,486
2010	3,244	4,653	\$651,595,819
2011	2,564	4,961	\$609,079,597
2012	3,093	5,695	\$729,636,305
2013	3,092	3,261	\$594,772,205
2014	3,498	6,959	\$1,020,998,941
2015	3,458	4,404	\$808,958,709

⁶ Source: <http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl>

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Hazard Description

Section 4 is the first phase of the Risk Assessment, providing background information for the hazard identification process and descriptions for the hazards identified. The Risk Assessment continues with Sections 5 through 14, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Bexar County and the participating jurisdictions identified ten natural hazards that are addressed in the Hazard Mitigation Plan. Of the hazards identified, nine natural hazards and one quasi-technological hazard (dam failure) were identified as significant, as shown in Table 4-1. The hazards were identified through input from Planning Team members and a review of the current 2013 State of Texas Hazard Mitigation Plan Update (State Plan Update). Readily available online information from reputable sources such as federal and state agencies were also evaluated and utilized to supplement information as needed.

In general, there are three main categories of hazards: atmospheric, hydrologic, and technological. Atmospheric hazards are events or incidents associated with weather generated phenomenon. Atmospheric hazards that have been identified as significant for the Bexar County Planning area include extreme heat, hail, hurricane, thunderstorm wind, tornado, and winter storm (Table 4-1).

Hydrologic hazards are events or incidents associated with water related damage and account for over 75 percent of Federal disaster declarations in the United States. Hydrologic hazards identified as significant for the planning area include flood and drought.

Technological hazards refers to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. They are distinct from natural hazards primarily because they originate from human activity. The risks presented by natural hazards may be increased or decreased as a result of human activity, however they are not inherently human-induced. Therefore, dam failure is classified as a quasi-technological hazard and referred to as “technological,” in Table 4-1 for purposes of description.

For the Risk Assessment, the wildfire hazard is considered “other,” since a wildfire may be natural or human-caused, and is not considered atmospheric or hydrologic.

Section 4: Risk Overview

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Hurricane	A hurricane is an intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher.
Thunderstorm Wind	A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes, and therefore thunderstorms.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.

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HAZARD	DESCRIPTION
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, and shallow flooding.
OTHER	
Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
TECHNOLOGICAL	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.

Hazards that weren't considered significant and were not included in the Plan are located in Table 4-2, along with the evaluation process used for determining the significance of each of these hazards. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4-2. Hazard Identification Process

HAZARD CONSIDERED	REASON FOR DETERMINATION
Coastal Erosion	The planning area is not located on the coast, therefore coastal erosion does not pose a risk.
Earthquakes	According to the State Plan, an earthquake occurrence for the planning area is considered exceedingly rare. Earthquake events are not considered to pose a risk to the planning area. There is no history of impact to critical structures, systems, populations or other community assets or vital services as a result of earthquakes and none is expected in the future.
Expansive Soils	There is no history of impact to critical structures, systems, populations or other community assets or vital services as a result of expansive soils and none is expected in the future.

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HAZARD CONSIDERED	REASON FOR DETERMINATION
Land Subsidence	There are no historical occurrences of land subsidence for the planning area and it is located in an area where occurrences are considered rare. There is no history of impact to critical structures, systems, populations or other community assets or vital services as a result of land subsidence and none is expected in the future.
Lightning	Only one event of lightning resulting in damages has been recorded for the entire planning area, occurring at Camp Stanley in unincorporated Bexar County, in the last ten years. One structure was struck by lightning, causing a structure fire. The structure was privately insured. The house was deemed not to be critical infrastructure, provide critical services to the community and was not a critical asset. Therefore, the community has not had any impact due to lightning. In the intent of 44 CFR 201.6(c)(2)(i) & 44 CFR 201.6(c)(2)(iii) the intent is to, "To understand the potential and chronic hazards affecting the planning area in order to identify which hazard risks are most significant (...)",. Based on the intent, it is the participating jurisdictions belief that lightning is not a hazard that is most significant to the jurisdiction. During public outreach this was not a concern of the public population and the myriad of reasons lightning will not be profiled in this plan.

Natural Hazards and Climate Change

Climate change is defined as a long-term hazard which can increase or decrease the risk of other weather hazards. It directly endangers property due to sea level rise and biological organisms due to habitat destruction.

Global climate change is expected to exacerbate the risks of certain types of natural hazards impacted through rising sea levels, warmer ocean temperatures, higher humidity, the possibility of stronger storms, and an increase in wind and flood damages due to storm surges. While sea level rise is a natural phenomenon and has been occurring for several thousand years, the general scientific consensus is that the rate has increased in the past 200 years, from 0.5 millimeters per year to 2 millimeters per year.

Texas is considered one of the more vulnerable states in the U.S. to both abrupt climate changes and to the impact of gradual climate changes to the natural and built environments. Mega-droughts can trigger abrupt changes to regional ecosystems and the water cycle, drastically increase extreme summer temperature and fire risk, and reduce availability of water resources, as Texas experienced during 2011-2012.

Paleoclimate records also show that the climate over Texas had large changes between periods of frequent mega-droughts and the periods of mild droughts that Texas is currently experiencing. While the cause of these fluctuations is unclear, it would be wise to anticipate that such changes could occur again, and may even be occurring now.

Section 4: Risk Overview

Overview of Hazard Analysis

The methodologies utilized to develop the Risk Assessment are FEMA’s loss estimation software, Hazards United States Multi-Hazards (HAZUS-MH), and a statistical approach. Both methodologies provide an estimate of potential impact by using a common, systematic framework for evaluation.

HAZUS-MH is FEMA’s standardized loss estimation software program built upon an integrated geographic information system (GIS) platform. HAZUS-MH was utilized in the Risk Assessment to develop regional profiles and estimate losses due to damage caused by a flood event for the Hazard Mitigation Plan.

The HAZUS-MH software and resulting Risk Assessment methodology are parametric, and distinct hazard and inventory parameters (e.g., wind speed and building types) are modeled to determine the impact (e.g., damages and losses) on the built environment.

Records retrieved from National Climatic Data Center (NCDC) and Spatial Hazard Events & Losses Database for the United States (SHELDUS) were reported for the Bexar County Planning Area, including the participating jurisdictions. Remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

The four general parameters that are described for each hazard in the Risk Assessment include frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard’s impact.

Frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events. Frequency of return statements are defined in Table 4-3, and impact statements are defined in Table 4-4 below.

Table 4-3. Frequency of Return Statements

PROBABILITY	DESCRIPTION
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next three years.
Occasional	Event is probable in the next five years.
Unlikely	Event is probable in the next ten years.

Table 4-4. Impact Statements

POTENTIAL SEVERITY	DESCRIPTION
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities for at least two weeks. More than 25 percent of property destroyed or with major damage.

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POTENTIAL SEVERITY	DESCRIPTION
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than one week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Each of the hazard profiles includes a description of a general Vulnerability Assessment. Vulnerability is the total of assets that are subject to damages from a hazard, based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where appropriate. The total amount of damages, including property and crop damages, for each hazard is divided by the total number of assets (building value totals) in that community to determine the percentage of damage that each hazard can cause to the community.

Hazard Vulnerability for Bexar County was reviewed based on recent development changes that occurred throughout the County. To better understand how future growth and development in the County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts.

Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact.

Hazard Ranking

Table 4-5 portrays the results of the County’s self-assessment for hazard ranking, based on the preliminary results of the risk assessment presented at the Risk Assessment Workshop. This table also takes into account local knowledge regarding frequency of occurrence and the potential impact of each hazard.

Table 4-5. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURENCE	POTENTIAL SEVERITY	RANKING
Extreme Heat	Occasional	Minor	High
Drought	Highly Likely	Limited	High
Flood	Highly Likely	Limited ¹	High
Thunderstorm Wind	Highly Likely	Substantial	Moderate
Hail	Highly Likely	Minor	Moderate
Winter Storm	Highly Likely	Minor	Moderate

¹ The majority of jurisdictions have a Limited potential severity of impact, with the exception of Bexar County and the City of Helotes. Bexar County has a Substantial potential severity of impact and the City of Helotes has a Major potential severity of impact.

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HAZARD	FREQUENCY OF OCCURENCE	POTENTIAL SEVERITY	RANKING
Wildfire	Highly Likely	Substantial	Low
Tornado	Highly Likely	Major	Low
Hurricane Wind	Occasional	Minor ²	Low
Dam Failure	Unlikely	Substantial	Low

² While the potential severity of impact for the Bexar County planning area is considered minor, the historical fatalities support a substantial severity of impact.

Section 5: Extreme Heat

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Hazard Description

Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and Bexar County is no exception. Severe and excessive summer heat is characterized by a combination of exceptionally high temperatures and humidity. When these conditions persist over a period of time, it is defined as a heat wave.



Bexar County and all participating jurisdictions typically experience extended heat waves.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with severe summer heat include: heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. The most vulnerable populations to heat casualties are children and the elderly or infirmed, who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being.

Location

Nine heat related deaths have been reported in the Bexar County area, including one in 2000, two in 2003, one in 2004, 2005, 2006, and 2008 and two in 2009¹. In addition, there have been heat related deaths reported in neighboring counties, including Atascosa and Guadalupe County. There is no specific geographic scope to the extreme heat hazard. Extreme heat could occur anywhere within the Bexar County planning area, including all participating jurisdictions.

¹ Sources: Texas Department of State Health Services (2008) and National Centers for Environmental Information (NCEI) (2017)

Section 5: Extreme Heat

Extent

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the “Heat Index,” and is depicted in Figure 5-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 5-1. Extent Scale for Extreme Summer Heat²

Temperatures (°F)		Temperatures (°F)		Temperatures (°F)		Temperatures (°F)	
40	80 - 88: CAUTION	40	90 - 96: EXTREME CAUTION	40	98 - 106: DANGER	40	108 - 110: EXTREME DANGER
45	80 - 88: CAUTION	45	90 - 94: EXTREME CAUTION	45	96 - 104: DANGER	45	106 - 110: EXTREME DANGER
50	80 - 86: CAUTION	50	88 - 94: EXTREME CAUTION	50	96 - 102: DANGER	50	104 - 110: EXTREME DANGER
55	80 - 86: CAUTION	55	88 - 92: EXTREME CAUTION	55	94 - 100: DANGER	55	102 - 110: EXTREME DANGER
60	80 - 84: CAUTION	60	86 - 90: EXTREME CAUTION	60	92 - 98: DANGER	60	100 - 110: EXTREME DANGER
65	80 - 84: CAUTION	65	86 - 90: EXTREME CAUTION	65	92 - 96: DANGER	65	98 - 110: EXTREME DANGER
70	80 - 84: CAUTION	70	86 - 88: EXTREME CAUTION	70	90 - 94: DANGER	70	96 - 110: EXTREME DANGER
75	80 - 82: CAUTION	75	84 - 88: EXTREME CAUTION	75	90 - 94: DANGER	75	96 - 110: EXTREME DANGER
80	80 - 82: CAUTION	80	84 - 86: EXTREME CAUTION	80	88 - 92: DANGER	80	94 - 110: EXTREME DANGER
85	80 - 82: CAUTION	85	84 - 86: EXTREME CAUTION	85	88 - 90: DANGER	85	92 - 110: EXTREME DANGER
90	80: CAUTION	90	82 - 84: EXTREME CAUTION	90	86 - 90: DANGER	90	92 - 110: EXTREME DANGER
95	80: CAUTION	95	82 - 84: EXTREME CAUTION	95	86 - 88: DANGER	95	90 - 110: EXTREME DANGER
100	80: CAUTION	100	82 - 84: EXTREME CAUTION	100	86 - 88: DANGER	100	90 - 110: EXTREME DANGER

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

The Extent Scale in Figure 5-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (°F) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. “Caution” is the first category of intensity and it indicates when fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible, and a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 5-1.

² Source: NOAA

Section 5: Extreme Heat

Table 5-1. Heat Index & Warnings

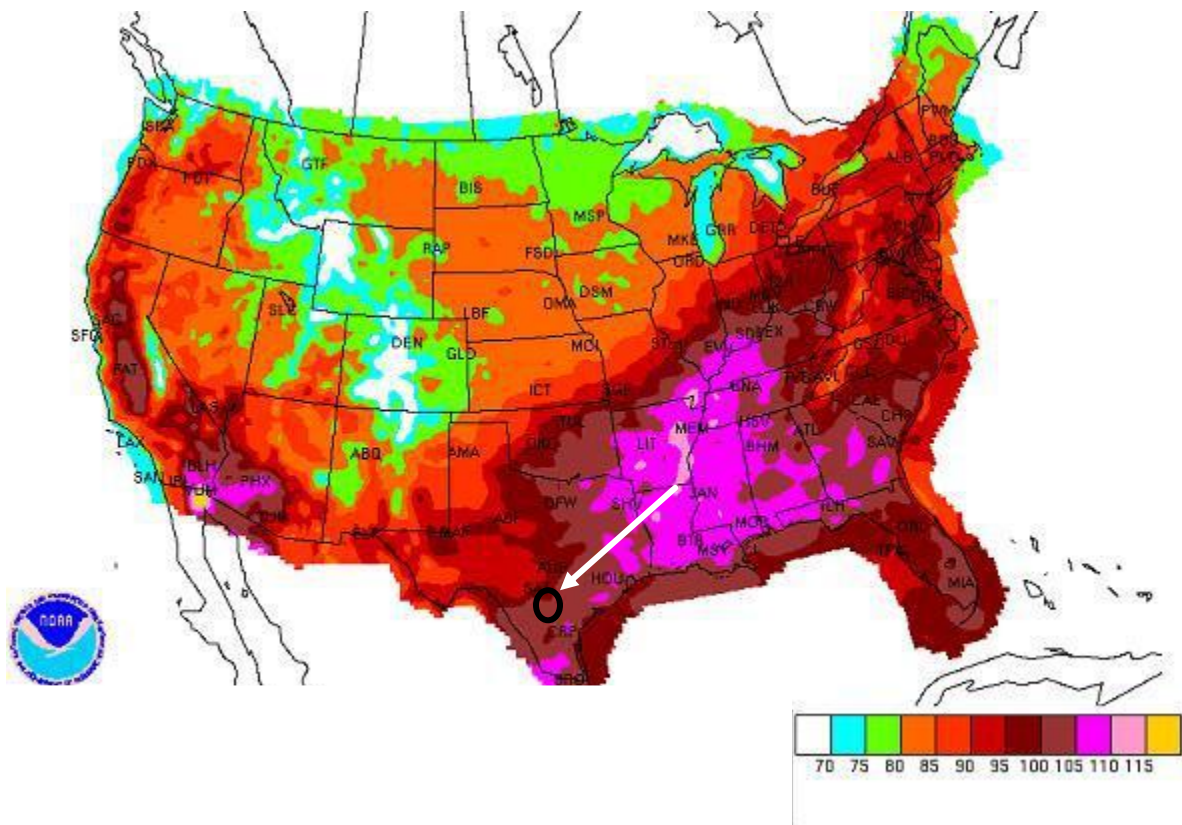
CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	A heat advisory will be issued to warn that the Heat Index may exceed 105°F.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	

The Bexar County planning area is comprised of gently rolling terrain and is located in South Central Texas between the Edwards Plateau to the northwest and the Gulf Coastal Plains to the southeast. Northwest of the area, the terrain slopes upward to the Edwards Plateau, and to the southeast it slopes downward to the Gulf Coastal Plains. Soils are black-land clay and silt loam on the Plains and thin limestone soils on the Edwards Plateau. The area’s gently rolling terrain is dotted with oak trees, mesquite, and cacti. Due to its geography, and its warm, muggy, and semitropical climate with hot summers, the Bexar County planning area can expect an extreme heat event each summer. Citizens, especially children and the elderly, should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is issued. Also at risk are those working or remaining outdoors.

Figure 5-2 displays the average daily maximum heat index as derived from NOAA and based on data compiled from 1838 to 2015. The black circle shows the Bexar County area. The brown and red colors indicate a daily maximum heat index of 95-105°F. The Bexar County planning area, including all participating jurisdictions, could experience extreme heat from 90°F to 105°F and should mitigate to the extent of “danger,” which can include sunstroke, muscle cramps, heat exhaustion, and potential heatstroke with prolonged exposure.

Section 5: Extreme Heat

Figure 5-2. Average Daily Maximum Heat Index Days³



Historical Occurrences

Every summer, the hazard of heat related illness becomes a significant public health issue throughout much of the United States. Mortality from all causes increases during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Preliminary data suggest that by August 21, 2009, record high summer temperatures in Texas resulted in more than 120 heat related deaths statewide. Table 5-2 depicts historical occurrences of mortality from heat from 1994 to 2004, sourced from the Texas Department of State Health Services, and 2005 to 2016, sourced from the National Centers for Environmental Information (NCEI) database.

Table 5-2. Extreme Heat Related Deaths in Bexar County, 1994-2016

YEAR	DEATHS
2000	1
2001	0
2002	0

³ Source: NCEI; the black circle indicates the Bexar County planning area.

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YEAR	DEATHS
2003	2
2004	1
2005	1
2006	1
2007	0
2008	1
2009	2
2010	0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	0

Because the Texas Department of State Health Services reports on total events statewide, previous occurrences for extreme heat are derived from the NCEI database. According to heat related incidents located solely within Bexar County, there are three heat waves⁴ on record for Bexar County (Table 5-3). Historical extreme heat information, as provided by the NCEI, shows extreme heat activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by each event. All participating jurisdictions are reported under Bexar County events. Only extreme heat events that have been reported have been factored into this Risk Assessment. It is likely additional extreme heat occurrences have gone unreported before and during the recording period.

Table 5-3. Historical Extreme Heat Events, 1996-2016

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	5/27/2000	1	0	\$0	\$0
Bexar County	7/2/2009	2	0	\$0	\$0
Bexar County	8/12/2016	0	0	\$0	\$0

⁴ Even though Bexar County experiences heat waves each summer, NCEI data only records events reported. Based on reports, only three events are on record.

Section 5: Extreme Heat

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TOTALS		3	0	\$0	\$0

Probability of Future Events

According to historical records, the Bexar County planning area has experienced 3 events in a 21 year reporting period. This provides a frequency of occurrence of 1 event approximately every 5 years. This frequency supports an occasional probability of future events for the entire planning area, including all participating jurisdictions.

Vulnerability and Impact

There is no defined geographic boundary for extreme heat events. While all of Bexar County is exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not likely to sustain significant damage from extreme heat events. Therefore, any estimated property losses associated with the extreme heat hazard are anticipated to be minimal across the area.

However, extreme temperatures do present a significant threat to life and safety for the population of the county as a whole. For example, heat casualties are typically caused by a lack of adequate air-conditioning or heat exhaustion. The most vulnerable populations to heat casualties are children or the elderly or infirmed, who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being.

Populations over the age of 65 in the Bexar County planning area are estimated at 11% of the total population and children under the age of 5 exceed 7%, constituting an estimated total of 333,698⁵ potentially vulnerable residents in the planning area based on age (Table 5-4).

Table 5-4. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Alamo Heights	941	528
Balcones Heights	239	185
Castle Hills	1,298	177
China Grove	222	22
Converse	1,736	1,715
Elmendorf	152	63
Fair Oaks Ranch	1,702	200
Grey Forest	101	39

⁵ Source: US Census Bureau 2015 data for Bexar County

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JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Helotes	1,448	428
Hill Country Village	168	23
Hollywood Park	1,138	217
Kirby	1,097	513
Leon Valley	1,788	475
Live Oak	1,734	825
Olmos Park	338	135
St. Hedwig	337	135
Sandy Oaks	141	145
Schertz	4,529	2,430
Shavano Park	715	111
Somerset	222	84
Terrell Hills	737	322
Universal City	2,575	1,640
Von Ormy	144	96
Windcrest	1,868	188
Bexar County⁶	200,444	133,254

Another segment of the population at risk are those whose jobs consist of strenuous labor outdoors. During times of extreme heat, livestock and crops can become stressed, decreasing in quality or in production. Extreme high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of rolling blackouts increases with unseasonably high temperatures in what is a normally mild month with low power demands.

Typically more than 12 hours of warning time would be given before the onset of an extreme heat event. Only minor property damage would result. The potential impact of excessive summer heat is considered “Minor,” as injuries and/or illnesses do not result in permanent disability.

In terms of vulnerability to structures, the impact from extreme heat would be negligible. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are running constantly, leading to a temporary power outage. Less than 10 percent of residential and commercial property could be damaged if extreme heat events lead to structure fires.

⁶ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

Section 5: Extreme Heat

The potential impact of extreme heat for the Bexar County planning area, including all participating jurisdictions, can be considered “Minor,” resulting in few injuries and minimal disruption to the quality of life. Based on historical records over a 21 year period, annualized losses for the entire Bexar County planning area are negligible.

Assessment of Impacts

The greatest risk from extreme heat is to public health and safety. Potential impacts to the community may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia; heat cramps; heat exhaustion; and heat stroke (or sunstroke).
- Response personnel including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts, which would elevate the risk of illness to vulnerable residents.
- Highways and roads may be damaged by excessive heat, causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicle engines and cooling systems typically run harder during extreme heat events, resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality, and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), escalating the risk of respiratory illnesses.
- Tourism and recreational activities predominant in the Sabine Lake area and Sea Rim State Park may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Food suppliers can anticipate an increase in food costs due to increases in production costs and crop and livestock losses.
- Fisheries may be negatively impacted by extreme heat, suffering damage to fish habitats (either natural or man-made), and a loss of fish and/or other aquatic organisms due to decreased water flows or availability.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water or developing supplemental water resources.
- Outdoor activities may see an increase in injury or illness during extreme heat events.

The economic and financial impacts of extreme heat on the community will depend on the duration of the event, demand for energy, drought associated with extreme heat, and many other factors. The level of preparedness and the amount of planning done by the jurisdiction, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

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Hazard Description

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 6-1 presents definitions for these different types of drought.



Table 6-1. Drought Classification Definitions¹

METEOROLOGICAL DROUGHT	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
HYDROLOGIC DROUGHT	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
AGRICULTURAL DROUGHT	Soil moisture deficiencies relative to water demands of plant life, usually crops.
SOCIOECONOMIC DROUGHT	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Droughts are one of the most complex of all natural hazards as it is difficult to determine their precise beginning or end. In addition, droughts can lead to other hazards such as extreme heat and wildfires. Their impact on wildlife and area farming is enormous, often killing crops, grazing land, edible plants, and even in severe cases, trees. A secondary hazard to drought is wildfire because dying vegetation serves as a prime ignition source. Therefore, a heat wave combined with a drought is a very dangerous situation.

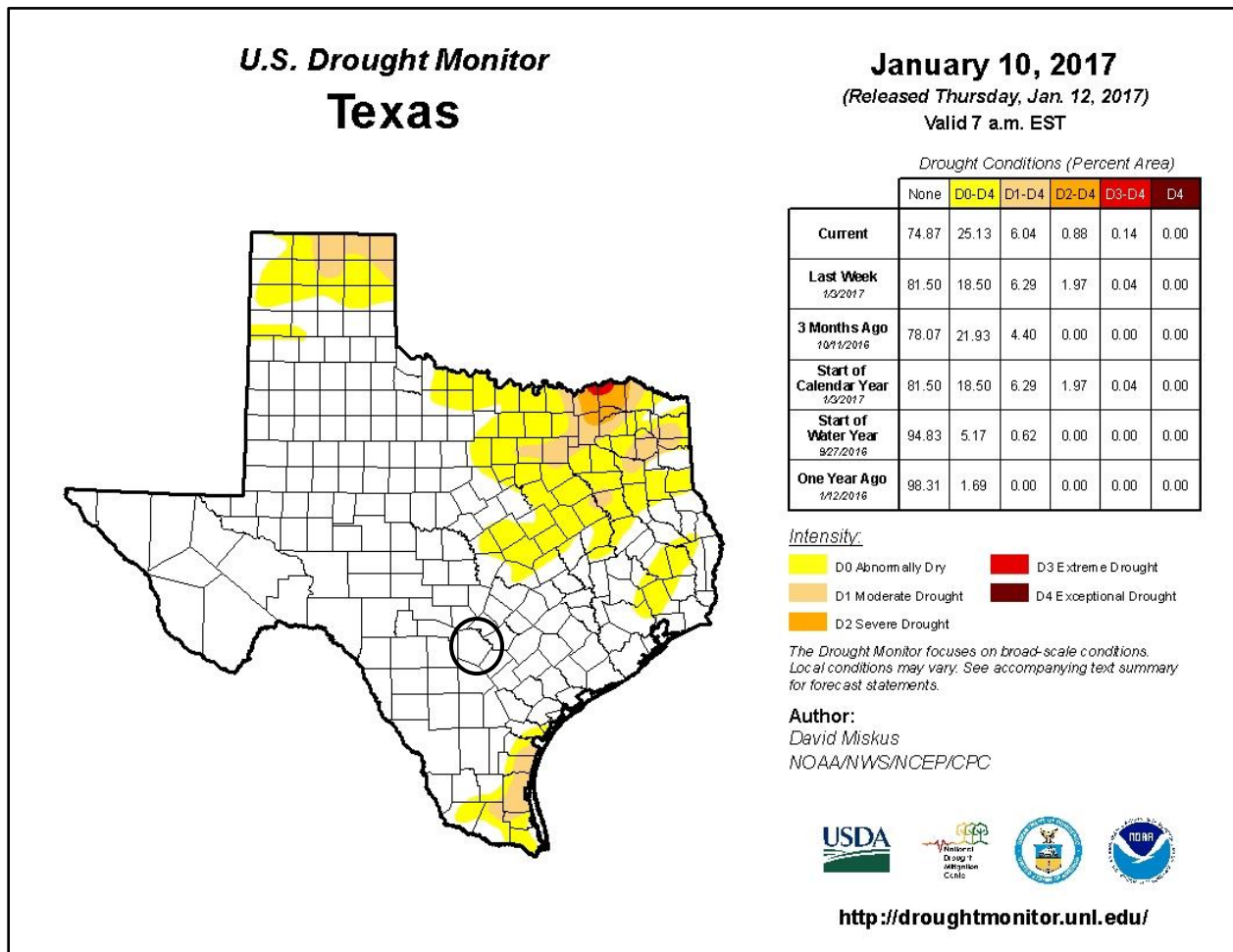
¹ Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, Federal Emergency Management Agency (FEMA)

Section 6: Drought

Location

Droughts occur regularly throughout Texas and Bexar County, and are a frequent condition. However, they can vary greatly in their intensity and duration. The Drought Monitor (Figure 6-1) shows the study region is currently experiencing normal conditions. The planning area has experienced abnormally dry to exceptional drought conditions over the last ten years. There is no distinct geographic boundary to drought; therefore, it can occur equally throughout the Bexar County planning area, including all participating jurisdictions.

Figure 6-1. U.S. Drought Monitor, January 2017



Extent

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns, plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop. Table 6-2 depicts magnitude of drought, while Table 6-3 describes the classification descriptions.

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Table 6-2. Palmer Drought Index

DROUGHT INDEX	DROUGHT CONDITION CLASSIFICATIONS						
	Extreme	Severe	Moderate	Normal	Moderately Moist	Very Moist	Extremely Moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	n/a
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

Table 6-3. Palmer Drought Category Descriptions²

CATEGORY	DESCRIPTION	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low; some water shortages developing or imminent; voluntary water use restrictions requested.	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions.	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.	-5.0 or less

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the United States. Indicators correspond to the intensity of drought.

Based on the historical occurrences for drought and the location of Bexar County, the entire planning area and all participating jurisdictions can anticipate a range of drought from abnormally dry to exceptional, or D0 to D4 based on the Palmer Drought Category.

² Source: National Drought Mitigation Center

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Historical Occurrences

Bexar County may typically experience a severe drought. Tables 6-4 and 6-5 list historical events that have occurred in Bexar County, as reported in the National Center for Environmental Information (NCEI). Historical drought information, as provided by the NCEI, shows drought activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data for all participating jurisdictions in the Bexar County planning area is provided on a County-wide basis, per the NCEI database.

Table 6-4. Historical Drought Years, 1996-2016

DROUGHT YEAR
1996
2000
2011
2012
2013
2013
2014
7 unique events

Table 6-5. Historical Drought Events, 1996-2016³

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	4/1/1996	-	0	0	\$0	\$0
Bexar County	5/1/1996	-	0	0	\$0	\$0
Bexar County	6/1/1996	-	0	0	\$0	\$0
Bexar County	7/1/1996	-	0	0	\$0	\$0
Bexar County	8/1/1996	-	0	0	\$0	\$0
Bexar County	9/1/1996	-	0	0	\$0	\$0
Bexar County	10/1/1996	-	0	0	\$0	\$0
Bexar County	11/1/1996	-	0	0	\$0	\$0
Bexar County	12/1/1996	-	0	0	\$0	\$0

³ Values are in 2016 dollars.

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JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	1/1/1997	-	0	0	\$0	\$0
Bexar County	2/1/1997	-	0	0	\$0	\$0
Bexar County	7/1/2000	D2	0	0	\$0	\$0
Bexar County	8/1/2000	D2	0	0	\$0	\$0
Bexar County	9/1/2000	D2	0	0	\$0	\$0
Bexar County	10/1/2000	D2	0	0	\$0	\$0
Bexar County	5/1/2011	D4	0	0	\$0	\$0
Bexar County	6/1/2011	-	0	0	\$0	\$0
Bexar County	7/1/2011	-	0	0	\$0	\$0
Bexar County	8/1/2011	D4	0	0	\$0	\$0
Bexar County	9/1/2011	D4	0	0	\$0	\$0
Bexar County	10/1/2011	D3	0	0	\$0	\$0
Bexar County	11/1/2011	D3	0	0	\$0	\$0
Bexar County	12/1/2011	D3	0	0	\$0	\$0
Bexar County	1/1/2012	D2	0	0	\$0	\$0
Bexar County	6/1/2012	D2	0	0	\$0	\$0
Bexar County	3/1/2013	D2	0	0	\$0	\$0
Bexar County	4/1/2013	D2	0	0	\$0	\$0
Bexar County	8/1/2013	D2	0	0	\$0	\$0
Bexar County	8/1/2014	D2	0	0	\$0	\$0
Bexar County	9/1/2014	D2	0	0	\$0	\$0
Bexar County	10/1/2014	D2	0	0	\$0	\$0
Bexar County	11/1/2014	D1	0	0	\$0	\$0
TOTALS			0	0	\$0	

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Significant Past Events

January – December, 1996 – Bexar County

Through the first four months of 1996, rainfall accumulations were between 1 and 2 inches across the area. Drought persisted across the southwestern part of South Central Texas through the remainder of the year and through the first two months of 1997.

July – October, 2000 – Bexar County

The severe drought that began early in 2000 across the southwest parts of South Central Texas spread again in July to cover all but the southeast counties. Little to no rain was recorded across these counties in July, and nearly all river levels were reported to be low. Aquifer levels and lake levels were approaching all time low readings, and strong conservation measures were enacted across much of the area. Numerous small creeks and streams ceased flowing. Agricultural activities were essentially brought to a halt.

August – November, 2014 – Bexar County

Most of the region had below normal precipitation and much of that area had 50 percent or less than normal precipitation. As a result, Bandera, Kendall, Kerr, and Medina Counties worsened to extreme drought category (Stage D3) and Bastrop, Bexar, Burnet, Caldwell, Comal, DeWitt, Guadalupe, Hays, Real, and Travis Counties moved into severe category (Stage D2). Gillespie and Val Verde Counties remained in Stage D3 while Blanco, Edwards, and Llano Counties continued in Stage D2. Fire danger was moderate to high across the area at the end of August. The seven day stream flow averages at the end of the month were below normal (10-24 percent) for the Upper San Antonio, Upper Colorado, Medina, and Frio River basins. The Lower Colorado and Guadalupe River Basins were much below normal (less than 10 percent). Area lakes and reservoirs continued well below normal pool elevations.

Probability of Future Events

Based on available records of historic events, there have been 7 extended time periods of drought within a 21 year reporting period, which provides a frequency of occurrence of 1 event approximately every year. This frequency supports a highly likely probability of future events. All participating jurisdictions are included under the county.

Vulnerability and Impact

Loss estimates were based on 21 years of statistical data from the NCEI. A drought event frequency-impact was then developed to determine an impact profile on agriculture products and estimate potential losses due to drought in the area. Table 6-6 shows annualized exposure.

Table 6-6. Drought Event Damage Totals, 1996-2016

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Bexar County	\$0	\$0

Drought impacts large areas and crosses jurisdictional boundaries. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are

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mostly experienced in water shortages and crop/livestock losses on agricultural lands and typically have no impact on buildings.

In terms of vulnerability, population, agriculture, property, and environment are all vulnerable to drought. The average person will survive only a few days without water, and this timeframe can be drastically shortened for people with more fragile health – typically children, the elderly, and the ill. Populations over the age of 65 in the Bexar County planning area are estimated at 11% of the total population and children under the age of 5 exceed 7% – an estimated total of 333,698⁴ potentially vulnerable residents in the planning area based on age (Table 6-7).

Table 6-7. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Alamo Heights	941	528
Balcones Heights	239	185
Castle Hills	1,298	177
China Grove	222	22
Converse	1,736	1,715
Elmendorf	152	63
Fair Oaks Ranch	1,702	200
Grey Forest	101	39
Helotes	1,448	428
Hill Country Village	168	23
Hollywood Park	1,138	217
Kirby	1,097	513
Leon Valley	1,788	475
Live Oak	1,734	825
Olmos Park	338	135
St. Hedwig	337	135
Sandy Oaks	141	145
Schertz	4,529	2,430
Shavano Park	715	111

⁴ Source: U.S. Census Bureau 2015 data for Bexar County

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JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Somerset	222	84
Terrell Hills	737	322
Universal City	2,575	1,640
Von Ormy	144	96
Windcrest	1,868	188
Bexar County⁵	200,444	133,254

The population is also vulnerable to food shortages when drought conditions exist and potable water is in short supply. Potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities. All residents in the Bexar County planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats. Furthermore, during summer drought, or hot and dry conditions, elderly persons, small children, infants, and the chronically ill who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death.

The economic impact of droughts can be significant as it produces a complex web of effects that span many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services. If droughts extend over a number of years, the direct and indirect economic impact can be significant.

Habitat damage is a vulnerability of the environment during periods of drought, for both aquatic and terrestrial species. The environment also becomes vulnerable during periods of extreme or prolonged drought due to severe erosion and land degradation.

The impact of droughts experienced in the Bexar County planning area, including all participating jurisdictions, has resulted in 0 injuries and fatalities. This supports a “limited” severity of impact, meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is destroyed or sustains major damage. Annualized loss over the 21-year reporting period in Bexar County is negligible.

Assessment of Impacts

The Drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on: agriculture; business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. Table 6-8 lists the drought impacts for Bexar County from 2005 to 2016, based on reports received by the Drought Impact Reporter.

⁵ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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Table 6-8. Drought Impacts, 2005-2016

DROUGHT IMPACTS	
Agriculture	36
Business & Industry	3
Energy	1
Fire	43
Plants & Wildlife	26
Relief, Response, & Restrictions	42
Society & Public Health	9
Tourism & Recreation	1
Water Supply & Quality	29

Drought has the potential to impact people in the Bexar County planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Drought is also frequently associated with a variety of impacts, including:

- Recreational activities at Braunig Lake, Calaveras Lake, and Mitchell Lake that rely on water may be curtailed, such as hunting and fishing, resulting in fewer tourists and lower revenue.
- The Government Canyon State Natural Area may be especially vulnerable as severe and prolonged drought can result in the reduction of a species, or cause the extinction of a species altogether.
- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline.
- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, and cross-connection contamination) will increase as the drought intensifies.
- Public safety risk from forest/range/wildfires will increase as water availability and/or pressure decreases.
- Respiratory ailments may increase as the air quality decreases.
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- Jurisdictions and residents may disagree over water use/water rights, creating conflict.
- Political conflicts may increase between municipalities, counties, states, and regions.
- Water management conflicts may arise between competing interests.
- Increased law enforcement activities may be required to enforce water restrictions.
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- There is an increased risk for wildfires and dust storms during drought.

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- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.
- Utilities providers may cut back energy generation and service to their customers in order to prioritize critical service needs.
- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- Wildlife will move to more sustainable locations, creating higher concentrations of wildlife in smaller areas, increasing vulnerability and further depleting limited natural resources.
- Dry and dead vegetation will increase the risk of wildfire.
- Land subsidence threat increases as groundwater is depleted.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Drought related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased costs for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water or developing supplemental water resources.
- Long term drought may negatively impact future economic development.

The overall extent of damages caused by periods of drought is dependent on its extent and duration. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a drought event.

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NFIP Compliance and Maintenance.....	46
Repetitive Loss	47

Hazard Description

Floods generally result from excessive precipitation. The severity of a flood event is determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

The primary types of general flooding are inland and coastal flooding. Inland or riverine flooding is a result of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Inland or riverine flooding is overbank flooding of rivers and streams, typically resulting from large-scale weather systems that generate prolonged rainfall over a wide geographic area; thus it is a naturally occurring and inevitable event. Some river floods occur seasonally when winter or spring rainfalls fill river basins with too much water, too quickly. Torrential rains from decaying hurricanes or tropical systems can also produce river flooding.

Location

The Digital Flood Insurance Rate Map (DFIRM) data provided by the Federal Emergency Management Agency (FEMA) for Bexar County shows the following flood hazard areas:

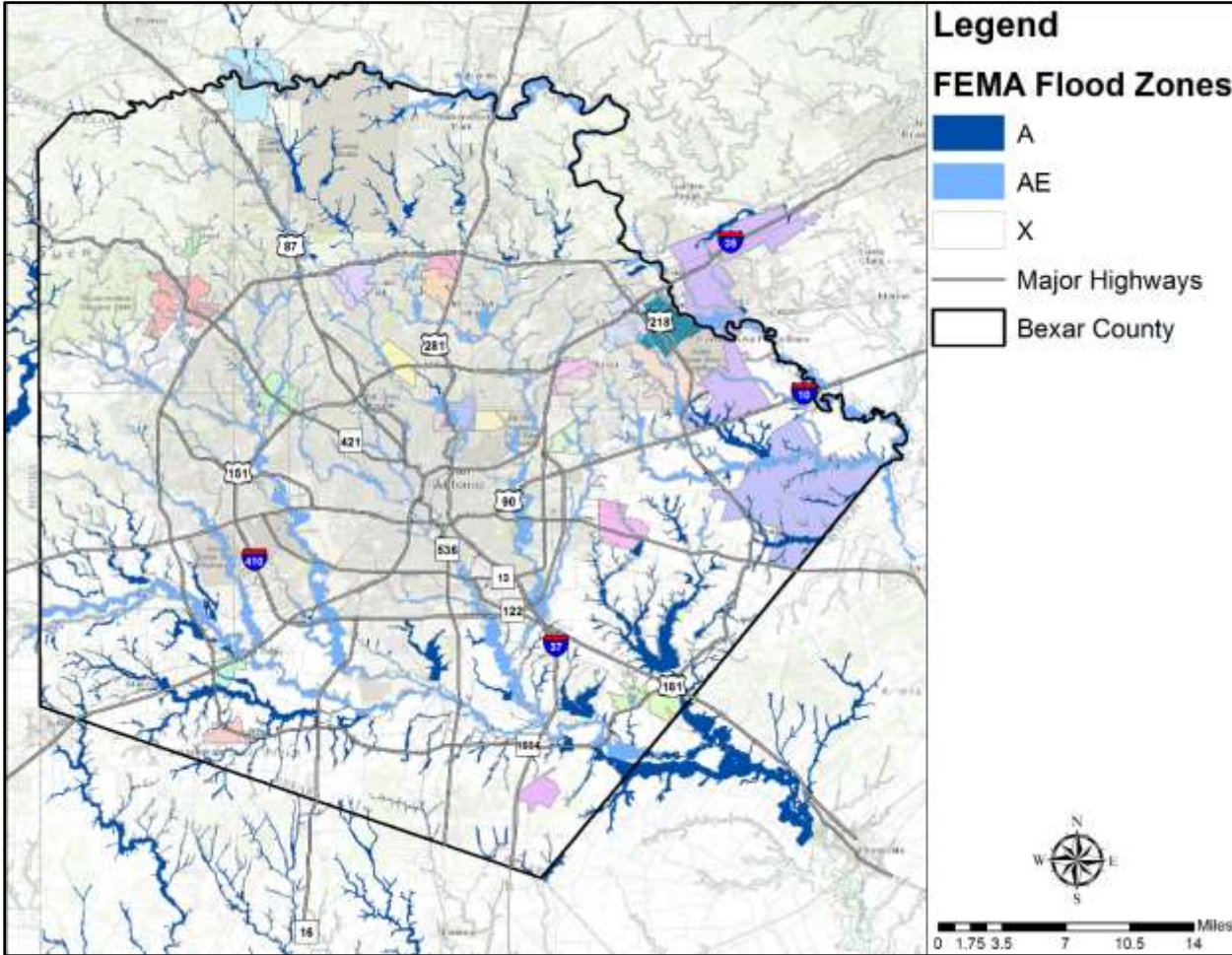
- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.
- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where BFEs are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.

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- Zone X: Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

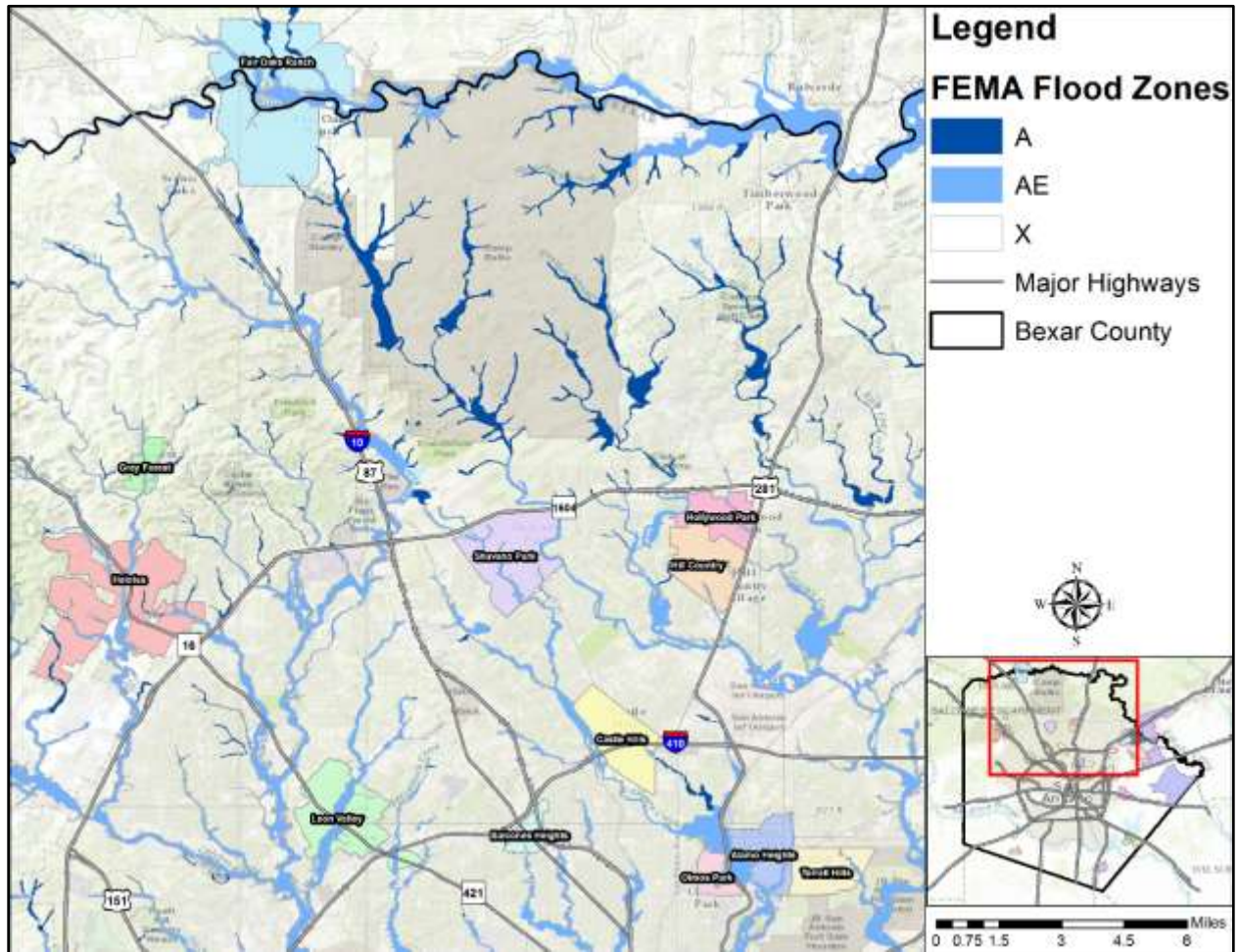
Locations of flood zones in Bexar County based on the DFIRM from FEMA are illustrated in Figures 7-1 to 7-28.

Figure 7-1. Estimated Flood Zones in Bexar County Overview



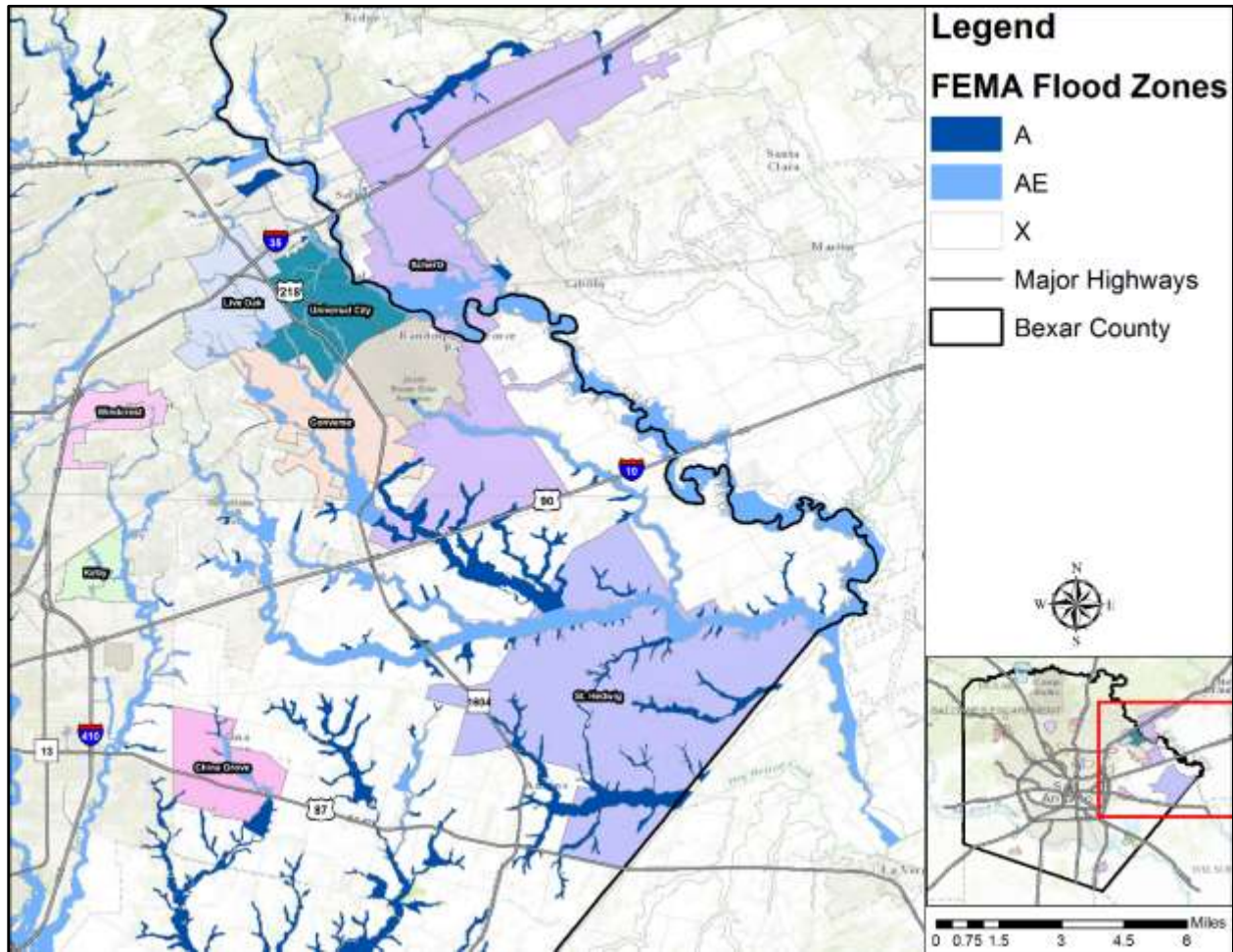
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Figure 7-2. Estimated Flood Zones in Bexar County North



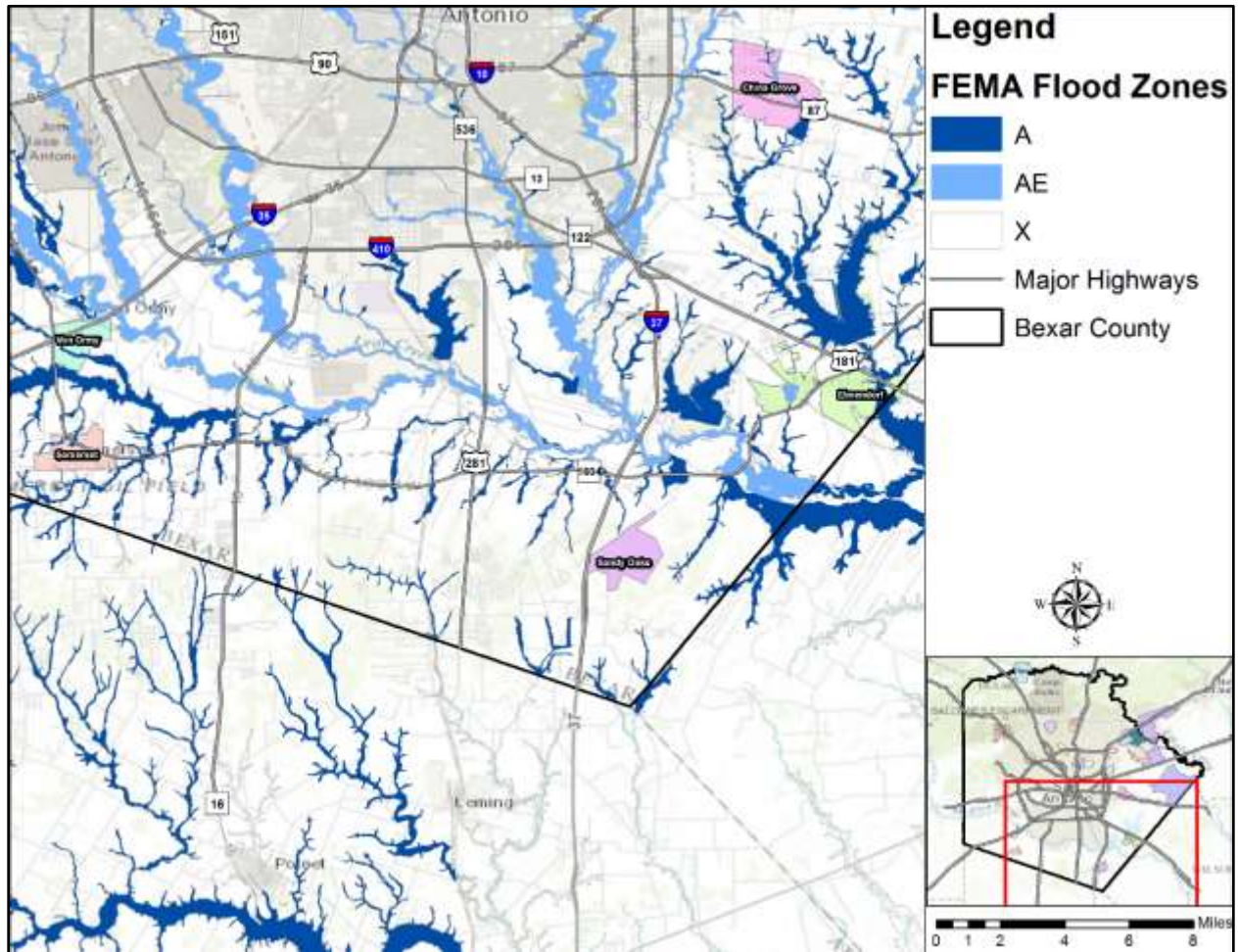
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Figure 7-3. Estimated Flood Zones in Bexar County East



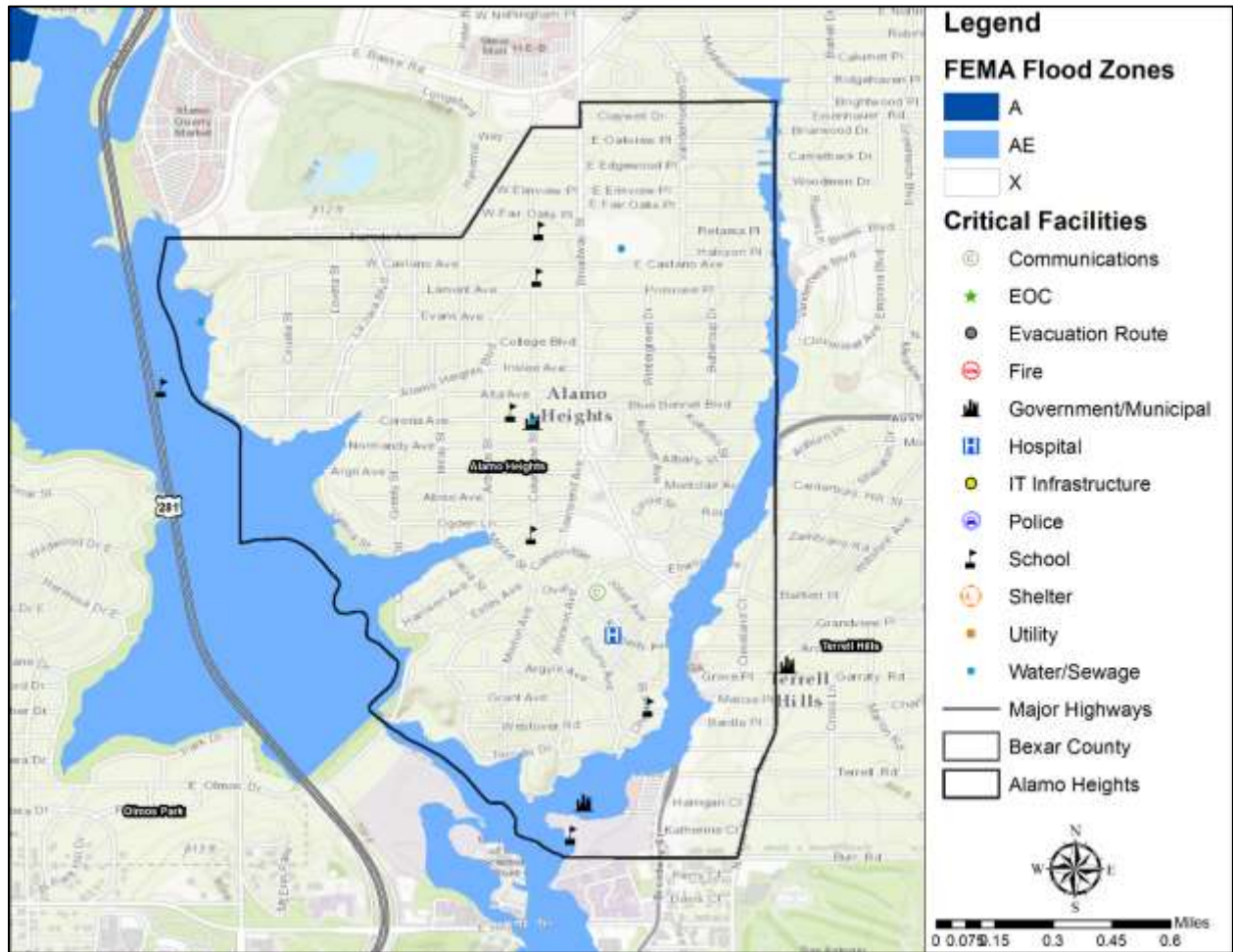
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Figure 7-4. Estimated Flood Zones in Bexar County South



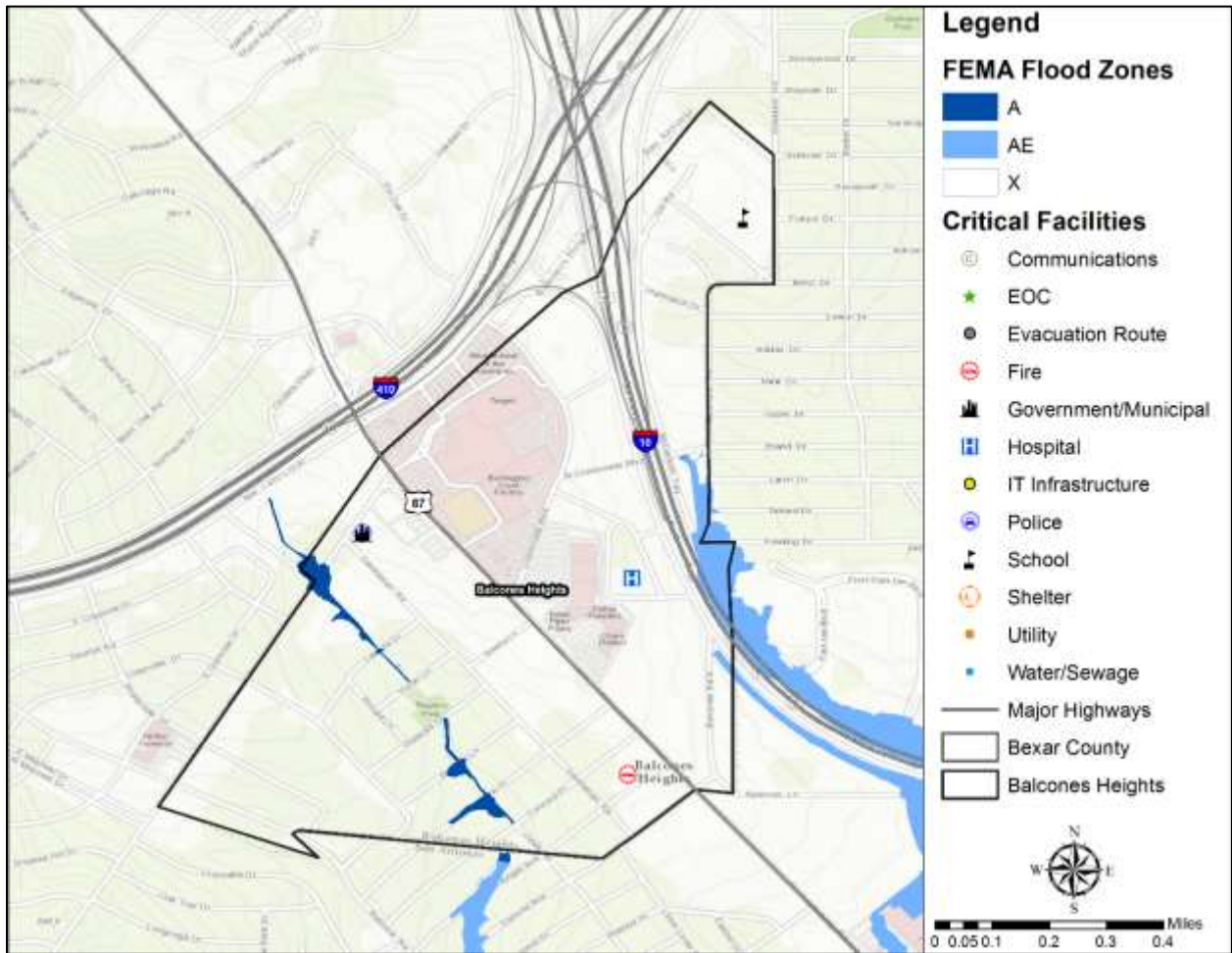
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Figure 7-5. Estimated Flood Zones in the City of Alamo Heights



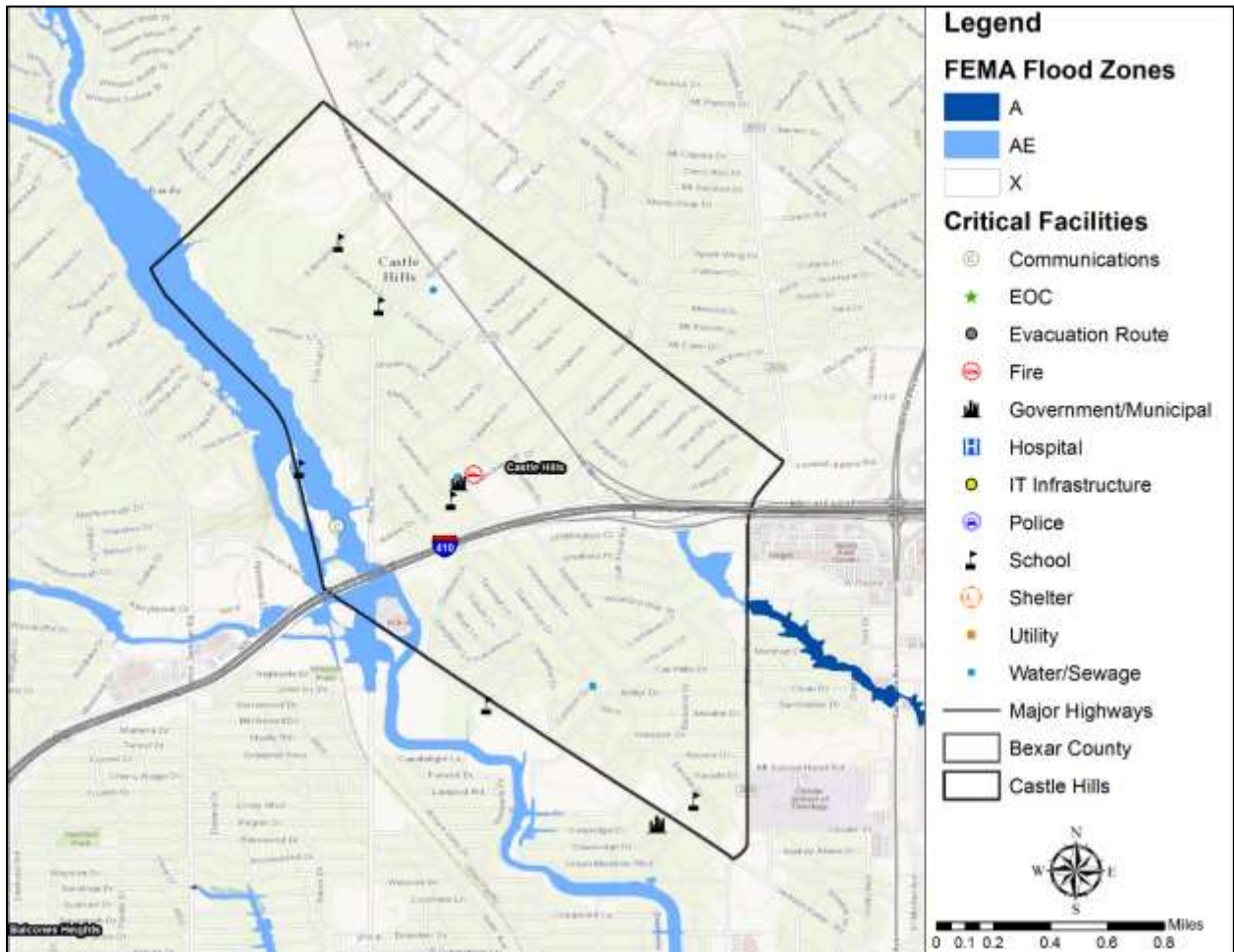
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Figure 7-6. Estimated Flood Zones in the City of Balcones Heights



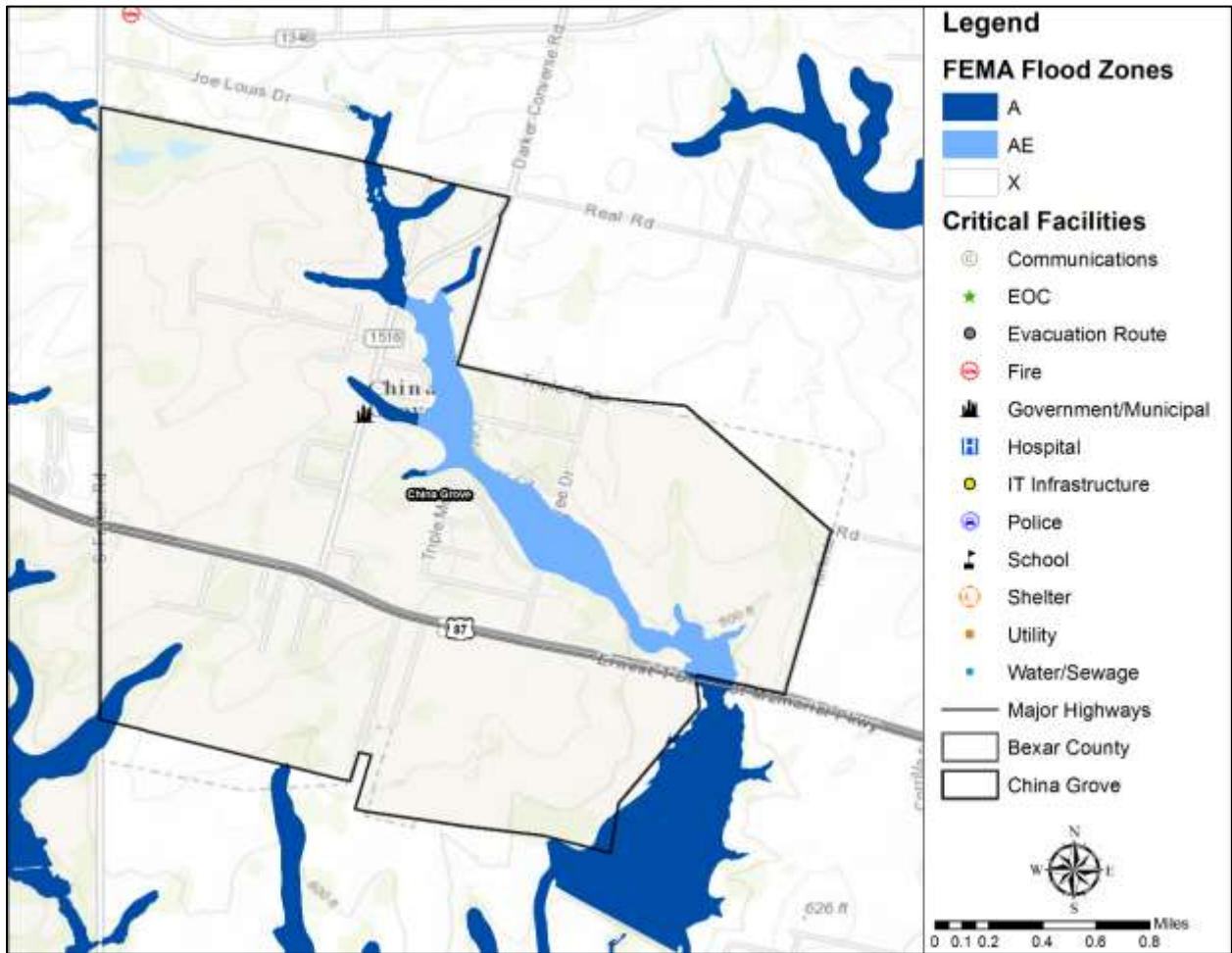
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Figure 7-7. Estimated Flood Zones in the City of Castle Hills



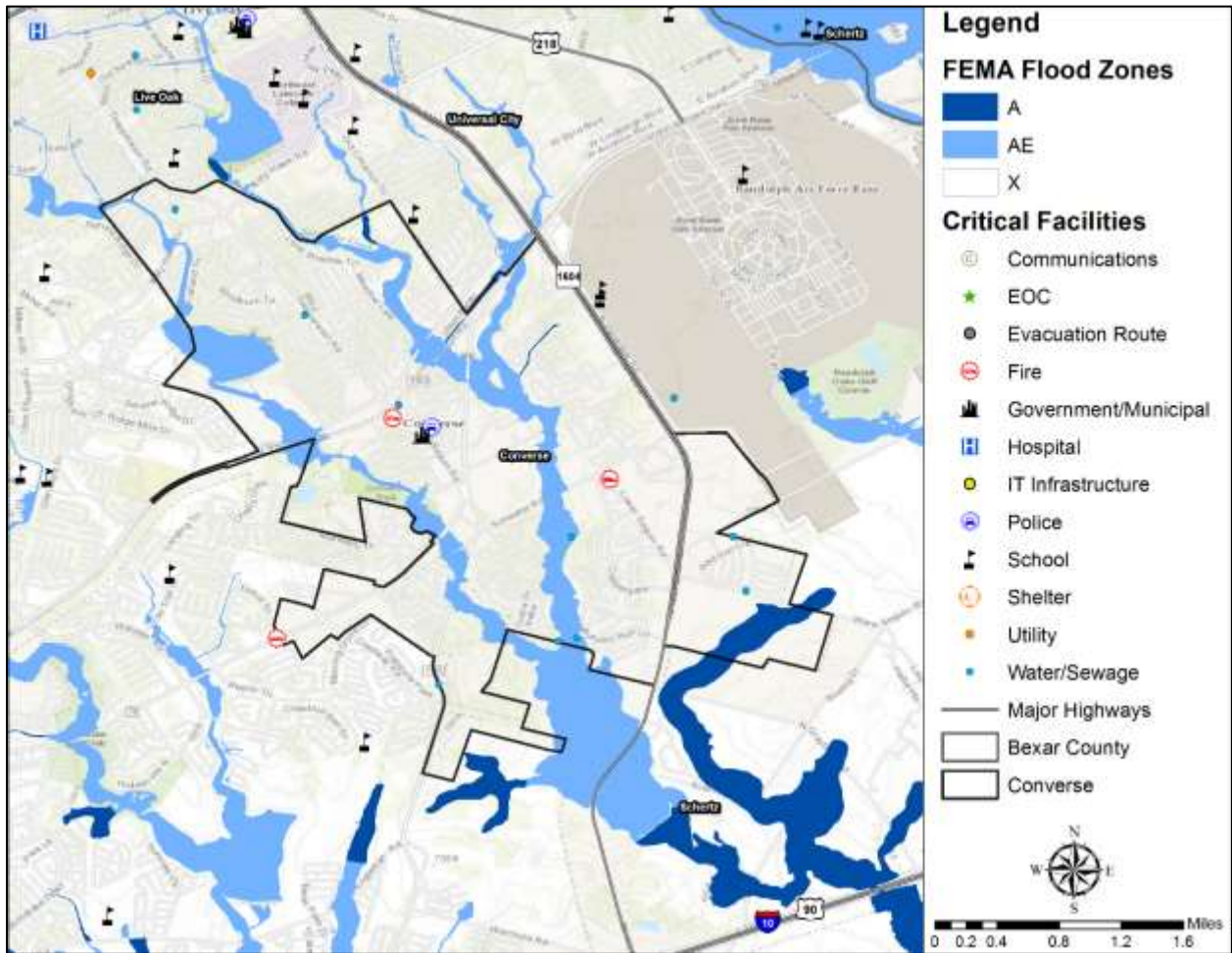
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Figure 7-8. Estimated Flood Zones in the City of China Grove



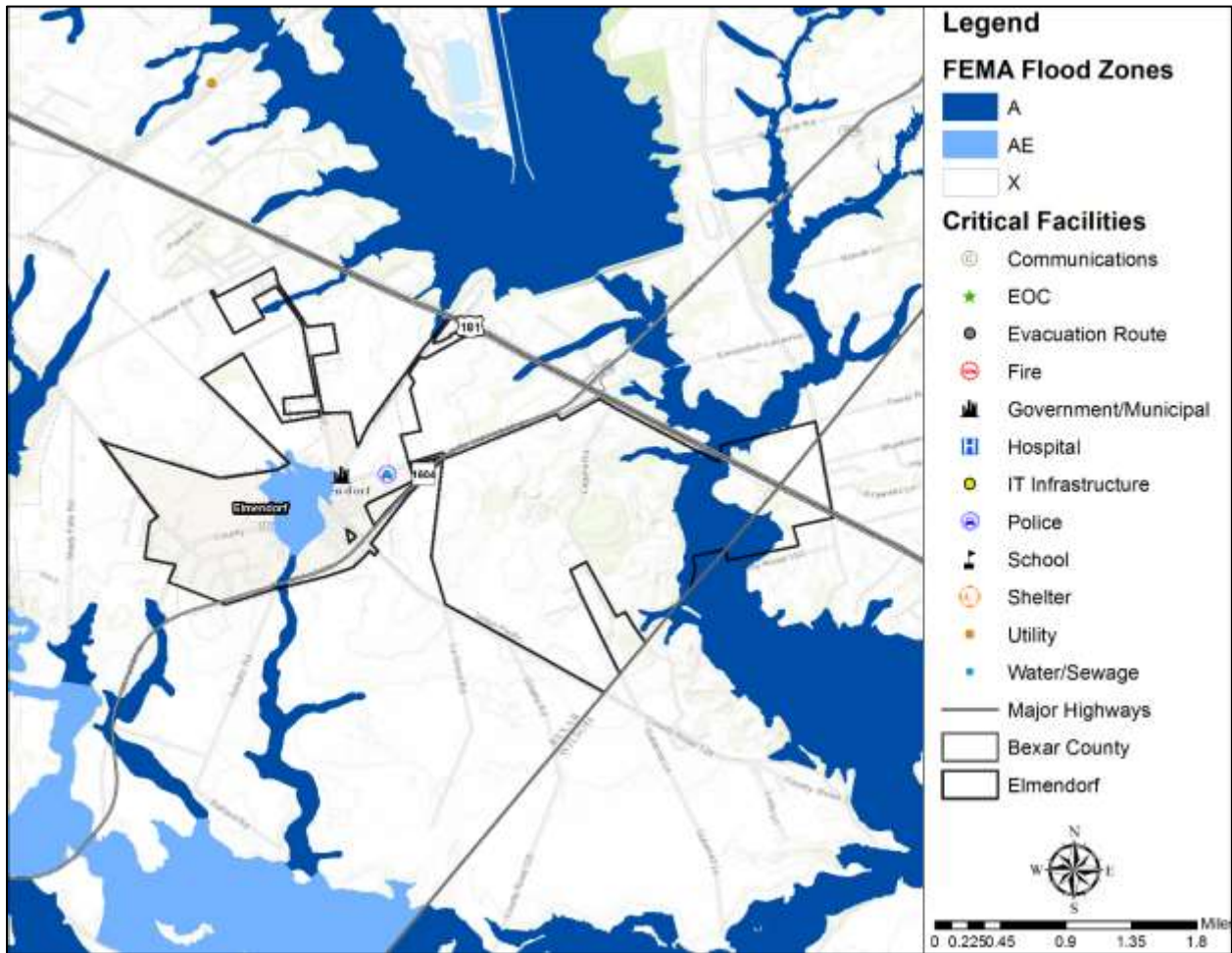
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Figure 7-9. Estimated Flood Zones in the City of Converse



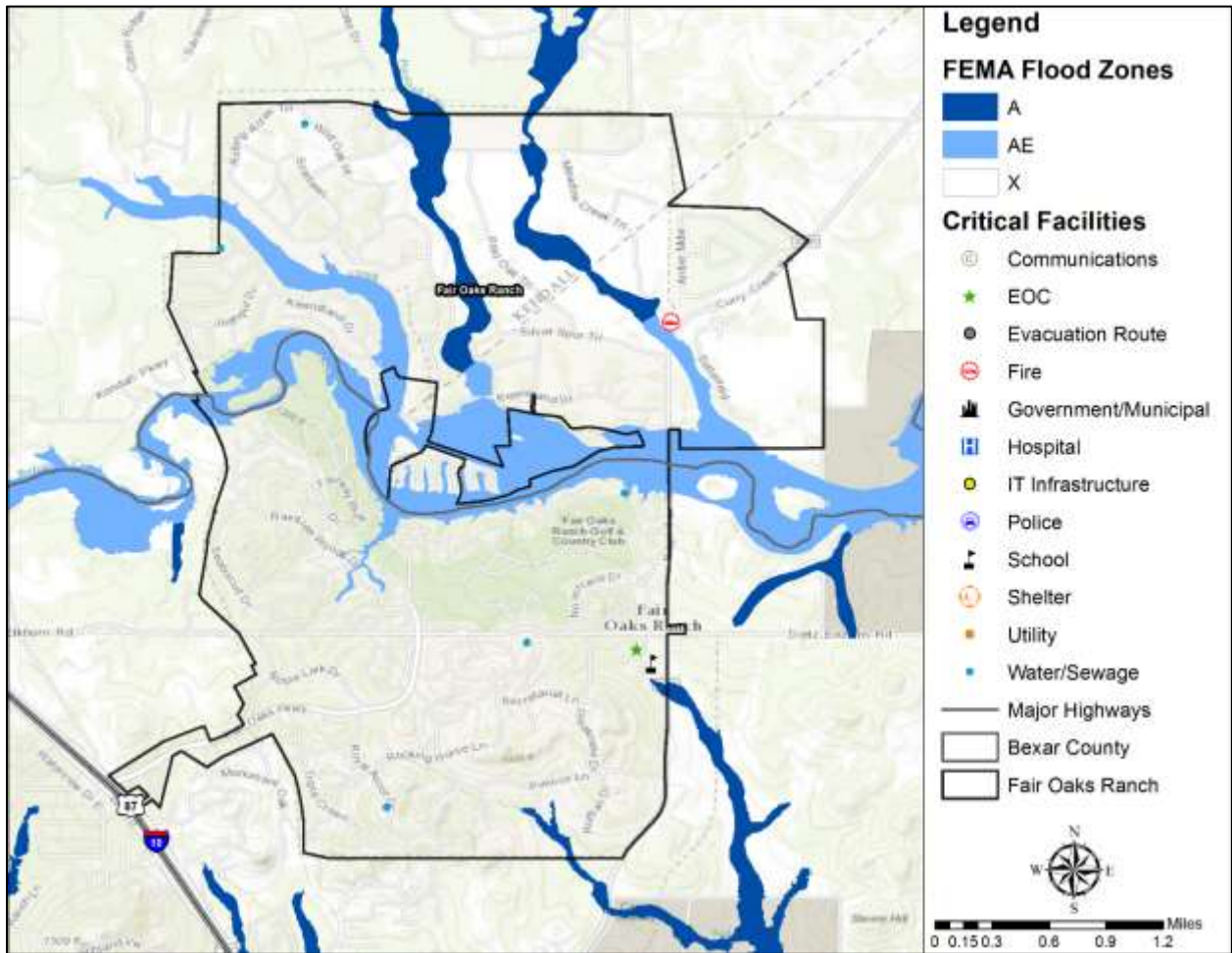
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Figure 7-10. Estimated Flood Zones in the City of Elmendorf



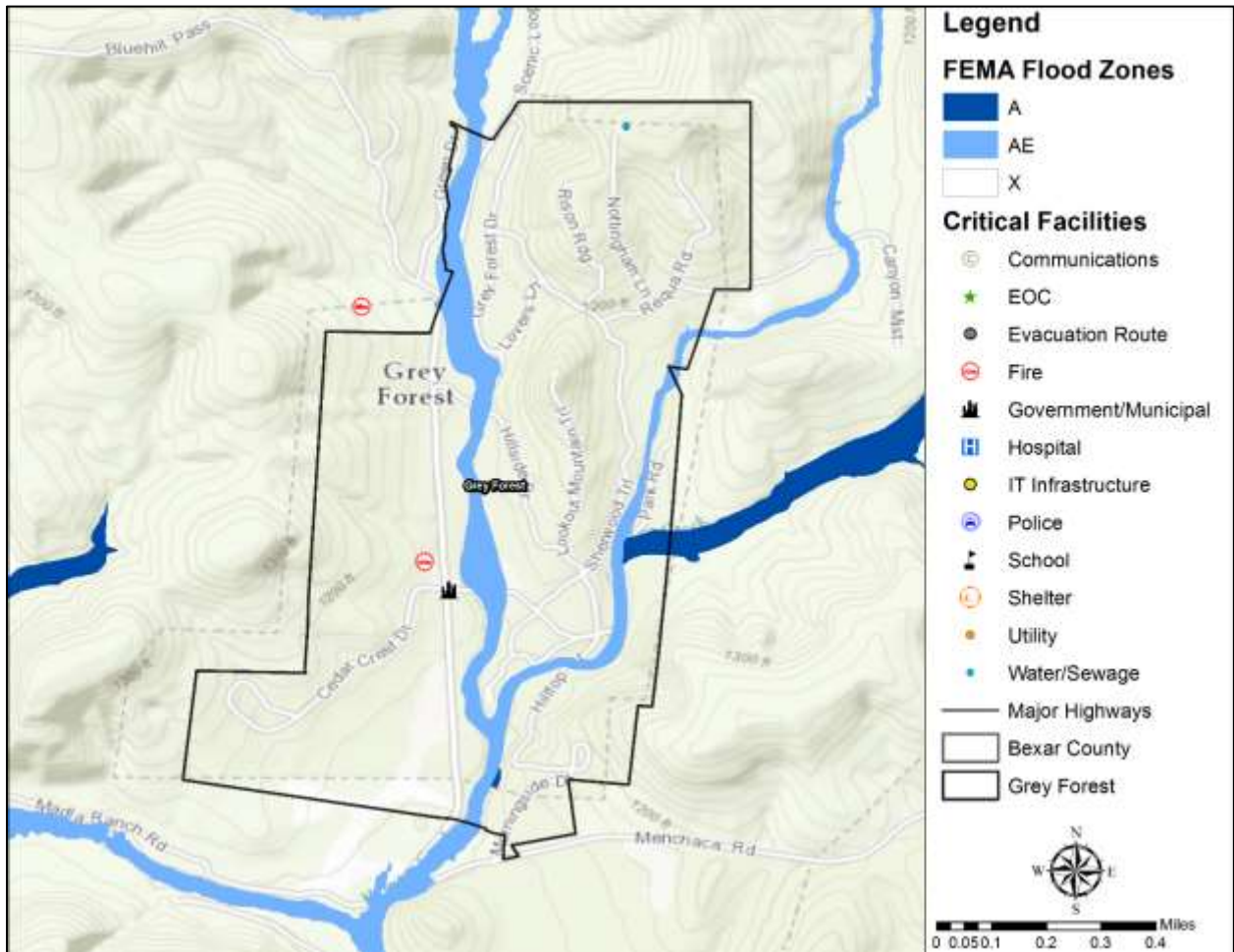
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Figure 7-11. Estimated Flood Zones in the City of Fair Oaks Ranch



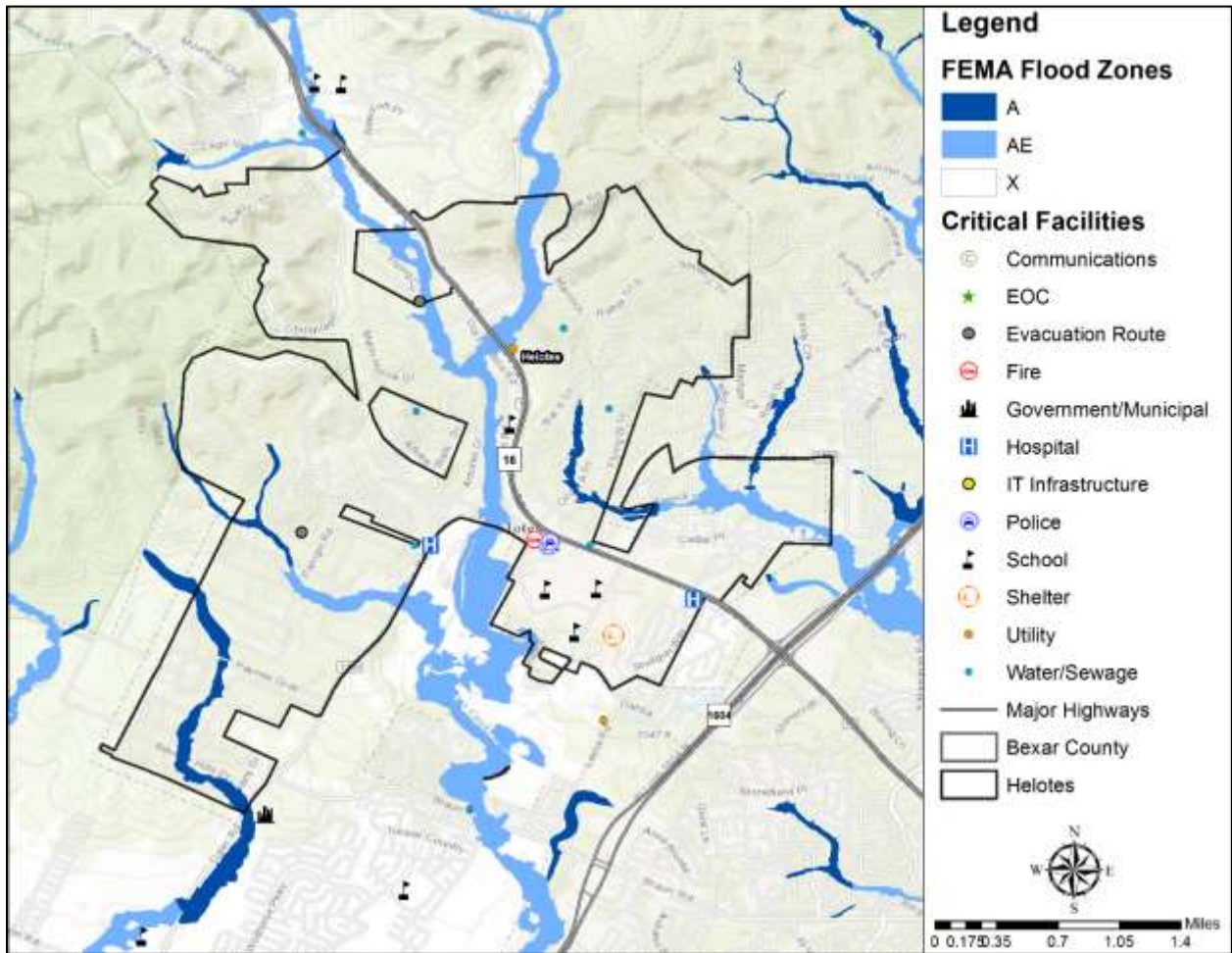
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Figure 7-12. Estimated Flood Zones in the City of Grey Forest



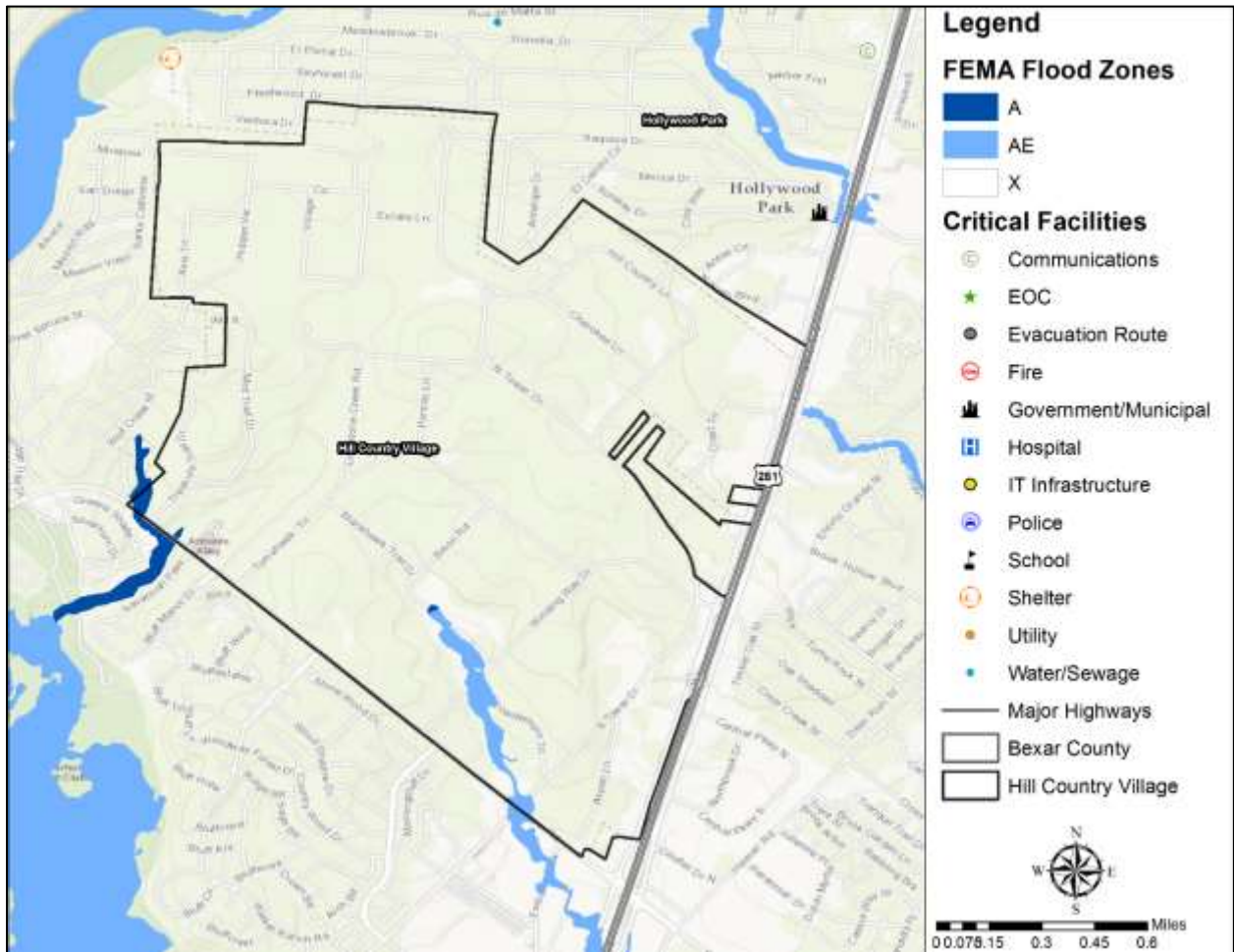
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Figure 7-13. Estimated Flood Zones in the City of Helotes



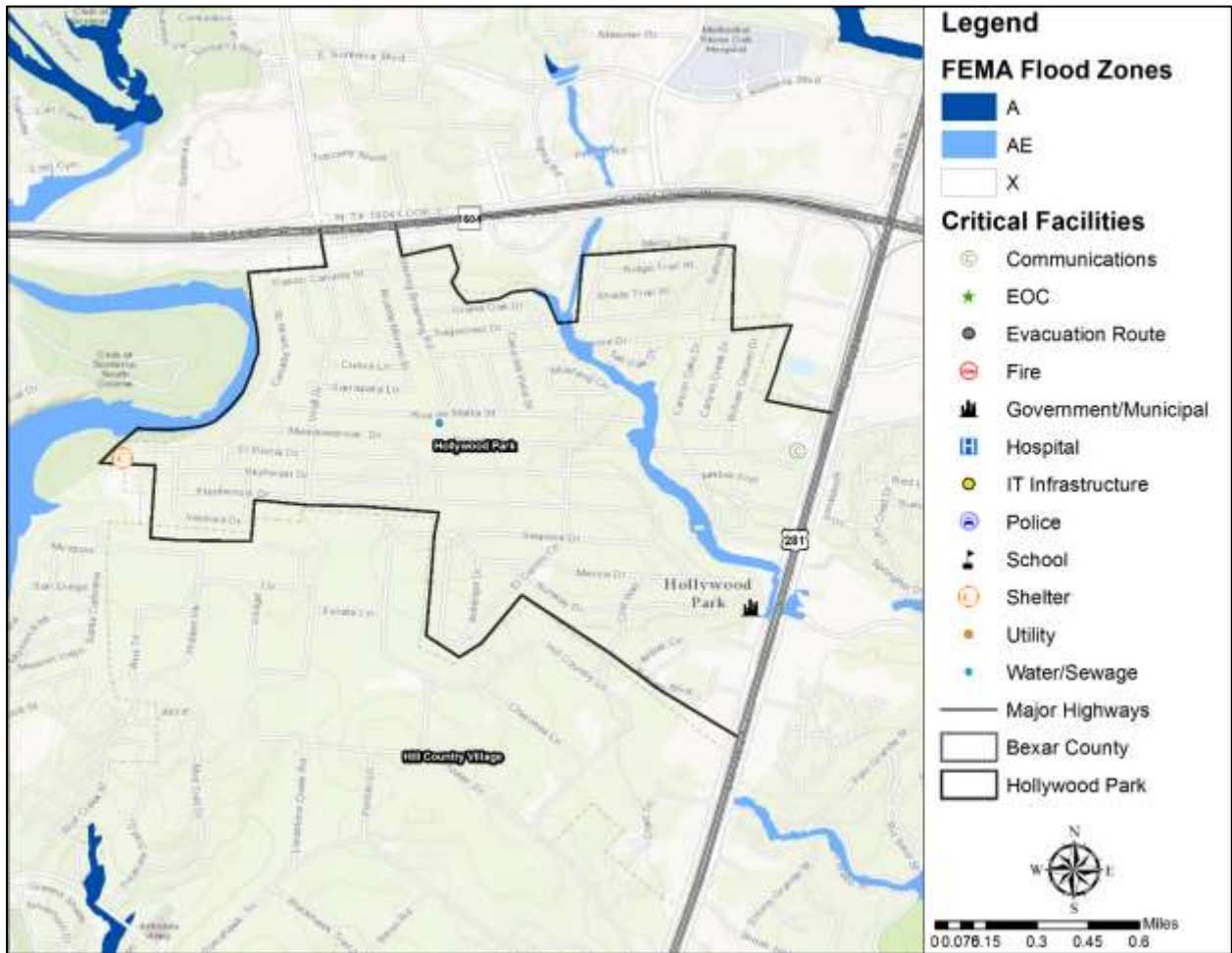
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Figure 7-14. Estimated Flood Zones in the City of Hill Country Village



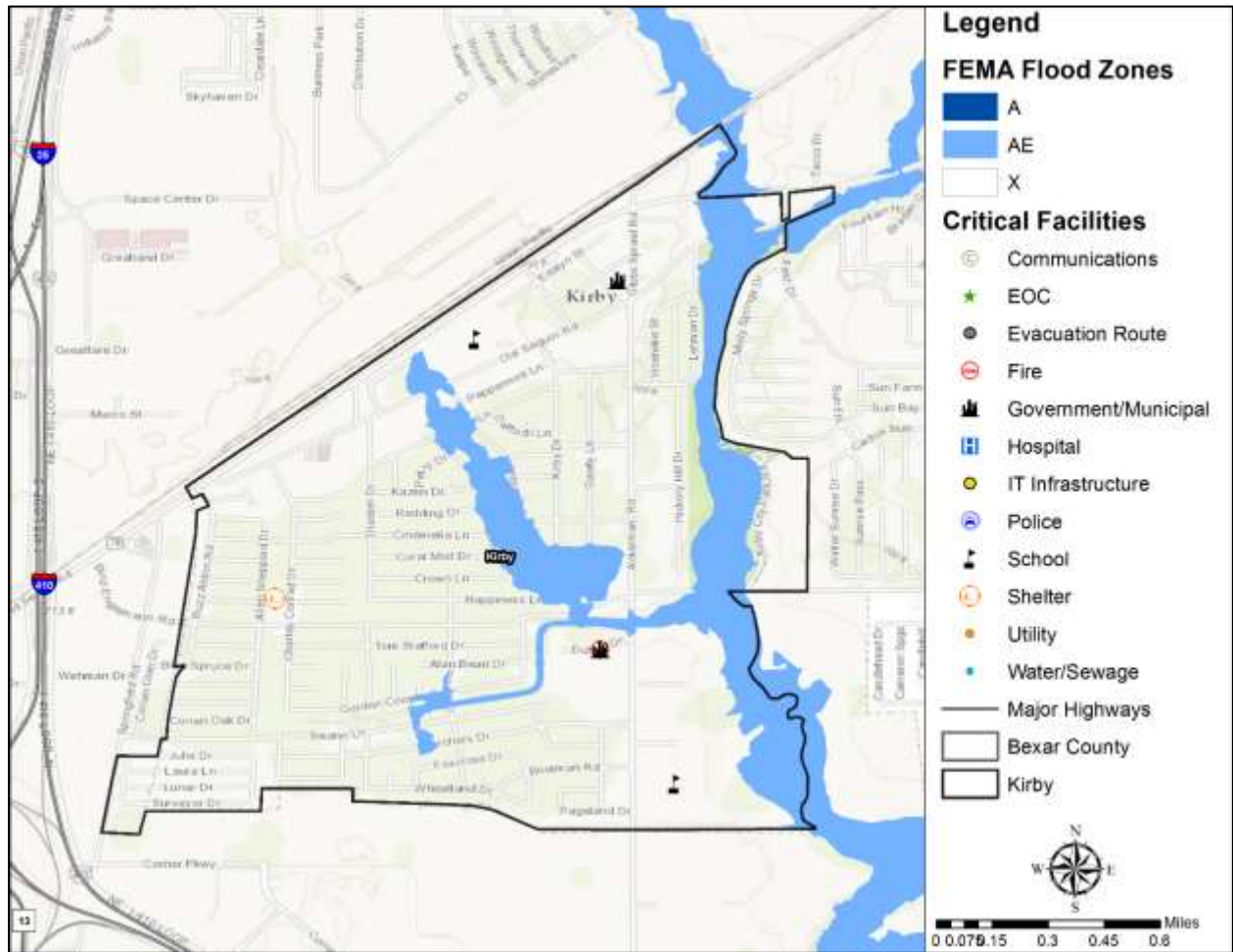
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Figure 7-15. Estimated Flood Zones in the Town of Hollywood Park



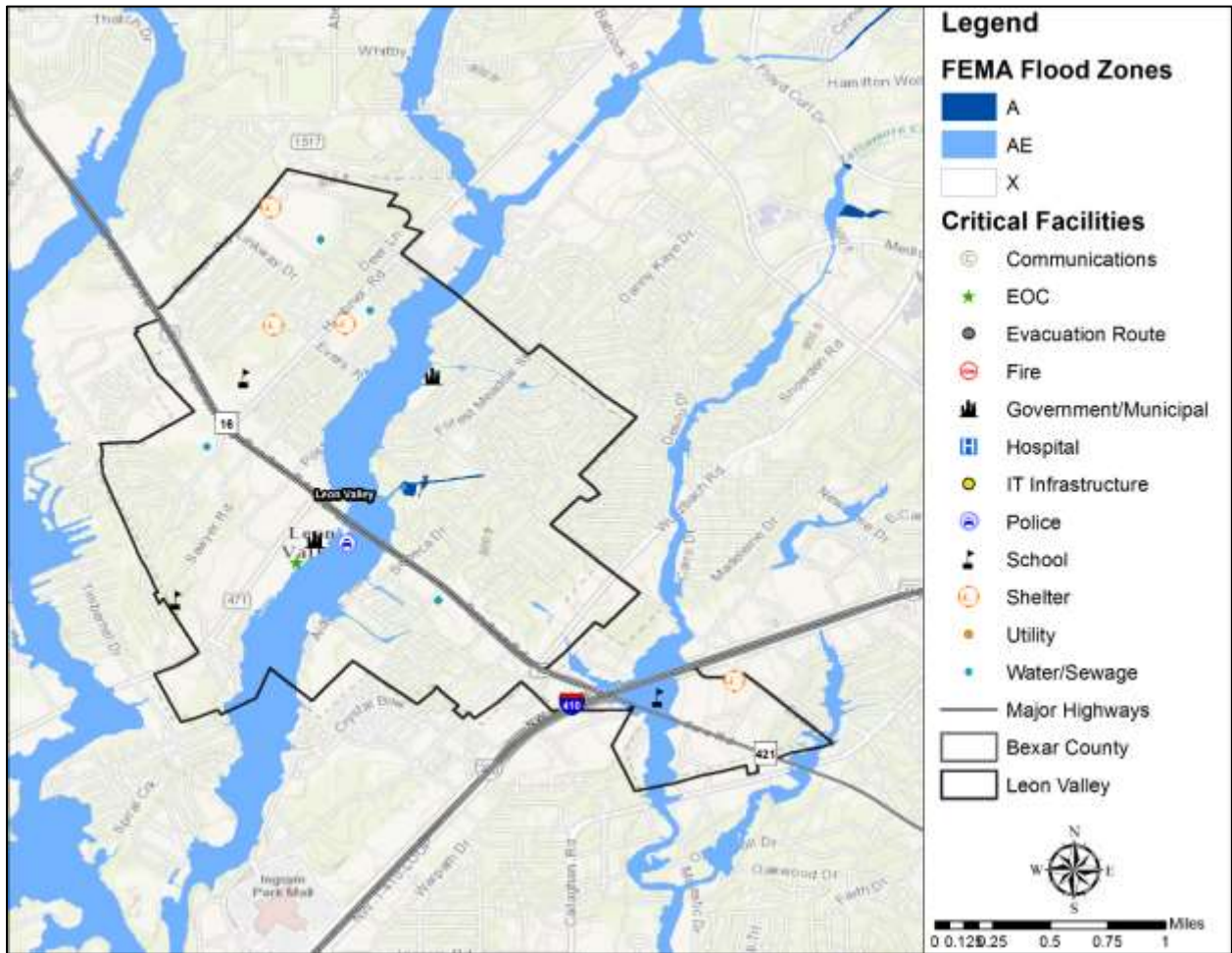
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Figure 7-16. Estimated Flood Zones in the City of Kirby



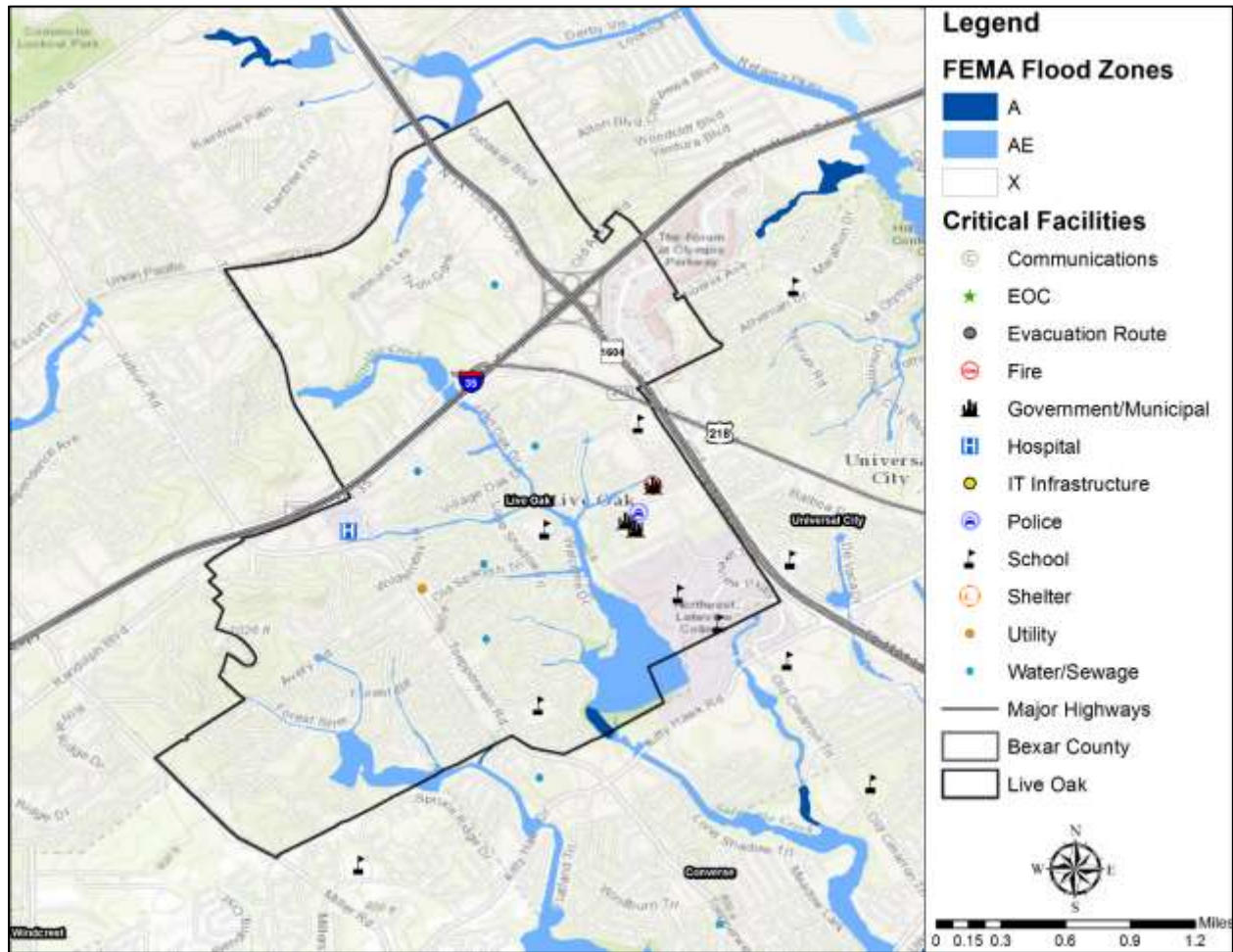
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Figure 7-17. Estimated Flood Zones in the City of Leon Valley



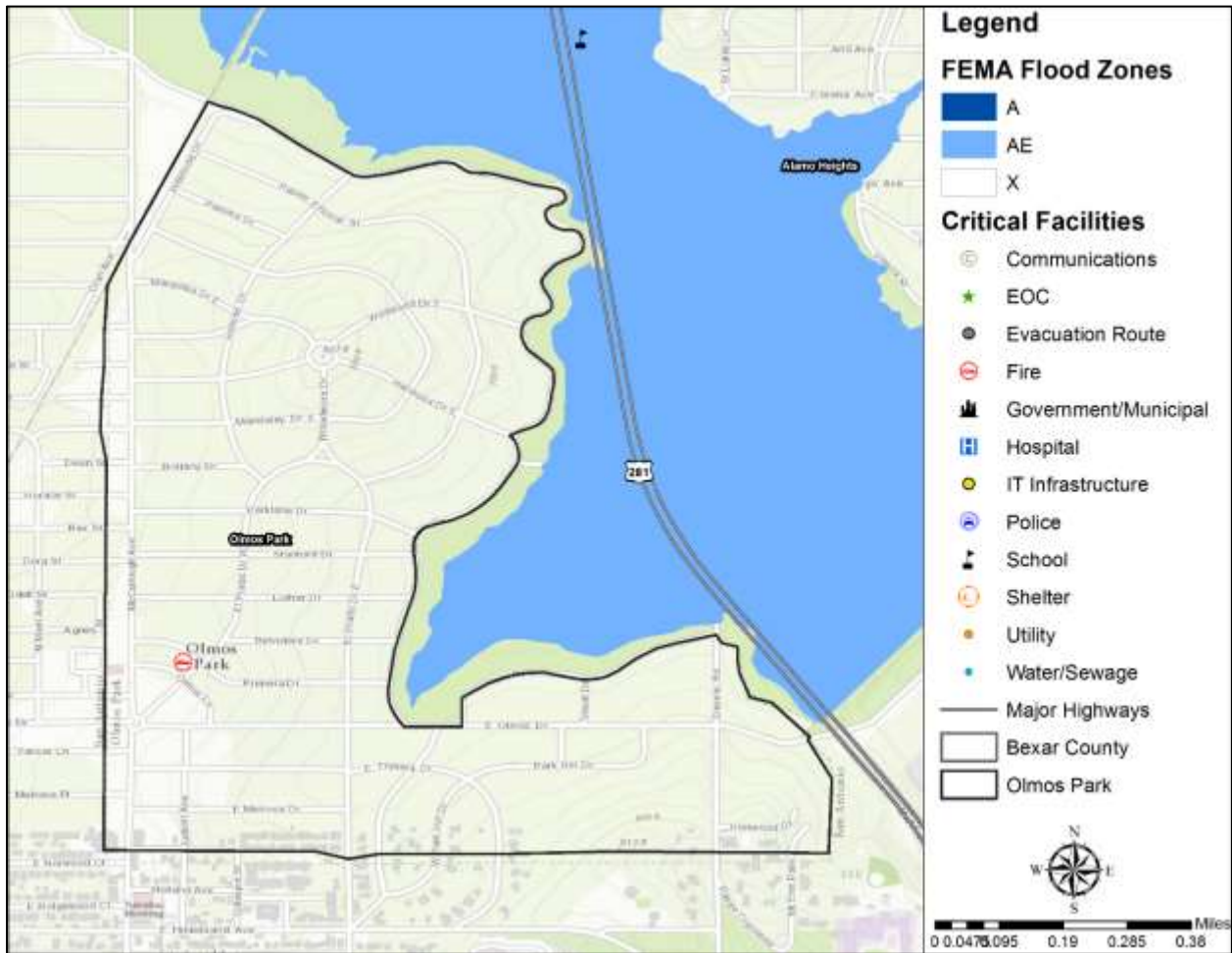
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Figure 7-18. Estimated Flood Zones in the City of Live Oak



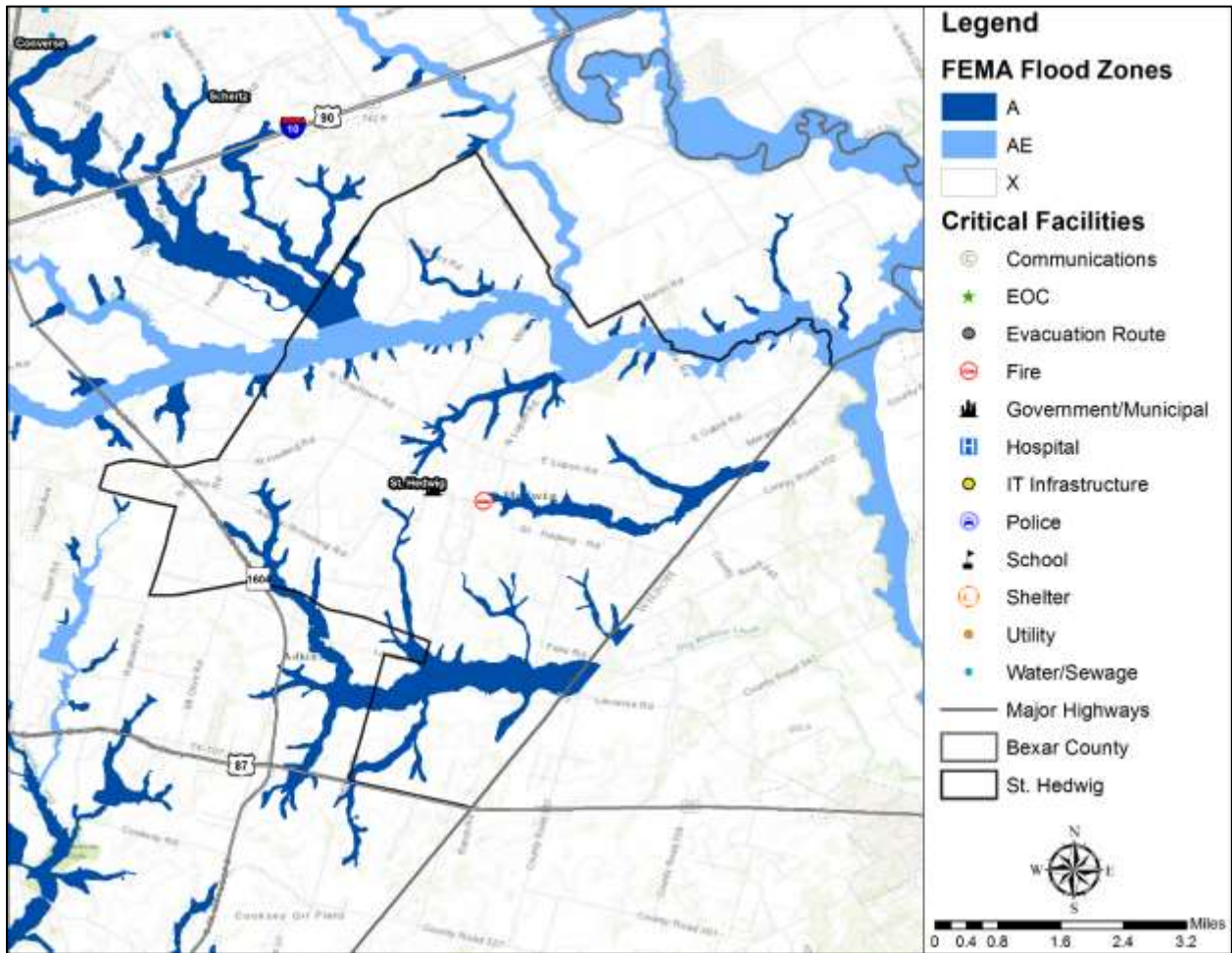
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Figure 7-19. Estimated Flood Zones in the City of Olmos Park



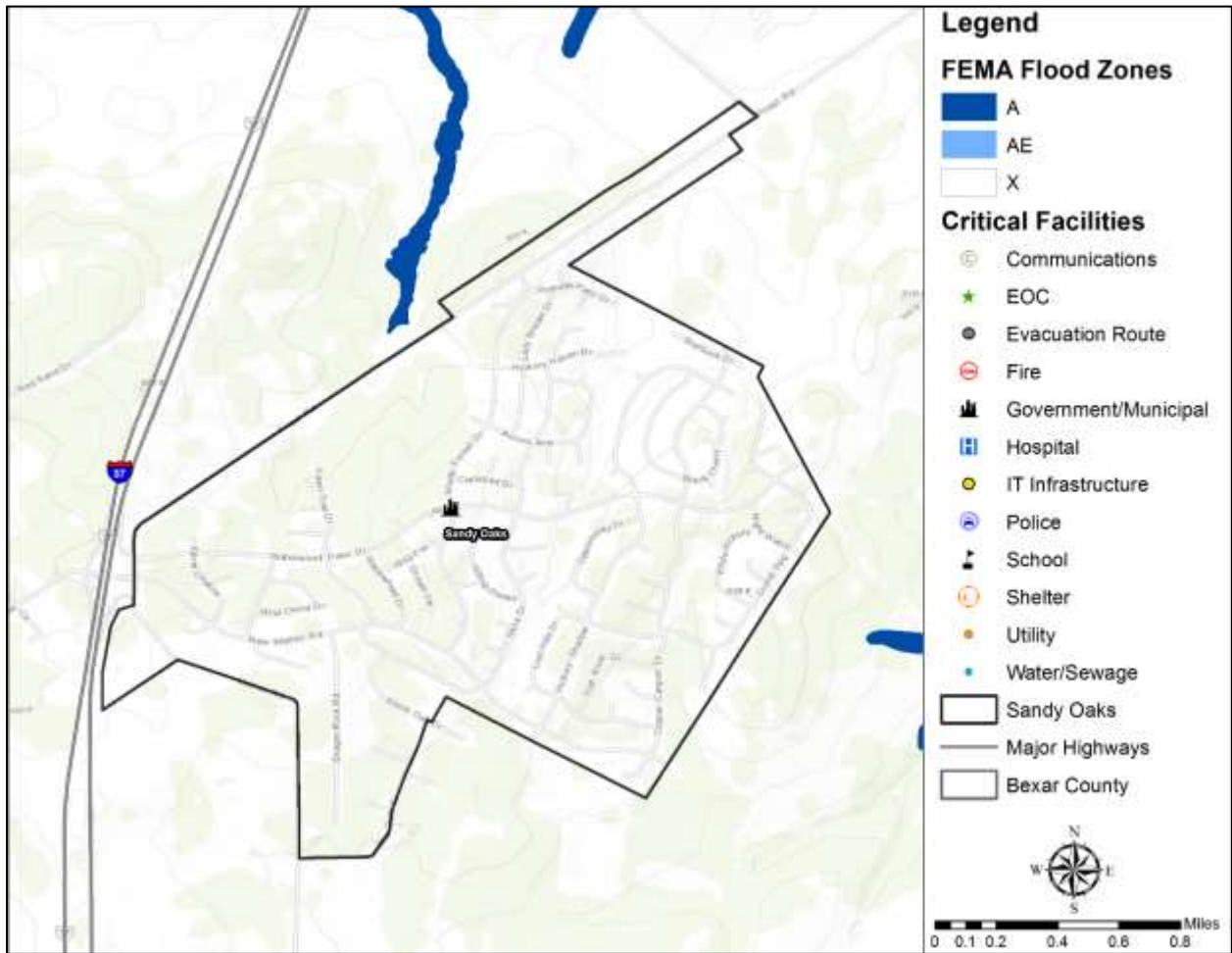
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Figure 7-20. Estimated Flood Zones in the City of Saint Hedwig



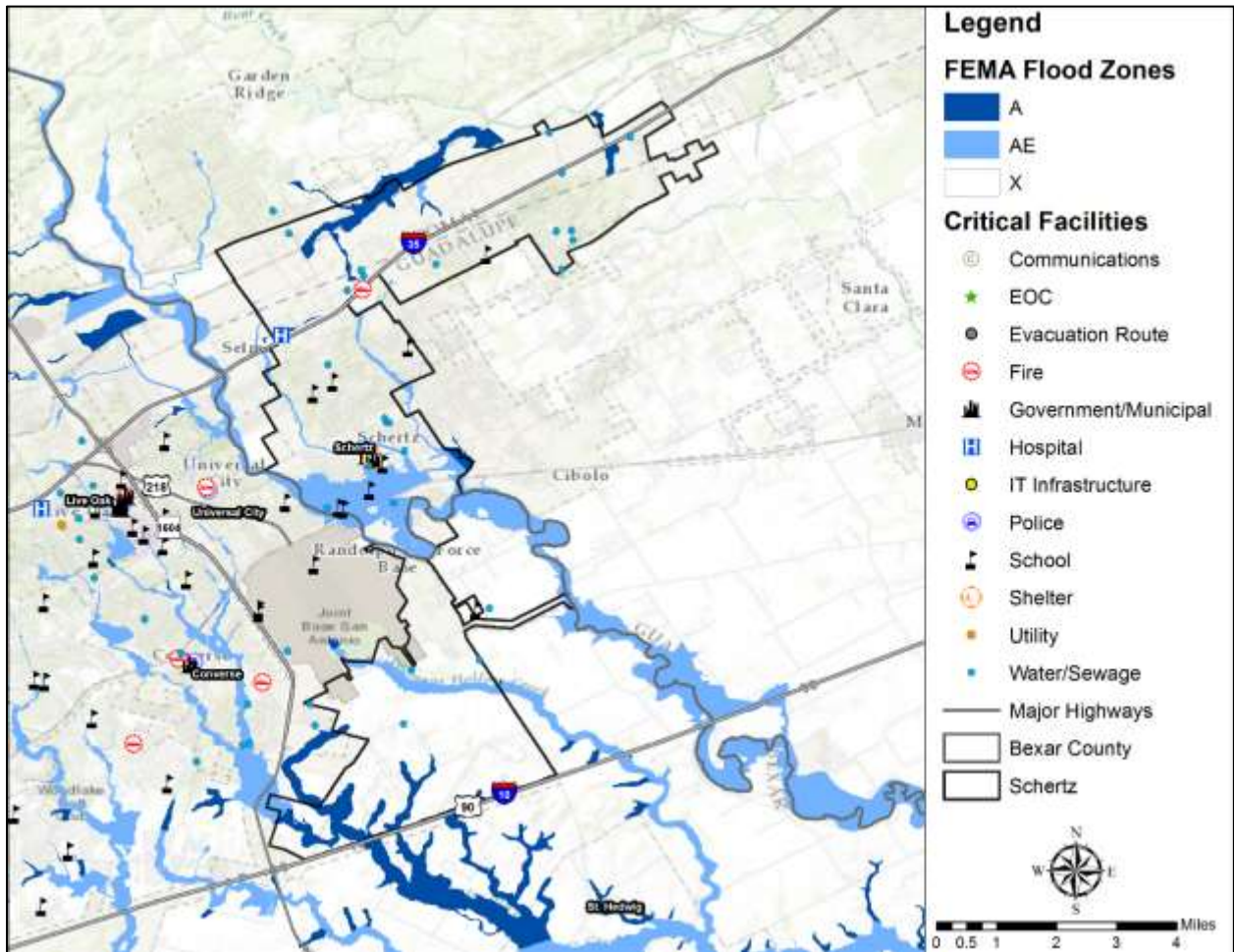
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Figure 7-21. Estimated Flood Zones in the City of Sandy Oaks



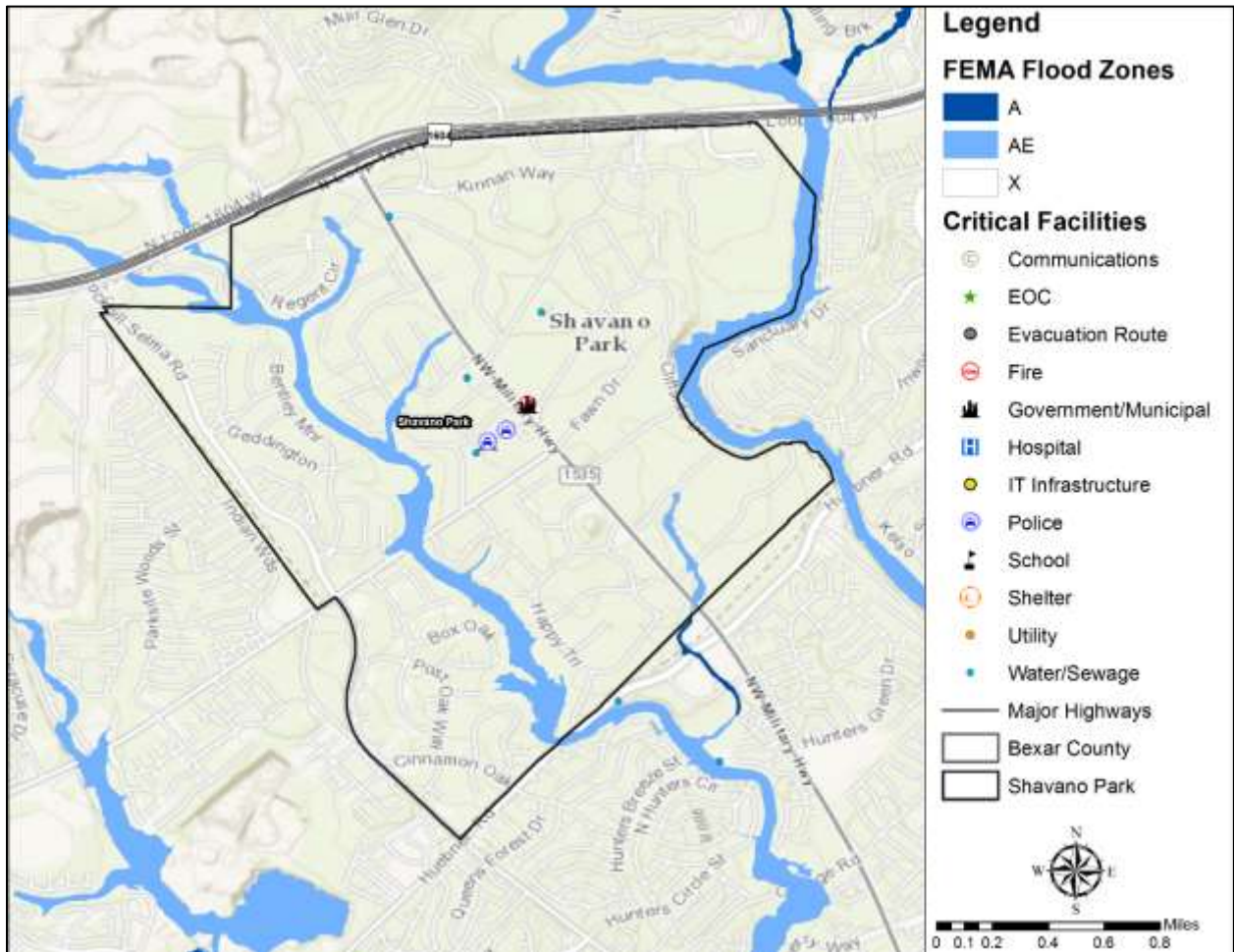
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Figure 7-22. Estimated Flood Zones in the City of Schertz



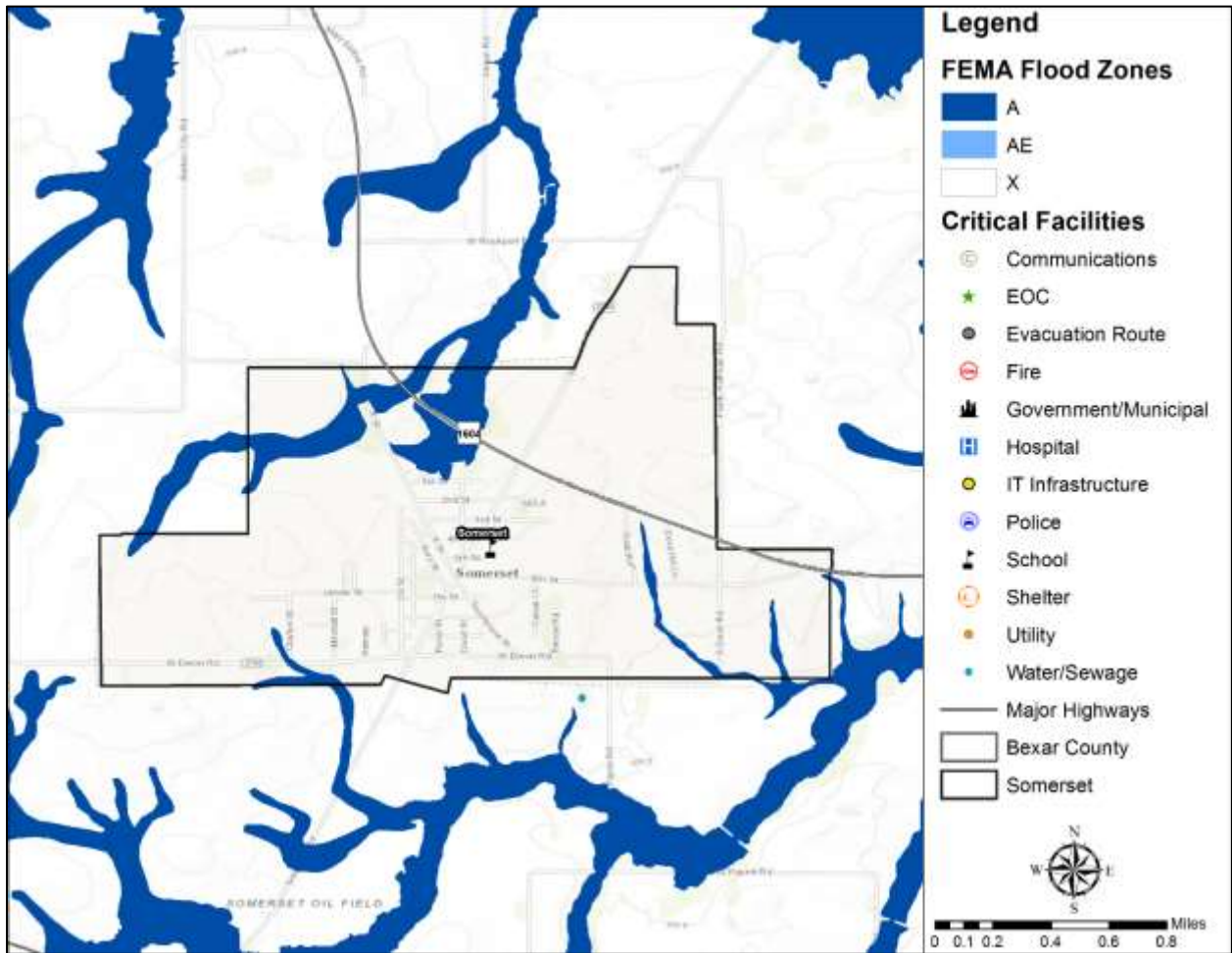
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Figure 7-23. Estimated Flood Zones in the City of Shavano Park



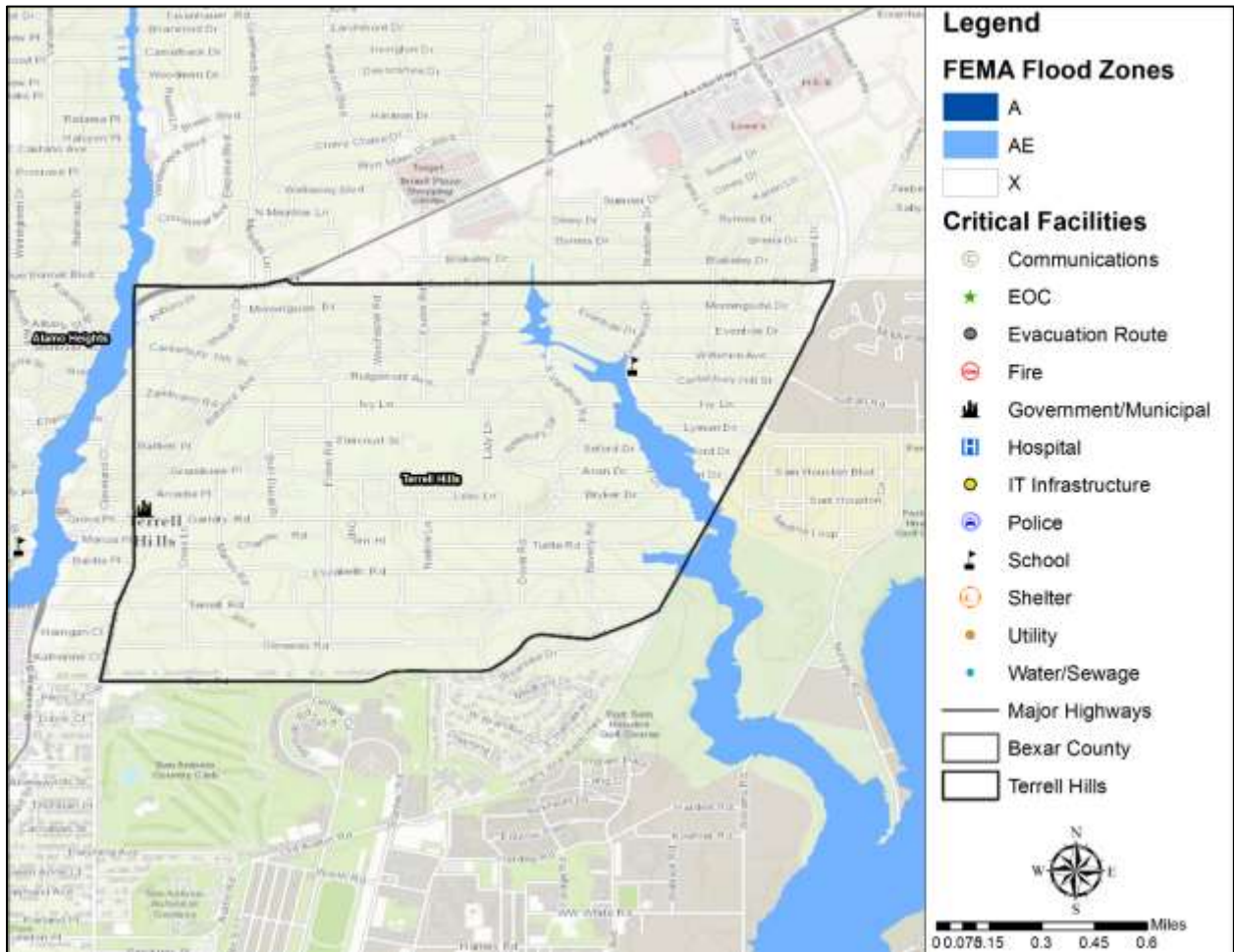
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Figure 7-24. Estimated Flood Zones in the City of Somerset



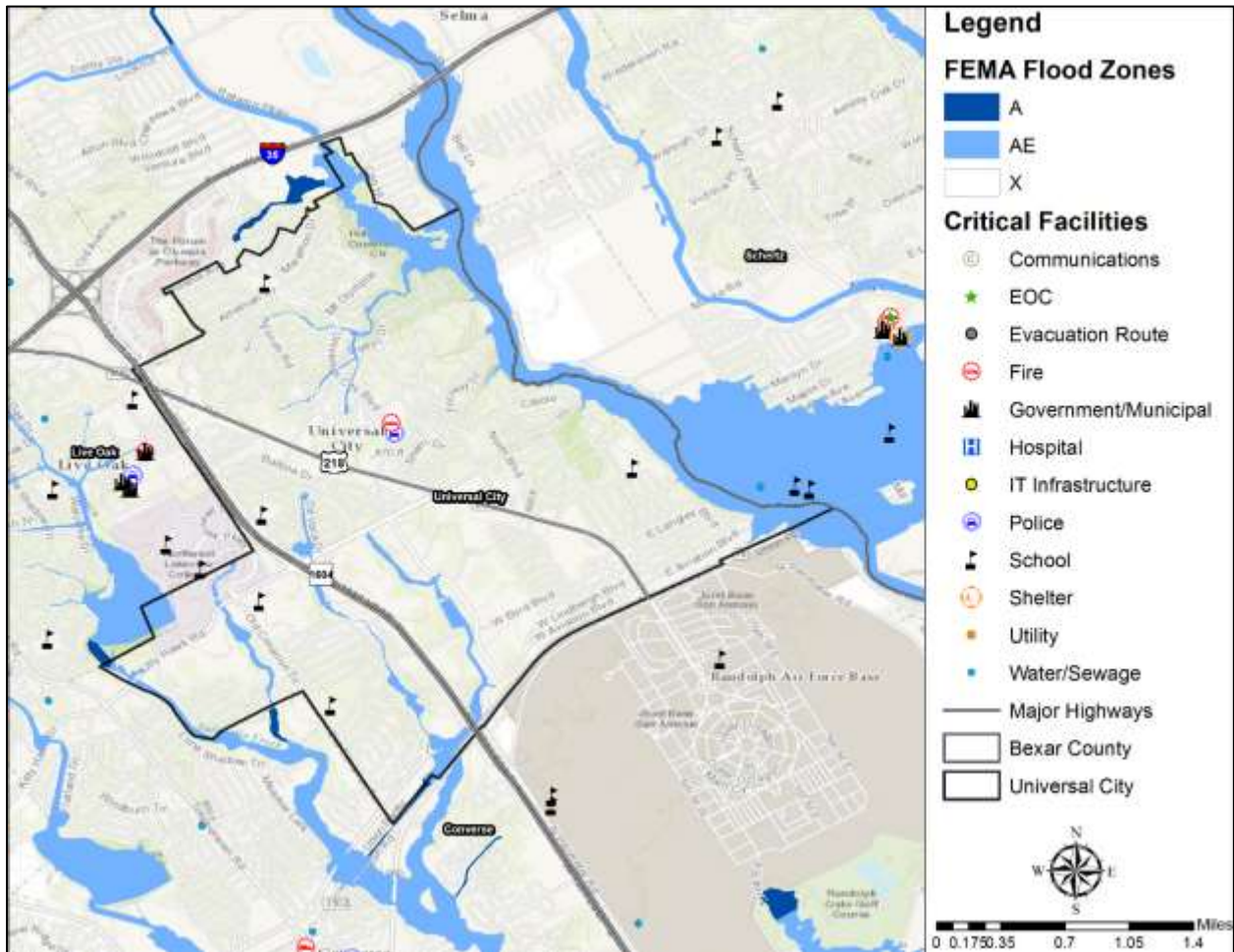
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Figure 7-25. Estimated Flood Zones in the City of Terrell Hills



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Figure 7-26. Estimated Flood Zones in the City of Universal City



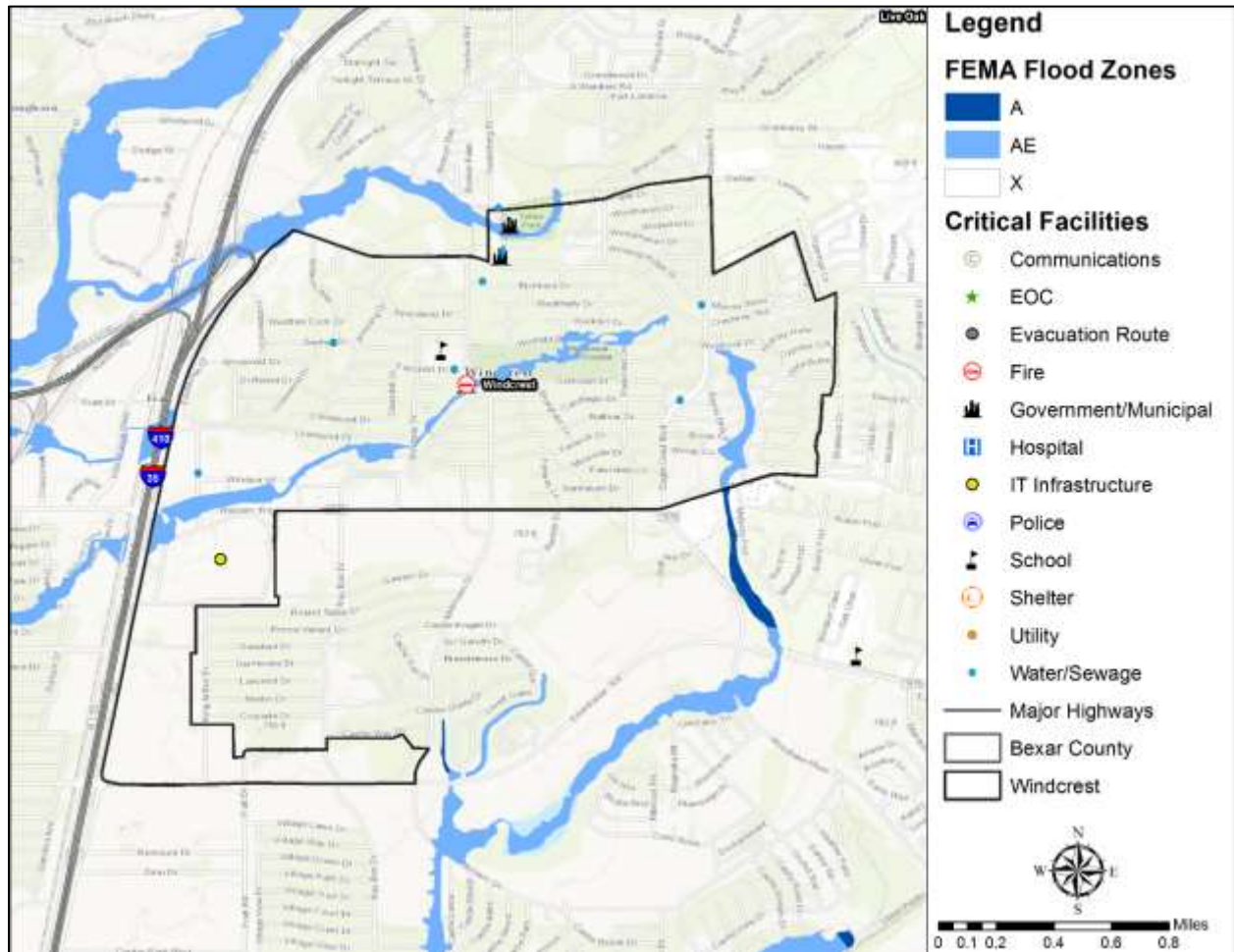
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Figure 7-27. Estimated Flood Zones in the City of Von Ormy



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Figure 7-28. Estimated Flood Zones in the City of Windcrest



Extent

The severity of a flood event is determined by a combination of several factors including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area, in addition to depths of flood waters. The extent of flood damages can be expected to be more damaging in the areas that will convey a base flood. FEMA categorizes areas on the terrain according to how the area will convey flood water. Flood zones are the categories that are mapped on Flood Insurance Rate Maps. Table 7-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, and X are the only hazard areas mapped in the region. Figures 7-1 through 7-28 (above) should be read in conjunction with the extent for flooding in Tables 7-1, 7-2, and 7-3, in order to determine the intensity of a potential flood event.

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Table 7-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1-percent-annual-chance of flooding and a 26-percent-chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	ZONE A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a Base Flood Elevation (BFE) (old format).
	ZONE AE	The base floodplain where base flood elevations are provided. AE Zones are now used on the new format FIRMs instead of A1-A30 Zones.
	ZONE AO	River or stream flood hazard areas and areas with a 1-percent or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26-percent-chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
	ZONE AH	Areas with a 1-percent-annual-chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26-percent chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
	ZONE A99	Areas with a 1-percent-annual-chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
	ZONE AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
	ZONE V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

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INTENSITY	ZONE	DESCRIPTION
	ZONE VE	Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic analyses are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
MODERATE to LOW	ZONE X 500	An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

Zone A is interchangeably referred to as the 100-year flood, the 1-percent-annual chance flood, the Special Flood Hazard Area (SFHA), or more commonly, the base flood. This is the area that will convey the base flood and constitute a threat to the planning area. The impact from a flood event can be more damaging in areas that will convey a base flood.

Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving flood water exerts pressure on everything in its path and causes erosion of soil and solid objects. Utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems, and water systems, may also be damaged if not elevated above the BFE.

The intensity and magnitude of a flood event is also determined by the depth of flood waters. Table 7-2 below describes the category of risk and potential magnitude of an event in correlation to water depth. The water depths depicted in Table 7-2 are approximations based on elevation data. Table 7-3 describes the extent associated with stream gauge data provided by the United States Geological Survey (USGS).

Table 7-2. Extent Scale – Water Depth

SEVERITY	DEPTH (in feet)	DESCRIPTION
BELOW FLOOD STAGE	0 to 15	Water begins to exceed low sections of banks and the lowest sections of the floodplain.
ACTION STAGE	16 to 23	Flow is well into the floodplain, minor lowland flooding reaches low areas of the floodplain. Livestock should be moved from low lying areas.
FLOOD STAGE	24 to 28	Homes are threatened and properties downstream of river flows or in low lying areas begin to flood.
MODERATE FLOOD STAGE	29 to 32	At this stage the lowest homes downstream flood. Roads and bridges in the floodplain flood severely and are dangerous to motorists.

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SEVERITY	DEPTH (in feet)	DESCRIPTION
MAJOR FLOOD STAGE	33 and above	Major flooding approaches homes in the floodplain. Primary and secondary roads and bridges are severely flooded and very dangerous. Major flooding extends well into the floodplain, destroying property, equipment, and livestock.

Table 7-3. Extent for Bexar County Planning Area¹

JURISDICTION ²	ESTIMATED SEVERITY PER FLOOD EVENT	PEAK FLOOD EVENT
Bexar County	Below Flood Stage, 0 to 15 feet, 12.87	Flood Stage: Martinez Creek near Saint Hedwig reached an overflow elevation of 26.36 feet in September 2010 near the City of Saint Hedwig, Texas.
Bexar County	Below Flood Stage, 0 to 15 feet, 14.54	Action Stage: Calaveras Creek reached an overflow elevation of 21.83 feet in September 1957 near Elmendorf, Texas
Bexar County	Major Flood Stage, 33 feet and above, 36.17	Major Flood Stage: San Antonio River reached an overflow elevation of 64.22 feet in October 1998 near Elmendorf, Texas.
Bexar County	Action Stage, 16 to 23 feet, 21.12	Major Flood Stage: Medina River reached an overflow elevation of 49.47 feet in October 1998 near San Antonio, Texas.
Bexar County	Action Stage, 16 to 23 feet, 16.47	Major Flood Stage: Medina River reached an overflow elevation of 42.19 feet in July 2002 near Somerset, Texas.
Bexar County	Below Flood Stage, 0 to 15 feet, 11.18	Action Stage: Medina River reached an overflow elevation of 18.23 feet in May 2013 near Von Ormy, Texas.
Bexar County	Below Flood Stage, 0 to 15 feet, 10.39	Flood Stage: Medina River reached an overflow elevation of 24.78 feet in July 2002 near Macdona, Texas.
City of Helotes	Below Flood Stage, 0 to 15 feet, 4.68	Below Flood Stage: Helotes Creek reached an overflow elevation of 15.21 feet in October 1998 at Helotes, Texas.
Bexar County	Below Flood Stage, 0 to 15 feet, 10.48	Major Flood Stage: Cibolo Creek reached an overflow elevation of 35.37 feet in October 1998 at Selma, Texas.

¹ Severity estimated by averaging floods at certain stage level over the history of flood events. Severity and peak events are based on U.S. Geological Survey data.

² Severity is provided for jurisdictions where peak data was provided.

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JURISDICTION ²	ESTIMATED SEVERITY PER FLOOD EVENT	PEAK FLOOD EVENT
City of San Antonio	Action Stage, 16 to 23 feet, 28.83	Major Action Stage: Medina River at San Antonio had floodwaters reach 49.47 feet in October 1999 and San Antonio River at Loop 410 had floodwaters reach 34.21 feet in May 2013.

The range of flood intensity that the County can experience is high, or Zone A. Based on reporting from the USGS, a flood event can place the County at the extent of “Below Flood Stage,” as shown in Tables 7-2 and 7-3 (above). However, the Bexar County planning area has experienced flooding over 33 feet Mean Sea Level (MSL). Based on historical occurrences, the planning area could experience 9 to 16 inches of water within a 24-hour period due to flooding.

The data described in Tables 7-1 through 7-3, together with Figures 7-1 through 7-28, and historical occurrences for the area, provides an estimated potential magnitude and severity for the planning area. For example the City of Fair Oaks Ranch, as shown in Figure 7-11, has areas designated as Zone A and Zone AE. Reading this figure in conjunction with Table 7-1 means the area is of high risk for flood.

Historical Occurrences

Historical evidence indicates that areas within Bexar County are susceptible to flooding, especially in the form of flash flooding. It is important to note that only flood events that have been reported have been factored into this risk assessment; therefore it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 7-4 identifies historical flood events that resulted in damages, injuries, or fatalities within the Bexar County planning area. Table 7-5 provides the historical flood event summary by jurisdiction. Historical Data is provided by the National Oceanic and Atmospheric Administration and the National Weather Service’s (NOAA/NWS) Storm Prediction Center, in addition to the National Center for Environmental Information (NCEI) database for Bexar County.

Table 7-4. Historical Flood Events, 1996-2016³

JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	9/24/1996	5:25 PM	0	0	\$15,311	\$0
Bexar County	6/6/1997	5:00 PM	0	0	\$22,452	\$0
Bexar County	6/21/1997	7:00 AM	0	0	\$37,420	\$0
Bexar County	6/22/1997	2:30 PM	0	10	\$4,490,393	\$74,840
Bexar County	10/7/1997	6:00 PM	0	0	\$119,744	\$0
Bexar County	1/6/1998	2:00 PM	0	0	\$7,369	\$0

³ Values are in 2016 dollars.

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JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	1/31/1998	11:00 AM	0	0	\$22,108	\$0
Bexar County	2/21/1998	5:00 PM	0	0	\$7,369	\$0
Bexar County	3/16/1998	1:00 AM	0	0	\$44,215	\$0
Bexar County	8/6/1998	7:45 AM	0	0	\$29,477	\$0
Bexar County	8/14/1998	4:05 PM	0	3	\$73,692	\$0
Bexar County	8/22/1998	7:30 AM	0	0	\$73,692	\$14,738
Bexar County	8/23/1998	5:00 PM	0	10	\$14,738	\$0
Bexar County	9/11/1998	10:30 AM	0	0	\$22,108	\$0
Bexar County	10/17/1998	5:30 AM	11	600	\$11,790,724	\$147,384
Bexar County	10/17/1998	8:00 AM	0	100	\$11,790,724	\$117,907
Bexar County	10/17/1998	8:00 AM	0	100	\$11,790,724	\$73,692
Bexar County	6/14/1999	7:30 PM	0	0	\$14,420	\$0
Bexar County	6/15/1999	9:00 AM	0	0	\$43,260	\$0
Bexar County	6/15/1999	9:30 PM	0	0	\$14,420	\$0
Bexar County	6/21/1999	10:00 AM	0	0	\$14,420	\$0
Bexar County	7/11/1999	6:30 PM	0	0	\$28,840	\$0
Bexar County	8/24/1999	3:00 AM	0	0	\$72,100	\$0
Bexar County	4/3/2000	12:30 AM	0	0	\$13,951	\$0
Bexar County	5/19/2000	8:20 PM	0	0	\$13,951	\$0
Bexar County	6/10/2000	1:30 PM	0	0	\$41,853	\$0
Bexar County	6/11/2000	2:00 PM	0	0	\$13,951	\$0
Bexar County	10/17/2000	1:30 PM	0	8	\$41,853	\$0
Bexar County	10/23/2000	3:30 AM	0	0	\$69,755	\$13,951
Bexar County	11/2/2000	8:00 PM	0	0	\$69,755	\$0
Bexar County	11/5/2000	7:00 PM	0	0	\$27,902	\$0
Bexar County	11/23/2000	10:00 PM	0	0	\$13,951	\$0

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JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	4/23/2001	7:30 AM	0	0	\$108,520	\$0
Bexar County	8/30/2001	10:00 AM	0	2	\$67,825	\$0
Bexar County	8/31/2001	4:00 AM	0	0	\$40,695	\$0
Bexar County	8/31/2001	8:00 AM	0	0	\$54,260	\$27,130
Bexar County	9/5/2001	5:30 PM	0	0	\$108,520	\$0
Bexar County	11/15/2001	7:00 AM	0	10	\$135,650	\$0
Bexar County	4/8/2002	1:30 AM	0	0	\$106,831	\$66,769
Bexar County	6/30/2002	9:30 AM	0	0	\$20,031	\$0
Bexar County	7/1/2002	4:30 PM	4	0	\$0	\$0
Bexar County	9/8/2002	3:45 AM	0	0	\$66,769	\$0
Bexar County	9/8/2002	4:30 PM	0	2	\$106,831	\$0
Bexar County	9/19/2002	2:00 PM	0	2	\$66,769	\$0
Bexar County	10/8/2002	10:30 PM	0	0	\$66,769	\$0
Bexar County	10/23/2002	2:50 AM	0	4	\$106,831	\$0
Bexar County	10/24/2002	5:30 AM	0	0	\$66,769	\$0
Bexar County	12/9/2002	4:30 AM	0	0	\$6,677	\$0
Bexar County	6/13/2003	6:45 PM	0	0	\$6,528	\$0
Bexar County	7/5/2003	6:30 AM	0	0	\$13,056	\$0
Bexar County	7/15/2003	10:30 PM	0	0	\$13,056	\$0
Bexar County	7/16/2003	12:30 PM	0	0	\$6,528	\$0
Bexar County	9/5/2003	12:30 PM	0	0	\$130,563	\$0
Bexar County	4/2/2004	10:30 PM	0	0	\$25,435	\$0
Bexar County	9/22/2004	9:00 PM	1	0	\$0	\$0
Bexar County	11/16/2004	6:30 PM	1	0	\$0	\$0
Bexar County	11/22/2004	1:30 AM	1	0	\$0	\$0
Bexar County	5/3/2007	2:00 AM	1	0	\$0	\$0

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JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Helotes	6/16/2007	9:30 AM	0	0	\$34,759	\$0
Bexar County	6/28/2007	8:00 AM	0	0	\$57,932	\$0
Helotes	9/4/2007	7:15 PM	1	1	\$0	\$0
Bexar County	8/20/2008	2:20 AM	0	0	\$11,158	\$0
Bexar County	2/4/2010	12:00 AM	1	0	\$0	\$0
Bexar County	6/9/2010	1:15 AM	0	0	\$55,086	\$0
Bexar County	9/8/2010	8:33 PM	1	0	\$0	\$0
Bexar County	5/25/2013	6:00 AM	2	0	\$0	\$0
Grey Forest	11/4/2014	9:50 AM	0	0	\$50,739	\$0
Bexar County	11/4/2014	8:18 PM	0	0	\$50,739	\$0
Bexar County	5/18/2015	8:40 AM	1	0	\$0	\$0
Bexar County	10/30/2015	6:15 AM	1	0	\$0	\$0

Table 7-5. Summary of Historical Flood Events, 1996-2016⁴

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	220	11	852	\$42,346,470	\$536,412
Alamo Heights	1	0	0	\$0	\$0
Balcones Heights	2	0	0	\$0	\$0
Castle Hills	3	0	0	\$0	\$0
China Grove	0	0	0	\$0	\$0
Converse	1	0	0	\$0	\$0
Elmendorf	4	0	0	\$0	\$0
Fair Oaks Ranch	0	0	0	\$0	\$0
Grey Forest	10	0	0	\$50,739	\$0
Helotes	3	1	1	\$34,759	\$0

⁴ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hill Country Village	0	0	0	\$0	\$0
Hollywood Park	3	0	0	\$0	\$0
Kirby	3	0	0	\$0	\$0
Leon Valley	9	0	0	\$0	\$0
Live Oak	0	0	0	\$0	\$0
Olmos Park	4	0	0	\$0	\$0
St. Hedwig	1	0	0	\$0	\$0
Sandy Oaks	0	0	0	\$0	\$0
Schertz	0	0	0	\$0	\$0
Shavano Park	0	0	0	\$0	\$0
Somerset	3	0	0	\$0	\$0
Terrell Hills	1	0	0	\$0	\$0
Universal City	0	0	0	\$0	\$0
Von Ormy	2	0	0	\$0	\$0
Windcrest	0	0	0	\$0	\$0
TOTAL LOSSES	270	12	853	\$42,968,380	

Significant Past Events

Flash Flood on October 17, 1998 – Bexar County

The Great October Flood - In advance of a very slow-moving upper level trough of low pressure over West Texas, a cold front drifted slowly southeastward into West Central Texas during the evening of Friday, October 16th. Deep moisture was in place across South Central Texas as the two systems approached, being fed at the mid and upper levels by two nearly stationary hurricanes, Madeline near the tip of Baja Mexico, and Lester, anchored just off Acapulco, Mexico, and at the low levels by a strong flow from the Gulf of Mexico. A very moisture-rich environment was in place across South Central Texas as the event developed. Near 3 AM CST, scattered showers and thunderstorms began to break out over Bexar County beneath the mid and upper level moisture plume. They quickly became widespread as a low level rain-cooled boundary formed along the south and east edge of the county. It was upon this boundary that subsequent showers and thunderstorms continued to form. By 6 AM CST, rainfall of up to 4 inches had been reported in Western Bexar County, with amounts approaching 4 inches in neighboring Western Comal County. By 8 AM CST that morning, heavy rain continued over Bexar County, and had spread northward across Comal County into Hays, Travis, and Williamson Counties. Amounts at this time were approaching 8 inches in Bexar and Comal Counties and 4 inches in Hays and Travis Counties. The heavy rain continued through the morning period. By midnight, moderate rain had again broken out over Bexar and Comal Counties. The activity spread westward through the early morning hours on Sunday.

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At the same time, moderate to heavy rain also redeveloped along and north of a line from San Antonio to Gonzales to LaGrange. By late Sunday morning, spotty heavy rainfall continued in the wake of a cold front between San Antonio, Burnet, and Bastrop as another weak upper level disturbance in the southwesterly flow aloft approached.

All rivers, creeks, and streams along and east of a San Antonio to Austin line remained at or above flood stage from Saturday, October 17th through Sunday, October 18th, with a majority continuing to flood through Monday, October 19th. This event broke rainfall records across South Central Texas, producing 18 floods of record in South Central Texas streams. October became the wettest of any month in climate records for Bexar County since 1885. October 17th became the wettest day and wettest 24-hour period in Bexar County climatic records, nearly doubling both previous records. Rivers across the area reached or exceeded record stage heights, resulting in widespread flooding in the flood plains of streams, creeks, and rivers. Rainfall amounts on October 17th and 18th ranged from 15 to 22 inches, from northern Bexar County to southeast Kendall County, most of Comal County, and southern Hays County. Damage and destruction to livestock and agriculture, roads and bridges, and both public and property and buildings significantly exceeded that of previous flooding. Thousands to tens of thousands of livestock were killed, as nearly 3,000 homes were destroyed and another 8,000 or so homes were damaged. Nearly 1,000 mobile homes were destroyed and another 3,000 were damaged.

Twenty-five people drowned as a direct result of the flooding in October in South Central Texas. All nine deaths in Bexar County on Saturday, as well as the two on Sunday, were associated with driving vehicles into flooded waters.

Flash Flood on August 16, 2007 – Bexar County, City of Elmendorf

Extremely heavy rainfall associated with the remains of Tropical Storm Erin spread across Bexar County on the 16th and into the 17th of August, with a general 4 to 5 inch rain over the county. Totals of up to 8 inches were reported at several locations in the south and west parts of San Antonio, as well as between Helotes and Leon Springs. By 2 PM, most roads in the northwest part of Bexar County were closed. By 3:30 PM that afternoon, more than 39 high water rescues were reportedly underway in Bexar County. Water was almost waist-deep at Southcross Boulevard in San Antonio. Floodwaters were so deep and running so swiftly at the San Antonio High School West Campus that a masonry wall collapsed and filled the school with almost five feet of muddy water. Hallways were flooded, and desks, computers, and boxes were tossed and thrown together. A young man was driving to work in the mid-afternoon of August 16th when his vehicle struck a guardrail on Southwest Military Drive and was knocked into Six Mile Creek near South Flores Street. The young man called his family to say he had an accident, then exited the vehicle but drowned as he attempted to move to higher ground. Near midnight a young woman was driving with three friends and a baby near North Star Mall when she accidentally drove her sport utility vehicle into deeper water where it was slammed against a bridge and then was swept into a drainage ditch. The three other adults in the vehicle were able to get the baby out of the vehicle through the window and escape. When the three looked back for the driver, she was gone. Her body was found later by emergency responders when the water receded.

Probability of Future Events

Based on recorded historical occurrences and extent within the Bexar County planning area, including all participating jurisdictions, flooding is highly likely and an event will likely occur within the next year.

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Vulnerability and Impact

A property's vulnerability to a flood depends on its location and proximity to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures.

All participating jurisdictions encourage development outside of the floodplain, although there are some critical facilities, homes, and businesses already located in the floodplain. Table 7-6 includes critical facilities in the planning area that are located in the floodplain and are vulnerable to flooding.

Table 7-6. Critical Facilities in the Floodplain by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	None
Alamo Heights	Hospital
Balcones Heights	Police Department, City Hall
Castle Hills	None
China Grove	None
Converse	2 Water/Sewage Facilities
Elmendorf	Church
Fair Oaks Ranch	None
Grey Forest	None
Helotes	Utility Department, Fire Station, School
Hill Country Village	None
Hollywood Park	None
Kirby	None
Leon Valley	Public Works Department
Live Oak	None
Olmos Park	None
St. Hedwig	None
Sandy Oaks	None
Schertz	4 Schools, 4 Water/Sewage Facilities
Shavano Park	None
Somerset	None
Terrell Hills	None

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JURISDICTION	CRITICAL FACILITIES
Universal City	None
Von Ormy	None
Windcrest	None

Historic loss estimates due to flood events are presented in Table 7-7 below. Considering 70 flood events over a 21-year period, the frequency is approximately 2 to 3 events every year.

Table 7-7. Potential Annualized Losses by Jurisdiction, 1996-2016⁵

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Bexar County	220	\$42,882,882	\$2,042,042
Alamo Heights	1	\$0	\$0
Balcones Heights	2	\$0	\$0
Castle Hills	3	\$0	\$0
China Grove	0	\$0	\$0
Converse	1	\$0	\$0
Elmendorf	4	\$0	\$0
Fair Oaks Ranch	0	\$0	\$0
Grey Forest	10	\$50,739	\$2,416
Helotes	3	\$34,759	\$1,655
Hill Country Village	0	\$0	\$0
Hollywood Park	3	\$0	\$0
Kirby	3	\$0	\$0
Leon Valley	9	\$0	\$0
Live Oak	0	\$0	\$0
Olmos Park	4	\$0	\$0
St. Hedwig	1	\$0	\$0
Sandy Oaks	0	\$0	\$0

⁵ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Schertz	0	\$0	\$0
Shavano Park	0	\$0	\$0
Somerset	3	\$0	\$0
Terrell Hills	1	\$0	\$0
Universal City	0	\$0	\$0
Von Ormy	2	\$0	\$0
Windcrest	0	\$0	\$0
Total Losses	270	\$42,968,380	\$2,046,113

The severity of a flooding event varies depending on the relative risk to citizens and structures located within each jurisdiction. Table 7-8 depicts the level of impact for Bexar County and each participating jurisdiction.

Table 7-8. Impact by Jurisdiction

JURISDICTION	IMPACT	DESCRIPTION
Bexar County	Substantial	Multiple fatalities are possible. Complete shutdown of critical facilities for 30 days or more, and it is expected that more than 50 percent of property would be destroyed or with major damage in the county.
Alamo Heights	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down, it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Balcones Heights	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Castle Hills	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
China Grove	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Converse	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.

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JURISDICTION	IMPACT	DESCRIPTION
Elmendorf	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Fair Oaks Ranch	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Grey Forest	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Helotes	Major	Injuries or illnesses may result in permanent disability. Critical facilities may be shut down for 2 weeks or more, and it is expected that more than 25 percent of property would be destroyed or damaged in the city.
Hill Country Village	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Hollywood Park	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Kirby	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Leon Valley	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Live Oak	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Olmos Park	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
St. Hedwig	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.

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JURISDICTION	IMPACT	DESCRIPTION
Sandy Oaks	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Schertz	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Shavano Park	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Somerset	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Terrell Hills	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Universal City	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Von Ormy	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Windcrest	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.

Assessment of Impacts

Flooding is the deadliest natural disaster that occurs in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the planning area. Impacts to the planning area can include:

- Recreational lakes including Braunig, Calaveras, and Mitchell Lake attract fishing and boating activities throughout the year. A large flood event could impact recreational water activities, placing boaters and campers in imminent danger, potentially requiring emergency services or lake evacuation.
- The Government Canyon State Natural Area may suffer significant wildlife mortality during and following a flood due to damaged or destroyed ecosystems and water contamination.

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- Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities, and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after the flood waters have receded due to contaminated flood waters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or be otherwise impacted by a flood event and unable to report for duty, limiting response capabilities.
- City or county departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the county, city, and residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psycho-social effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.

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- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Floods pose a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood-related declines in production may lead to an increase in unemployment.
- Large floods may result in loss of livestock, potential increased livestock mortality due to stress and water borne disease, and increased cost for feed.

The overall extent of damages caused by floods is dependent on the extent, depth, and duration of flooding, and the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a flood event.

National Flood Insurance Program (NFIP) Participation

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. All of the jurisdictions located in Bexar County participate in the NFIP and have a designated floodplain administrator except for Sandy Oaks. The City of Sandy Oaks was incorporated in 2014 and does not currently have any FEMA designated Special Flood Hazard Areas.

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, only the City of Live Oak participates in CRS (current class 7). The remaining jurisdictions in the planning area understand the value of participation in this program and have identified this as a goal and objective of the Plan that was discussed during Planning Team meetings.

Many participating jurisdictions in the NFIP currently have in place minimum NFIP standards for new construction and substantial improvements of structures; these jurisdictions include: Balcones Heights, China Grove, Converse, Elmendorf, Grey Forest, Hill Country Village, Hollywood Park, Kirby, Leon Valley, Saint Hedwig, Somerset, Terrell Hills, Von Ormy, and Bexar County. Other jurisdictions have adopted higher regulatory NFIP standards to limit floodplain development, such as freeboard. These communities include: Alamo Heights, Castle Hills, Fair Oaks Ranch, Live Oak, Olmos Park, Schertz, Universal City, and Windcrest. The remaining jurisdictions of Helotes, Saint Hedwig, and Shavano Park have adopted significantly restrictive standards including prohibiting habitable structures in the regulatory floodplain.

The flood hazard areas throughout Bexar County are subject to periodic inundation, which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect public safety.

These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood-proofed, or otherwise protected from flood damage. Mitigation actions are included to address flood maintenance issues as well, including routinely clearing debris from roadside ditches and bridges, and expanding drainage culverts and storm water structures to more adequately convey flood waters.

It is the purpose of Bexar County and NFIP jurisdictions participating in the Hazard Mitigation plan to continue to promote the public health, safety, and general welfare by minimizing public and private losses due to flood

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conditions in specific areas. Each of the NFIP participating jurisdictions in the Plan are guided by their local Flood Damage Prevention Ordinance. These communities will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. Furthermore, the NFIP program for each of the participating jurisdictions promotes sound development in floodplain areas and includes provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in floodplains;
- Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
- Ensure that potential buyers are notified that property is in a flood area.

In order to accomplish these tasks, Bexar County and participating NFIP jurisdictions seek to follow the subsequent guidelines to achieve flood mitigation:

- Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, such as filling or dumping, that may cause excessive increases in flood heights or velocities;
- Require that uses vulnerable to floods, including facilities, which serve such uses, be protected against flood damage at the time of initial construction, as a method of reducing flood losses;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
- Control filling, grading, dredging and other development, which may increase flood damage; and
- Prevent or regulate the construction of flood barriers, which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

NFIP Compliance and Maintenance

As mentioned, Bexar County and participating jurisdictions have developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 16.

Flooding was identified by the majority of the communities as a high risk hazard during hazard ranking activities at the Risk Assessment Workshop. As a result, many of the mitigation actions were developed with flood mitigation in mind. A majority of these flood actions address compliance with the NFIP and implementing flood awareness programs. County-wide, communities recognize the need and are working towards adopting additional higher NFIP regulatory standards to further minimize flood risk in their community. Smaller no-growth communities that typically do not have personnel or funds to implement more stringent NFIP compliance measures are focusing on NFIP public awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places.

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Repetitive Loss

The Severe Repetitive Loss (SRL) Grant Program under FEMA provides federal funding to assist states and communities in implementing mitigation measures to reduce or eliminate the long-term risk of flood damage to SRL residential structures insured under the NFIP. The Texas Water Development Board (TWDB) administers the SRL Grant Program for the State of Texas.

Severe Repetitive Loss properties are defined as residential properties that are:

- Covered under the NFIP and have at least 4 flood-related damage claim payments (building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceed \$20,000; or
- At least 2 separate claim payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

In either scenario, at least 2 of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart.⁶ Table 7-9 shows repetitive loss and severe repetitive loss properties for Bexar County and all participating jurisdictions.

Table 7-9. Repetitive Loss and Severe Repetitive Loss Properties

COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Bexar County	0110541	NO	SINGLE FMLY	2	7,178.24	-
Bexar County	0140109	SDF	SINGLE FMLY	4	190,769.25	V
Bexar County	0099275	NO	SINGLE FMLY	2	47,177.34	-
Bexar County	0118058	NO	OTHR-NONRES	2	12,562.07	-
Bexar County	0236417	NO	OTHR-NONRES	2	228,161.07	-
Bexar County	0193748	YES	SINGLE FMLY	3	82,466.91	-
Bexar County	0124621	NO	SINGLE FMLY	3	8,954.95	-
Bexar County	0004039	NO	SINGLE FMLY	4	19,310.09	-
Bexar County	0193746	NO	SINGLE FMLY	2	28,092.80	-
Bexar County	0172807	NO	SINGLE FMLY	3	56,899.48	-
Bexar County	0245304	NO	SINGLE FMLY	2	24,134.50	-
Bexar County	0122073	NO	SINGLE FMLY	4	137,653.28	VU
Bexar County	0094028	SDF	OTHR-NONRES	5	280,900.15	VN
Bexar County	0121030	NO	ASSMD CONDO	3	36,514.56	-
Bexar County	0174259	NO	SINGLE FMLY	2	27,603.60	-

⁶ Source: Texas Water Development Board

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Bexar County	0173172	NO	SINGLE FMLY	2	11,033.04	-
Bexar County	0244659	NO	SINGLE FMLY	2	56,849.04	-
Bexar County	0110130	NO	SINGLE FMLY	3	32,950.73	-
Bexar County	0099299	NO	SINGLE FMLY	2	31,027.65	-
Bexar County	0097015	NO	SINGLE FMLY	2	129,568.24	-
Bexar County	0001905	NO	SINGLE FMLY	2	14,927.18	-
Bexar County	0115612	NO	SINGLE FMLY	2	37,233.82	-
Bexar County	0101007	NO	SINGLE FMLY	2	45,007.62	-
Bexar County	0172999	YES	OTHR-NONRES	3	32,480.00	-
Bexar County	0055015	NO	SINGLE FMLY	2	3,459.22	-
Bexar County	0018774	NO	OTHR-NONRES	2	5,706.75	-
Bexar County	0099272	NO	OTHR-NONRES	2	41,955.41	-
Bexar County	0131435	NO	SINGLE FMLY	4	54,924.26	-
Bexar County	0189637	NO	SINGLE FMLY	2	28,821.39	-
Bexar County	0187881	NO	SINGLE FMLY	2	56,782.51	-
Bexar County	0244167	YES	SINGLE FMLY	2	19,574.99	-
Bexar County	0237394	YES	SINGLE FMLY	2	48,420.48	-
Bexar County	0039369	NO	OTHR-NONRES	2	6,035.01	-
Bexar County	0068474	NO	OTHR-NONRES	2	11,424.73	-
Bexar County	0055040	NO	OTHR-NONRES	3	33,865.87	-
Bexar County	0068480	NO	SINGLE FMLY	2	23,048.72	-
Bexar County	0194800	NO	SINGLE FMLY	2	72,026.95	-
Bexar County	0134775	NO	SINGLE FMLY	2	2,895.78	-
Bexar County	0235799	NO	SINGLE FMLY	3	31,999.21	-
Bexar County	0128804	NO	SINGLE FMLY	2	14,992.64	-
Bexar County	0171192	NO	SINGLE FMLY	2	3,405.82	-
Bexar County	0170987	NO	SINGLE FMLY	2	4,409.92	-
Bexar County	0132883	NO	SINGLE FMLY	2	7,168.84	-

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Bexar County	0236412	NO	SINGLE FMLY	2	106,927.91	-
Bexar County	0236411	YES	SINGLE FMLY	2	14,491.85	-
Bexar County	0117269	NO	SINGLE FMLY	3	79,098.43	-
Bexar County	0018462	NO	OTHR-NONRES	2	6,930.65	-
Bexar County	0235141	NO	SINGLE FMLY	2	40,851.72	-
Bexar County	0117153	YES	SINGLE FMLY	4	13,256.30	-
Bexar County	0018593	NO	SINGLE FMLY	2	15,815.31	-
Bexar County	0105145	NO	OTHR-NONRES	2	136,670.96	-
Bexar County	0050983	NO	OTHR-NONRES	2	4,508.15	-
Bexar County	0051283	NO	OTHR-NONRES	2	8,553.84	-
Bexar County	0136383	YES	OTHR-NONRES	3	62,202.29	-
Bexar County	0243380	NO	SINGLE FMLY	2	18,346.15	-
Bexar County	0136037	NO	SINGLE FMLY	2	78,532.16	-
Bexar County	0018294	NO	OTHR-NONRES	6	17,869.18	-
Bexar County	0007064	NO	OTHR-NONRES	6	187,432.86	VNU
Bexar County	0055425	SDF	OTHR-NONRES	3	94,995.21	PN
Bexar County	0118466	YES	SINGLE FMLY	2	13,698.80	-
Bexar County	0236416	YES	SINGLE FMLY	2	32,323.61	-
Bexar County	0236045	YES	SINGLE FMLY	2	31,172.07	-
Bexar County	0221508	NO	SINGLE FMLY	2	16,756.69	-
Bexar County	0118458	NO	SINGLE FMLY	2	9,142.60	-
Bexar County	0068443	NO	SINGLE FMLY	2	16,106.87	-
Bexar County	0118615	NO	SINGLE FMLY	2	18,941.85	-
Bexar County	0241217	YES	SINGLE FMLY	2	38,481.34	-
Bexar County	0000002	NO	SINGLE FMLY	4	280,234.57	VU
Bexar County	0164329	NO	SINGLE FMLY	5	201,522.32	VU
Bexar County	0239946	NO	SINGLE FMLY	2	20,322.34	-
Bexar County	0250499	YES	SINGLE FMLY	2	18,169.90	-

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Bexar County	0056853	NO	SINGLE FMLY	3	28,323.47	-
Bexar County	0043057	NO	SINGLE FMLY	3	17,426.38	-
Bexar County	0068447	NO	SINGLE FMLY	2	33,341.08	-
Bexar County	0055794	NO	SINGLE FMLY	3	52,753.09	-
Bexar County	0118749	NO	OTHR-NONRES	2	57,352.90	-
Bexar County	0118173	NO	SINGLE FMLY	2	14,329.91	-
Bexar County	0173794	YES	SINGLE FMLY	2	5,320.74	-
Bexar County	0056297	YES	SINGLE FMLY	3	5,506.33	-
Bexar County	0234934	NO	SINGLE FMLY	2	45,291.10	-
Bexar County	0128287	NO	SINGLE FMLY	3	9,896.64	-
Bexar County	0068475	NO	SINGLE FMLY	2	20,801.91	-
Bexar County	0224835	YES	SINGLE FMLY	3	74,600.90	-
Bexar County	0012904	NO	SINGLE FMLY	2	3,625.85	-
Bexar County	0137100	SDF	SINGLE FMLY	7	1,306,840.34	V
Bexar County	0110693	NO	SINGLE FMLY	2	21,559.62	-
Bexar County	0109475	YES	SINGLE FMLY	3	32,293.93	-
Bexar County	0097232	NO	SINGLE FMLY	2	21,420.55	-
Bexar County	0111385	NO	SINGLE FMLY	3	25,137.12	-
Bexar County	0237064	YES	SINGLE FMLY	2	11,310.21	-
Bexar County	0211834	YES	SINGLE FMLY	2	17,998.91	-
Bexar County	0211817	NO	SINGLE FMLY	2	11,141.88	-
Bexar County	0068451	YES	SINGLE FMLY	4	26,960.15	-
Bexar County	0252528	YES	SINGLE FMLY	2	9,509.22	-
Bexar County	0118060	NO	SINGLE FMLY	2	9,010.95	-
Bexar County	0118054	NO	SINGLE FMLY	3	31,824.69	-
Bexar County	0118301	NO	SINGLE FMLY	2	5,110.68	-
Bexar County	0118434	NO	SINGLE FMLY	7	56,385.57	-
Bexar County	0005606	SDF	OTHR-NONRES	7	157,556.64	VN

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Bexar County	0236418	NO	SINGLE FMLY	2	7,032.59	-
Bexar County	0218535	YES	SINGLE FMLY	2	9,781.45	-
Bexar County	0236413	YES	SINGLE FMLY	2	26,280.78	-
Bexar County	0025521	NO	SINGLE FMLY	2	9,203.24	-
Bexar County	0025847	NO	SINGLE FMLY	2	6,647.48	-
Bexar County	0018446	NO	SINGLE FMLY	3	17,637.21	-
Bexar County	0096964	YES	SINGLE FMLY	3	9,459.97	-
Bexar County	0193170	NO	SINGLE FMLY	2	5,900.07	-
Bexar County	0164659	NO	OTHR-NONRES	2	36,575.59	-
Bexar County	0005650	NO	SINGLE FMLY	2	36,472.15	-
Bexar County	0022171	NO	SINGLE FMLY	2	3,700.72	-
Bexar County	0118177	NO	SINGLE FMLY	2	34,386.79	-
Bexar County	0000243	NO	SINGLE FMLY	7	260,318.87	MVU
Bexar County	0017726	NO	OTHR-NONRES	5	92,744.11	-
Bexar County	0050361	NO	OTHR-NONRES	3	15,172.98	-
Bexar County	0000301	NO	SINGLE FMLY	3	34,946.01	-
Bexar County	0068485	NO	SINGLE FMLY	2	19,990.29	-
Bexar County	0046702	NO	SINGLE FMLY	2	38,033.63	-
Bexar County	0068476	NO	SINGLE FMLY	2	5,288.46	-
Bexar County	0071465	NO	SINGLE FMLY	3	17,409.30	-
Bexar County	0013177	NO	SINGLE FMLY	3	27,204.56	-
Alamo Heights	0212265	NO	ASSMD CONDO	2	387,080.71	-
Alamo Heights	0118296	NO	SINGLE FMLY	2	102,075.31	-
Alamo Heights	0046626	NO	OTHR-NONRES	3	27,306.67	-
Alamo Heights	0054558	NO	OTHR-NONRES	3	5,185.36	-
Alamo Heights	0068478	YES	OTHR-NONRES	3	29,189.07	-
Alamo Heights	0211665	NO	OTHR-NONRES	2	13,937.93	-
Alamo Heights	0132683	NO	SINGLE FMLY	2	10,045.44	-

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Alamo Heights	0018513	NO	2-4 FAMILY	3	5,309.35	-
Alamo Heights	0068453	NO	SINGLE FMLY	3	29,554.20	-
Alamo Heights	0056158	YES	SINGLE FMLY	3	41,710.99	-
Alamo Heights	0018728	NO	OTHR-NONRES	2	6,181.93	-
Castle Hills	0118295	YES	OTHR-NONRES	2	71,238.17	-
Castle Hills	0005566	SDF	OTHR-NONRES	5	237,765.74	VN
Castle Hills	0051071	NO	2-4 FAMILY	2	5,801.93	-
Castle Hills	0048205	NO	OTHR-NONRES	2	8,943.27	-
Castle Hills	0234942	YES	SINGLE FMLY	2	21,641.19	-
Castle Hills	0249116	YES	SINGLE FMLY	2	105,045.30	-
Castle Hills	0068481	NO	SINGLE FMLY	8	32,701.69	-
Castle Hills	0026122	NO	SINGLE FMLY	3	5,608.00	-
Castle Hills	0054452	YES	SINGLE FMLY	3	34,715.49	-
Converse	0116316	NO	SINGLE FMLY	2	11,316.13	-
Converse	0240757	NO	SINGLE FMLY	2	16,391.03	-
Grey Forest	0118067	YES	SINGLE FMLY	3	21,469.29	-
Helotes	0118326	NO	SINGLE FMLY	5	27,962.13	-
Hollywood Park	0235754	YES	SINGLE FMLY	2	58,902.85	-
Hollywood Park	0068448	NO	SINGLE FMLY	2	39,298.88	-
Kirby	0250786	YES	SINGLE FMLY	2	12,326.95	-
Leon Valley	0237385	YES	SINGLE FMLY	2	16,644.56	-
Leon Valley	0117099	NO	SINGLE FMLY	2	43,927.83	-
Leon Valley	0241963	YES	SINGLE FMLY	2	14,088.66	-
Leon Valley	0037620	NO	SINGLE FMLY	3	12,939.90	-
Leon Valley	0068450	NO	SINGLE FMLY	4	64,118.76	-
Leon Valley	0117428	NO	OTHR-NONRES	2	37,873.25	PNU
Olmos Park	0199227	YES	2-4 FAMILY	2	17,437.88	-
Olmos Park	0191868	NO	SINGLE FMLY	2	13,706.50	-

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COMMUNITY NAME	PROPERTY	INSURED	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR
Schertz	0005649	NO	SINGLE FMLY	2	9,205.66	-
Schertz	0005648	NO	SINGLE FMLY	2	8,657.48	-
Schertz	0005646	NO	SINGLE FMLY	2	9,844.91	-
Schertz	0005647	NO	SINGLE FMLY	2	9,936.94	-
Terrell Hills	0098386	NO	SINGLE FMLY	2	12,646.17	-
Terrell Hills	0100471	NO	SINGLE FMLY	2	9,268.76	-
Terrell Hills	0068449	YES	SINGLE FMLY	4	20,195.52	-
Terrell Hills	0164799	NO	SINGLE FMLY	2	22,911.92	-

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Hazard Description

Thunderstorms create extreme wind events which includes straight line winds. Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from the high pressure toward the low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated.

Thunderstorms are created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. By-products of this process are the clouds, precipitation, and wind that become the thunderstorm.

According to the National Weather Service (NWS), a thunderstorm occurs when thunder accompanies rainfall. Radar observers use the intensity of radar echoes to distinguish between rain showers and thunderstorms.



Straight line winds can have gusts of 100 miles per hour (mph) or more. Unlike tornadoes, windstorms have a broader path that is several miles wide and can cover several counties. Straight line winds may down trees and power lines, overturn mobile homes, and cause damage to well-built structures.

Straight line winds are responsible for most thunderstorm wind damages. One type of straight line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous.

Location

Thunderstorm wind events can develop in any geographic location and are considered a common occurrence in Texas. Therefore, a thunderstorm wind event could occur at any location within Bexar County's planning area, as these storms develop randomly and are not confined to any geographic area within the County. It is assumed that the Bexar County planning area, including all participating jurisdictions, is uniformly exposed to the threat of thunderstorm winds.

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Extent

The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale. Table 8-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

Table 8-1. Beaufort Wind Scale¹

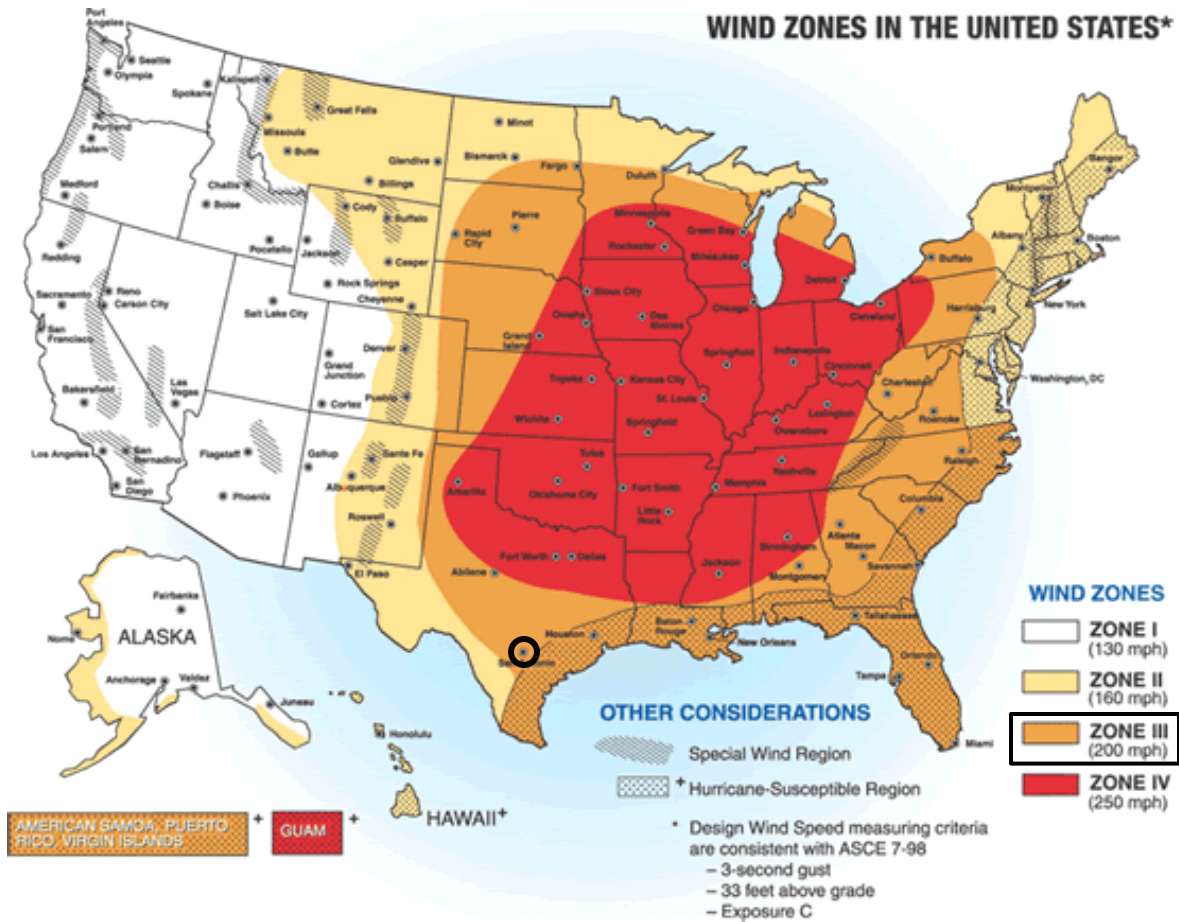
FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Dust, leaves and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Seldom experienced on land, trees broken or uprooted, considerable structural damage
11	64-72	Violent Storm	If experienced on land, widespread damage
12	73+	Hurricane	Violence and destruction

Figure 8-1 displays the wind zones as derived from the National Oceanic and Atmospheric Administration (NOAA).

¹ Source: World Meteorological Organization

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Figure 8-1. Wind Zones in the United States²



On average, the planning area experiences 3 to 4 thunderstorm wind events every year. The County is located within Zone III, meaning the entire planning area, including all participating jurisdictions, can experience winds up to 200 mph. Bexar County has experienced a significant wind event – an event with winds above 73 knots in the range of “Force 12” on the Beaufort Wind Scale.

Historical Occurrences

Tables 8-2, 8-3, and 8-4 depict historical occurrences of thunderstorm wind events for the Bexar County planning area according to the National Center for Environmental Information (NCEI) data. Since January 1955, 210 thunderstorm wind events are known to have impacted Bexar County, based upon NCEI records. Table 8-3 presents information on known historical events impacting the Bexar County planning area, with resulting damages. It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section.

The NCEI is a national data source organized under NOAA and is the largest archive available for climate data. Only NCEI reported incidents were factored into this risk assessment. In the tables that follow throughout this

² Source: NOAA; the black circle indicates the Bexar County planning area.

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section, some occurrences seem to appear multiple times in one table. This is due to reports from various locations throughout the County. In addition, property damage estimates are not always reported. When this occurs, estimates are provided when reasonable. When an estimate has been provided in a table for losses, the dollar amounts have been adjusted to indicate the damage in 2016 dollars.

Table 8-2. Historical Thunderstorm Wind Events, 1955-2016

MAXIMUM WIND SPEED RECORDED (KNOTS)	NUMBER OF REPORTED EVENTS
0-30	48
31-40	2
41-50	40
51-60	54
61-70	35
71-80	2
81-90	0
91-100+	1
Unknown	28

Table 8-3. Historical Thunderstorm Wind Events, With Reported Damages, 1955-2016³

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	2/14/1987	11:30 PM	0 knots	1	0	\$0	\$0
Bexar County	9/7/1987	4:50 PM	70 knots	0	10	\$0	\$0
Bexar County	3/27/1994	12:56 AM	56 knots	0	0	\$810,513	\$81,051
Bexar County	3/27/1994	1:10 AM	58 knots	0	0	\$810,513	\$81,051
Bexar County	3/8/1995	12:37 AM	50 knots	0	0	\$78,818	\$0
Bexar County	6/3/1995	10:41 PM	0 knots	0	0	\$0	\$15,764
Bexar County	7/3/1995	10:41 PM	0 knots	0	0	\$31,527	\$3,153
Bexar County	8/21/1995	6:00 PM	0 knots	0	0	\$15,764	\$0
Bexar County	4/28/1996	9:25 PM	Unknown	0	0	\$107,180	\$15,311
Bexar County	6/2/1996	8:30 PM	Unknown	0	0	\$30,623	\$0

³ Only recorded events with fatalities, injuries, or damages are listed. Magnitude is listed when available. Damage values are in 2016 dollars.

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	7/25/1996	6:15 PM	Unknown	0	0	\$45,934	\$0
Live Oak	9/15/1996	4:15 AM	Unknown	0	0	\$4,593	\$0
Bexar County	9/15/1996	4:30 AM	Unknown	0	0	\$7,656	\$0
St. Hedwig	5/15/1997	6:00 PM	Unknown	0	0	\$7,484	\$0
Bexar County	5/27/1997	7:03 PM	62 knots	0	0	\$29,936	\$0
Bexar County	5/27/1997	7:03 PM	106 knots	0	0	\$74,840	\$0
Bexar County	8/23/1997	2:30 PM	Unknown	0	0	\$74,840	\$0
Bexar County	9/9/1997	5:15 PM	Unknown	0	0	\$44,904	\$0
Schertz	2/10/1998	8:05 AM	Unknown	0	0	\$14,738	\$73,692
Bexar County	2/21/1998	4:40 PM	Unknown	0	0	\$147,384	\$14,738
Bexar County	2/21/1998	5:10 PM	Unknown	0	0	\$14,738	\$0
Bexar County	3/16/1998	2:45 AM	Unknown	0	0	\$44,215	\$0
Helotes	7/13/1998	4:32 PM	Unknown	0	0	\$29,477	\$0
Bexar County	3/27/1999	8:20 PM	Unknown	0	0	\$72,100	\$0
Bexar County	4/25/1999	4:20 AM	Unknown	0	0	\$72,100	\$0
Bexar County	5/17/1999	11:25 PM	Unknown	0	0	\$72,100	\$0
Leon Valley	6/12/1999	9:50 PM	Unknown	0	0	\$72,100	\$0
Schertz	6/12/1999	7:40 PM	Unknown	0	0	\$14,420	\$0
Schertz	6/12/1999	9:10 PM	Unknown	0	0	\$14,420	\$0
Bexar County	5/1/2000	4:20 AM	Unknown	0	0	\$41,853	\$0
Bexar County	11/2/2000	7:00 PM	Unknown	0	0	\$111,608	\$0
Bexar County	11/5/2000	7:36 PM	Unknown	0	0	\$209,265	\$0
Leon Valley	5/6/2001	6:45 PM	Unknown	0	0	\$40,695	\$0
Bexar County	3/19/2002	7:15 PM	Unknown	0	10	\$2,670,773	\$133,539
Helotes	3/31/2002	5:10 AM	Unknown	0	0	\$0	\$100,154
Bexar County	5/17/2002	2:30 AM	Unknown	0	0	\$534,155	\$0
Bexar County	5/17/2002	2:40 AM	Unknown	0	0	\$66,769	\$0
Elmendorf	8/8/2002	4:45 PM	70 knots	0	0	\$133,539	\$0

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	12/23/2002	6:35 PM	Unknown	0	0	\$66,769	\$0
Bexar County	6/10/2003	6:00 AM	55 knots	0	0	\$65,282	\$0
Bexar County	6/13/2003	6:45 PM	55 knots	0	9	\$39,169	\$0
Bexar County	8/8/2003	4:10 PM	60 knots	0	0	\$39,169	\$0
Bexar County	8/11/2003	2:25 PM	54 knots	0	0	\$26,113	\$0
Bexar County	10/24/2004	3:49 PM	58 knots	0	0	\$63,588	\$0
Bexar County	7/22/2006	6:00 PM	70 knots	0	0	\$238,329	\$0
Bexar County	8/6/2006	4:10 PM	65 knots	0	0	\$59,582	\$0
Bexar County	4/24/2007	11:50 PM	70 knots	0	0	\$57,932	\$0
Bexar County	7/15/2007	1:20 AM	80 knots	0	0	\$92,692	\$0
Bexar County	1/31/2008	12:00 PM	38 knots	0	0	\$278,951	\$0
Bexar County	5/14/2008	3:30 AM	50 knots	0	0	\$5,579	\$0
Bexar County	7/24/2008	9:20 AM	43 knots	0	0	\$5,579	\$0
Bexar County	8/19/2008	6:05 PM	50 knots	0	0	\$1,116	\$0
Converse	8/20/2008	1:47 AM	52 knots	0	0	\$11,158	\$0
Bexar County	6/2/2010	7:17 PM	56 knots	0	0	\$165,258	\$0
Bexar County	6/2/2010	7:39 PM	52 knots	0	0	\$11,017	\$0
Bexar County	6/2/2010	7:40 PM	43 knots	0	0	\$11,017	\$0
Bexar County	7/26/2010	6:45 PM	65 knots	0	0	\$1,102	\$0
Bexar County	7/26/2010	6:46 PM	43 knots	0	0	\$1,102	\$0
Terrell Hills	8/24/2010	4:18 PM	52 knots	0	1	\$0	\$0
Bexar County	9/2/2010	6:54 PM	43 knots	0	0	\$22,034	\$0
Bexar County	9/2/2010	8:30 PM	43 knots	0	0	\$55,086	\$0
Bexar County	9/18/2011	8:00 PM	50 knots	0	0	\$26,700	\$0
Bexar County	7/13/2012	4:25 PM	39 knots	0	0	\$523	\$0
Bexar County	8/10/2012	4:30 PM	65 knots	0	0	\$10,464	\$0
Bexar County	8/10/2012	4:30 PM	52 knots	0	0	\$10,464	\$0
Bexar County	4/29/2013	6:05 PM	43 knots	0	0	\$1,031	\$0

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Von Ormy	5/10/2013	6:45 PM	61 knots	0	0	\$10,313	\$0
Bexar County	5/10/2013	6:20 PM	50 knots	0	0	\$1,031	\$0
Balcones Heights	7/18/2014	12:30 AM	43 knots	0	0	\$10,148	\$0
Bexar County	4/25/2015	3:55 AM	56 knots	0	0	\$5,067,907	\$0
Bexar County	6/17/2015	5:16 PM	43 knots	0	0	\$507	\$0
Bexar County	6/17/2015	6:49 PM	43 knots	0	0	\$507	\$0
TOTAL				1	30	\$13,008,793	\$518,453

Table 8-4. Summary of Historical Thunderstorm Wind Events, 1955-2016⁴

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	177	106 knots	1	29	\$12,645,708	\$344,607
Alamo Heights	0	N/A	0	0	\$0	\$0
Balcones Heights	1	43 knots	0	0	\$10,148	\$0
Castle Hills	0	N/A	0	0	\$0	\$0
China Grove	0	N/A	0	0	\$0	\$0
Converse	2	52 knots	0	0	\$11,158	\$0
Elmendorf	1	70 knots	0	0	\$133,539	\$0
Fair Oaks Ranch	0	N/A	0	0	\$0	\$0
Grey Forest	2	50 knots	0	0	\$0	\$0
Helotes	3	52 knots	0	0	\$29,477	\$100,154
Hill Country Village	0	N/A	0	0	\$0	\$0
Hollywood Park	0	N/A	0	0	\$0	\$0
Kirby	1	60 knots	0	0	\$0	\$0
Leon Valley	4	53 knots	0	0	\$112,795	\$0
Live Oak	1	Unknown	0	0	\$4,593	\$0

⁴ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Olmos Park	0	N/A	0	0	\$0	\$0
St. Hedwig	4	52 knots	0	0	\$7,484	\$0
Sandy Oaks	0	N/A	0	0	\$0	\$0
Schertz	6	56 knots	0	0	\$43,578	\$73,692
Shavano Park	0	N/A	0	0	\$0	\$0
Somerset	2	70 knots	0	0	\$0	\$0
Terrell Hills	2	52 knots	0	1	\$0	\$0
Universal City	2	65 knots	0	0	\$0	\$0
Von Ormy	2	61 knots	0	0	\$10,313	\$0
Windcrest	0	N/A	0	0	\$0	\$0
TOTAL LOSSES	210		1	30	\$13,527,246	

Significant Past Events

May 27, 1997 – Kelly Air Force Base – Bexar County

Severe downburst winds estimated in excess of 100 mph produced widespread damage across much of the southwest part of Bexar County. Widespread minor damage was reported to roofs and outbuildings, windows, signs, and trees in the area. Wind gusts to 62 knots were measured by an NWS employee at his home in San Antonio. Power lines were blown down, with power out for several hours to over 100,000 persons.

March 19, 2002 – Bexar County

High winds caused spotty damage over the western third of Bexar County, nearly continuous damage over the eastern two-thirds of the County, and widespread destruction of trees and limbs. The high winds damaged roofs, propelled hail into homes and cars, and knocked over power poles. Ten people were injured by the flying debris. The greatest devastation was in southwest Bexar County, just northeast of the town of Lytle. Emergency management and Red Cross officials estimated that 50 mobile homes and houses were severely damaged or destroyed, with minor damage to another 100 mobile homes and houses. In addition to the widespread downburst damage, evidence was found of small and short-lived tornadoes. It was very difficult to separate the widespread downburst-wind damage from the tornado damage. The main clues were that the downburst damage was almost exclusively along a southwest to northeast path and showed a consistent and gradual gradient of damage levels, from the worst of the damage to the least of the damage.

June 2, 2010 – Alamo Heights/Castle Hills

Thunderstorms moved through the northern part of San Antonio and produced wind gusts estimated up to 65 mph. These winds knocked down power lines in Leon Springs, knocked down traffic lights and tore a hole in a house roof in Stone Oak, knocked down tree limbs in Alamo Heights, knocked down trees around the San Antonio International Airport, and caused power outages in Castle Hills.

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Probability of Future Events

Most thunderstorm winds occur during the spring, in the months of March, April, and May, and in the fall, during the month of September. Based on available records of historic events, 210 events in a 61 year reporting period provides a frequency of occurrence of 3 to 4 events every year. Even though the intensity of thunderstorm wind events is not always damaging for the Bexar County planning area, the frequency of occurrence for a thunderstorm wind event is highly likely, meaning that an event is probable within the next year for the Bexar County planning area, including all participating jurisdictions.

Vulnerability and Impact

Vulnerability is difficult to evaluate since thunderstorm wind events can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of these events, all existing and future structures and facilities in Bexar County could potentially be impacted and remain vulnerable to possible injury and property loss from strong winds.

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage receptacles, brick facades, and vehicles, unless reinforced, are vulnerable to thunderstorm wind events. The Bexar County planning area features multiple mobile or manufactured home parks throughout the planning area and many participating jurisdictions. These parks are typically more vulnerable to thunderstorm wind events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including 16 jurisdictions. These homes would also be more vulnerable. The U.S. Census data indicates a total of 19,128 manufactured homes located in the Bexar County planning area, including most participating jurisdictions (Table 8-5). (Nine of the participating jurisdictions do not feature manufactured homes.) In addition, 44.8% (approximately 302,761 structures) of the single family residential (SFR) structures in the Bexar County planning area were built before 1980.⁵ These structures would typically be built to lower or less stringent construction standards than newer construction, and may be more susceptible to damages during significant thunderstorm wind events.

Table 8-5. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Alamo Heights	0	2,854
Balcones Heights	22	1,234
Castle Hills	0	1,705
China Grove	18	132
Converse	74	1,902
Elmendorf	242	152
Fair Oaks Ranch	0	292

⁵ Source: U.S. Census Bureau data estimates for 2015.

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JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Grey Forest	9	181
Helotes	31	579
Hill Country Village	4	161
Hollywood Park	0	934
Kirby	191	2,117
Leon Valley	0	2,764
Live Oak	0	2,204
Olmos Park	0	809
St. Hedwig	152	214
Sandy Oaks ⁶	Unknown	Unknown
Schertz	915	2,730
Shavano Park	0	485
Somerset	111	267
Terrell Hills	0	1,468
Universal City	76	3,401
Von Ormy	178	151
Windcrest	26	1,868
Bexar County⁷	19,128	302,761

More severe damage involves windborne debris; in some instances, patio furniture and other lawn items have been reported to have been blown around by wind and, very commonly, debris from damaged structures in turn have caused damage to other buildings not directly impacted by the event.

The following critical facilities would be vulnerable to thunderstorm wind events in each participating jurisdiction:

⁶ The City of Sandy Oaks was incorporated in 2014. Census data is not available for this community.

⁷ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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Table 8-6. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	3 Government Facilities, EOC, Sheriff's Office, Police Station, 4 Power Stations, 3 Public Works Facilities, Fire Marshall Office, 11 Fire Stations, 71 Schools
Alamo Heights	Hospital, 2 Government Facilities, 6 Schools, AT&T Facility (communications HUB), College
Balcones Heights	Hospital, Police Station, Government Facility, Fire Station, School
Castle Hills	Police Station (includes administration and communications), Fire Station, 2 Government Facilities, 6 Schools, 3 Water Facilities, AT&T Facility (switching station)
China Grove	Government Facility, Fire Station
Converse	Government Facility, Police Department, 2 Fire Stations, 4 Water Facilities, 2 Pump Stations, 4 Lift Stations
Elmendorf	Police Station (includes City Hall and Water Department), Church, Public Service Facility (Electrical)
Fair Oaks Ranch	Police Station (includes EOC), Fire Station, School, 5 Water Facilities, Sewer Treatment Facility
Grey Forest	Police Department (includes City Hall), Fire Department, Water facility
Helotes	Police Department (includes City Hall, Fire Department, and dispatch center), Evacuation Center, 7 Schools, School Transportation Center, 2 Medical Facilities, 3 Fire Stations, 2 Evacuation Routes, 3 Lift Stations, 5 Water Facilities, Utility Offices and 2 Distribution Centers, Emergency Equipment Provider, Government Facility, Radio Tower
Hill Country Village	None
Hollywood Park	AT&T Facility (communications HUB), 2 Government Facilities, Water Storage Facility
Kirby	Police Station, Fire Station, Public Works, Government Facility, 2 Schools, Community Center
Leon Valley	Fire Station, Government Facility, Police Station, Public Works, 6 Water Facilities, 4 Shelters, 3 Schools, Dispatch/Communications Center
Live Oak	Police Station, Fire Station, Public Works, 5 Water Facilities, Government Facility, Hospital, 3 Schools, 2 School Support Facilities, 2 Colleges, Power Sub-Station
Olmos Park	Fire Department
Saint Hedwig	2 Government Facilities, Fire Department, School
Sandy Oaks	Government Facility
Schertz	Police Station (includes EMS, Fire Department, EOC, Community Center, City Hall, Civic Center, and Administration), Fire Station, 9 Schools, Hospital, 7 Water Facilities, 18 Sewer Facilities (including lift stations and treatment plants)

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JURISDICTION	CRITICAL FACILITIES
Shavano Park	Government Facility, Police Station, Communication/Dispatch Facility, Fire Station, Public Works, 8 Water Facilities
Somerset	Sewer Treatment Facility, 4 Schools
Terrell Hills	2 Government Facilities, Fire Department, School
Universal City	Police Station, Fire Station, 5 Schools
Von Ormy	Police Station
Windcrest	Police Station (includes City Hall, Communications/Dispatch Center, and Fire Department), 8 Water Facilities, 3 Government Facilities, School

A thunderstorm wind event can also result in traffic disruptions, injuries, and in rare cases, fatalities. The impact of extreme winds experienced in the Bexar County planning area has resulted in thirty injuries and one fatality. While damages and shutdown of critical facilities would have a minor impact on the planning area, historic injuries and fatalities indicate an impact of “Substantial,” with multiple potential deaths and injuries. Overall, the average loss estimate (in 2016 dollars) is \$13,527,246, having an approximate annual loss estimate of \$221,758 (Table 8-7).

Table 8-7. Potential Annualized Losses by Jurisdiction, 1955-2016

JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Bexar County	\$12,990,315	\$212,956
Alamo Heights	\$0	\$0
Balcones Heights	\$10,148	\$166
Castle Hills	\$0	\$0
China Grove	\$0	\$0
Converse	\$11,158	\$183
Elmendorf	\$133,539	\$2,189
Fair Oaks Ranch	\$0	\$0
Grey Forest	\$0	\$0
Helotes	\$129,631	\$2,125
Hill Country Village	\$0	\$0
Hollywood Park	\$0	\$0
Kirby	\$0	\$0
Leon Valley	\$112,795	\$1,849

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JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Live Oak	\$4,593	\$75
Olmos Park	\$0	\$0
St. Hedwig	\$7,484	\$122
Sandy Oaks	\$0	\$0
Schertz	\$117,270	\$1,922
Shavano Park	\$0	\$0
Somerset	\$0	\$0
Terrell Hills	\$0	\$0
Universal City	\$0	\$0
Von Ormy	\$10,313	\$169
Windcrest	\$0	\$0
Planning Area	\$13,527,246	\$221,756

Assessment of Impacts

Thunderstorm wind events have the potential to pose a significant risk to people, and can create dangerous and difficult situations for public health and safety officials. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees, causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During exceptionally heavy wind events, first responders may be prevented from responding to calls, as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Thunderstorm wind events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages often result in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.

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- County or City departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the County or City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by extreme wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to extreme winds.
- Large scale wind events can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- Recreational lakes including Braunig, Calaveras, and Mitchell Lake attract fishing and boating activities throughout the year. A large thunderstorm wind event could impact recreational water activities, placing boaters and campers in imminent danger, potentially requiring emergency services or lake evacuation.
- Recreational areas and parks may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to area businesses.

The economic and financial impacts of thunderstorm winds on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any thunderstorm wind event.

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Hazard Description



Hailstorm events are a potentially damaging outgrowth of severe thunderstorms. During the developmental stages of a hailstorm, ice crystals form within a low pressure front due to the rapid rising of warm air into the upper atmosphere, and the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as round or irregularly shaped masses of ice typically greater than 0.75 inches in diameter. The size of hailstones is a direct result of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a by-product of heating on the Earth’s surface. Higher temperature gradients above the Earth’s surface result in increased suspension time and hailstone size.

Location

Hailstorms are an extension of severe thunderstorms that could potentially cause severe damage. As a result, they are not confined to any specific geographic location, and can vary greatly in size, location, intensity, and duration. Therefore, the Bexar County planning area, including all participating jurisdictions, is equally at risk to the hazard of hail.

Extent

The National Weather Service (NWS) classifies a storm as “severe” if there is hail 0.75 inches in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Center for Environmental Information (NCEI) Intensity Scale in Table 9-1.

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Table 9-1. Hail Intensity and Magnitude¹

SIZE CODE	INTENSITY CATEGORY	SIZE (Diameter Inches)	DESCRIPTIVE TERM	TYPICAL DAMAGE
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 – 0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60 – 0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80 – 1.20	Nickel	Severe damage to plants and crops
H4	Severe	1.2 – 1.6	Quarter	Widespread glass and auto damage
H5	Destructive	1.6 – 2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of injuries
H6	Destructive	2.0 – 2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4 – 3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0 – 3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5 – 4.0	Tennis Ball	Extensive structural damage, could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage, could cause fatal injuries

The intensity scale in Table 9-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on available data regarding the previous occurrences for the area, the Bexar County planning area, including all participating jurisdictions, may experience hailstorms ranging from an H0 to an H10. Bexar County can mitigate a storm from low risk (hard hail) to a super hailstorm with baseball sized hail that leads to extensive structural damage and could cause fatal injuries.

Historical Occurrences

Historical evidence shown in Figure 9-1 demonstrates that the planning area is vulnerable to hail events overall, which typically result from severe thunderstorm activity. Only those events for Bexar County and participating jurisdictions with latitude and longitude available were plotted (Figure 9-1). Historical events with reported damages, injuries, or fatalities are shown in Table 9-2. A total of 349 reported historical hail events impacted Bexar County between 1955 and December 2016 (Table 9-3). These events were reported to the NCEI and National Oceanic and Atmospheric Administration (NOAA) databases, and may not represent all hail events that have occurred during the past 61 years. Only hail events that have been reported have been factored into this Risk Assessment. It is likely that additional hail occurrences have gone unreported before and during the recording period.

¹ Source: NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale

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Figure 9-1. Spatial Historical Hail Events, 1955–2016

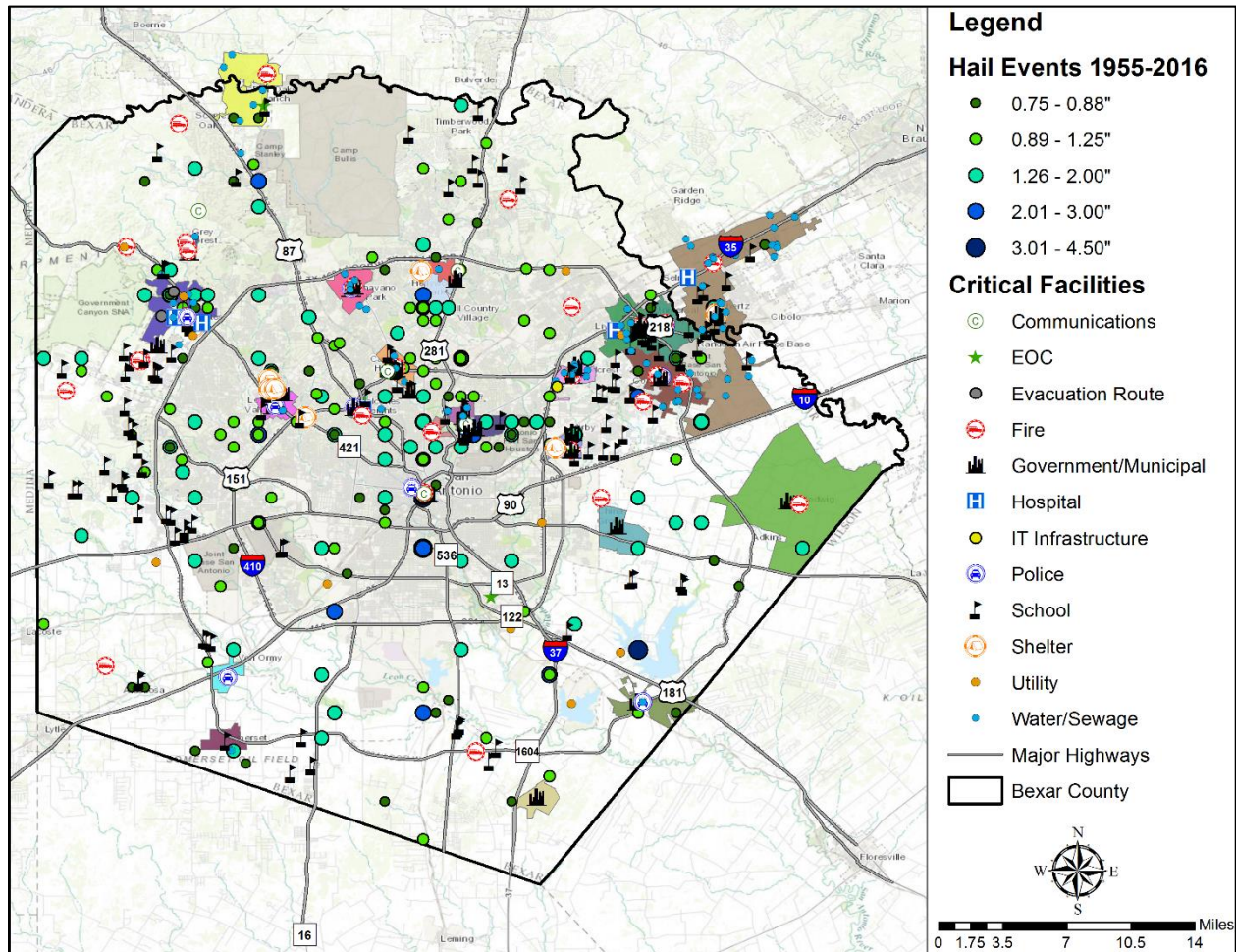


Table 9-2. Historical Hail Events, 1955-2016²

JURISDICTION	DATE	MAGNITUDE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	3/27/1994	1.75	0	0	\$8,105,128	\$81,051
Bexar County	3/27/1994	1	0	0	\$810,513	\$81,051
Bexar County	4/5/1994	0.88	0	0	\$81,051	\$81,051
Somerset	2/10/1998	1.75	0	0	\$14,738	\$73,692
Bexar County	3/16/2000	1.25	0	0	\$69,755	\$0
Bexar County	3/16/2000	2.5	0	0	\$69,755	\$0
Leon Valley	3/28/2000	2.75	0	0	\$6,975,494	\$0

² Damages reported in 2016 dollars.

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JURISDICTION	DATE	MAGNITUDE	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	5/6/2001	4	0	0	\$162,779,904	\$40,694,975
Elmendorf	12/23/2002	4.5	0	0	\$66,769	\$0
Bexar County	4/12/2016	4.5	0	0	\$1,360,000,000	\$0
TOTAL		4.5	0	0	\$1,538,973,107	\$41,011,820

Table 9-3. Summary of Historical Hail Events, 1955-2016³

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	253	4.5	0	0	\$1,531,916,106	\$40,938,128
Alamo Heights	3	1.75	0	0	\$0	\$0
Balcones Heights	1	1.0	0	0	\$0	\$0
Castle Hills	2	1.0	0	0	\$0	\$0
China Grove	0	N/A	0	0	\$0	\$0
Converse	3	2.0	0	0	\$0	\$0
Elmendorf	6	4.5	0	0	\$66,769	\$0
Fair Oaks Ranch	0	N/A	0	0	\$0	\$0
Grey Forest	2	4.0	0	0	\$0	\$0
Helotes	20	3.0	0	0	\$0	\$0
Hill Country Village	0	N/A	0	0	\$0	\$0
Hollywood Park	8	1.75	0	0	\$0	\$0
Kirby	6	4.0	0	0	\$0	\$0
Leon Valley	13	3.5	0	0	\$6,975,494	\$0
Live Oak	0	N/A	0	0	\$0	\$0
Olmos Park	2	3.0	0	0	\$0	\$0
St. Hedwig	0	N/A	0	0	\$0	\$0
Sandy Oaks	0	N/A	0	0	\$0	\$0
Schertz	10	2.75	0	0	\$0	\$0

³ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	INJURIES	FATALITIES	PROPERTY DAMAGE	CROP DAMAGE
Shavano Park	0	N/A	0	0	\$0	\$0
Somerset	8	2.0	0	0	\$14,738	\$73,692
Terrell Hills	8	2.5	0	0	\$0	\$0
Universal City	2	2.5	0	0	\$0	\$0
Von Ormy	2	2.5	0	0	\$0	\$0
Windcrest	0	N/A	0	0	\$0	\$0
PLANNING AREA	349	4.5	0	0	\$1,579,984,927	

Significant Past Events

March 28, 2000 – Leon Valley

A small and short-lived tornado struck just northwest of Leon Valley. It was preceded by winds estimated at 40 to 50 mph, along with heavy rain and large hail. Widespread damage was reported to cars in the Leon Valley due to the very large hail. No significant damage was reported as a result of the small tornado. Hail damage in the area was estimated at more than 5 million dollars.

May 6, 2001 – Bexar County

A significant storm system developed into one of the most devastating hail-and-wind storms in the history of Bexar County to date. Hail in sizes up to 4 inches, accompanied at times by winds estimated to be over 60 mph, destroyed the roofs of hundreds of homes, and severely damaged hundreds of vehicle bodies, as well as breaking thousands of windows in houses and vehicles. The damage was reported to have been the worst in the northwestern part of the county, where hail reached at least 4 inches in diameter. Damages were estimated to reach at least \$60,000,000 for homes, and an additional \$60,000,000 for cars. Additional severe thunderstorm winds struck the western part of the county just before 8 PM and destroyed around a dozen power lines along Grissom Road near Culebra.

April 12, 2016 – Bexar County

An upper level low pressure system over the Desert Southwest combined with a stationary front to produce thunderstorms across South Central Texas. Some of these storms produced large to giant hail. The largest hail storm moved across northern Bexar County, crossing the northern half of San Antonio. Damage costs in Bexar County were estimated at \$1.36 billion, making it the costliest hail storm recorded in the state of Texas according to the Insurance Council of Texas. Estimates do not include commercial losses which pushed the losses higher. Estimates are provided by the Insurance Council of Texas and include damage to 136,000 vehicles and 125,000 homes.

Probability of Future Events

Based on available records of historic events, 349 events in a 61 year reporting period for the Bexar County planning area provides a frequency of occurrence of 5 to 6 events every year. This frequency supports a “highly likely” probability of future events for the entire planning area, including all participating jurisdictions. The numbers listed for the jurisdictions within the county are historical events that are known to have specifically impacted those jurisdictions.

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Vulnerability and Impact

Damage from hail approaches \$1 billion in the U.S. each year. Much of the damage inflicted by hail impacts crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are also most commonly damaged by hail.

Utility systems on roofs at school districts and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people as they could be struck by hail and falling trees and branches. Outdoor activities and events may elevate the risk to residents and visitors in the planning area when a hailstorm strikes with little warning. Older structures not built to current codes may be more vulnerable to damages than newer structures.

The Bexar County planning area features multiple mobile or manufactured home parks throughout the planning area and participating jurisdictions. These parks are typically more vulnerable to hail events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including 16 jurisdictions. These homes would also be more vulnerable. The U.S. Census data indicates a total of 19,128 manufactured homes located in the Bexar County planning area, including most participating jurisdictions (Table 9-4). (Nine of the participating jurisdictions do not feature manufactured homes.) In addition, 44.8% (approximately 302,761 structures) of the single family residential (SFR) structures in the Bexar County planning area were built before 1980.⁴ These structures would typically be built to lower or less stringent construction standards than newer construction, and may be more susceptible to damages during significant hail events.

Table 9-4. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Alamo Heights	0	2,854
Balcones Heights	22	1,234
Castle Hills	0	1,705
China Grove	18	132
Converse	74	1,902
Elmendorf	242	152
Fair Oaks Ranch	0	292
Grey Forest	9	181
Helotes	31	579
Hill Country Village	4	161
Hollywood Park	0	934

⁴ Source: U.S. Census Bureau data estimates for 2015.

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JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Kirby	191	2,117
Leon Valley	0	2,764
Live Oak	0	2,204
Olmos Park	0	809
St. Hedwig	152	214
Sandy Oaks ⁵	Unknown	Unknown
Schertz	915	2,730
Shavano Park	0	485
Somerset	111	267
Terrell Hills	0	1,468
Universal City	76	3,401
Von Ormy	178	151
Windcrest	26	1,868
Bexar County⁶	19,128	302,761

The following critical facilities would be vulnerable to hail events in each participating jurisdiction:

Table 9-5. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	3 Government Facilities, EOC, Sheriff's Office, Police Station, 4 Power Stations, 3 Public Works Facilities, Fire Marshall Office, 11 Fire Stations, 71 Schools
Alamo Heights	Hospital, 2 Government Facilities, 6 Schools, AT&T Facility (communications HUB), College
Balcones Heights	Hospital, Police Station, Government Facility, Fire Station, School
Castle Hills	Police Station (includes administration and communications), Fire Station, 2 Government Facilities, 6 Schools, 3 Water Facilities, AT&T Facility (switching station)
China Grove	Government Facility, Fire Station

⁵ The City of Sandy Oaks was incorporated in 2014. Census data is not available for this community.

⁶ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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JURISDICTION	CRITICAL FACILITIES
Converse	Government Facility, Police Department, 2 Fire Stations, 4 Water Facilities, 2 Pump Stations, 4 Lift Stations
Elmendorf	Police Station (includes City Hall and Water Department), Church, Public Service Facility (Electrical)
Fair Oaks Ranch	Police Station (includes EOC), Fire Station, School, 5 Water Facilities, Sewer Treatment Facility
Grey Forest	Police Department (includes City Hall), Fire Department, Water facility
Helotes	Police Department (includes City Hall, Fire Department, and dispatch center), Evacuation Center, 7 Schools, School Transportation Center, 2 Medical Facilities, 3 Fire Stations, 2 Evacuation Routes, 3 Lift Stations, 5 Water Facilities, Utility Offices and 2 Distribution Centers, Emergency Equipment Provider, Government Facility, Radio Tower
Hill Country Village	None
Hollywood Park	AT&T Facility (communications HUB), 2 Government Facilities, Water Storage Facility
Kirby	Police Station, Fire Station, Public Works, Government Facility, 2 Schools, Community Center
Leon Valley	Fire Station, Government Facility, Police Station, Public Works, 6 Water Facilities, 4 Shelters, 3 Schools, Dispatch/Communications Center
Live Oak	Police Station, Fire Station, Public Works, 5 Water Facilities, Government Facility, Hospital, 3 Schools, 2 School Support Facilities, 2 Colleges, Power Sub-Station
Olmos Park	Fire Department
St. Hedwig	2 Government Facilities, Fire Department, School
Sandy Oaks	Government Facility
Schertz	Police Station (includes EMS, Fire Department, EOC, Community Center, City Hall, Civic Center, and Administration), Fire Station, 9 Schools, Hospital, 7 Water Facilities, 18 Sewer Facilities (including lift stations and treatment plants)
Shavano Park	Government Facility, Police Station, Communication/Dispatch Facility, Fire Station, Public Works, 8 Water Facilities
Somerset	Sewer Treatment Facility, 4 Schools
Terrell Hills	2 Government Facilities, Fire Department, School
Universal City	Police Station, Fire Station, 5 Schools
Von Ormy	Police Station
Windcrest	Police Station (includes City Hall, Communications/Dispatch Center, and Fire Department), 8 Water Facilities, 3 Government Facilities, School

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First responders could be unable to respond to calls due to blocked roads. Furthermore, hail could cause power outages, which could cause health and safety risks to more vulnerable populations in the planning area.

Hail has been known to cause injury to humans, and occasionally has been fatal. Overall, the average property and crop loss estimate (in 2016 dollars) is \$1,579,984,927, having an approximate annual loss estimate of \$23,939,166. Based on historic loss and damages, the impact of hail damages on the Bexar County planning area, including all participating jurisdictions, can be considered “Minor” severity of impact, meaning injuries and illness do not result in permanent disability, City area facilities shut down for more than one week, and more than 10 percent of property destroyed or with major damage.

Table 9-4. Potential Annualized Losses by Jurisdiction, 1955-2016

JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Bexar County	\$1,572,854,234	\$23,831,125
Alamo Heights	\$0	\$0
Balcones Heights	\$0	\$0
Castle Hills	\$0	\$0
China Grove	\$0	\$0
Converse	\$0	\$0
Elmendorf	\$66,769	\$1,012
Fair Oaks Ranch	\$0	\$0
Grey Forest	\$0	\$0
Helotes	\$0	\$0
Hill Country Village	\$0	\$0
Hollywood Park	\$0	\$0
Kirby	\$0	\$0
Leon Valley	\$6,975,494	\$105,689
Live Oak	\$0	\$0
Olmos Park	\$0	\$0
St. Hedwig	\$0	\$0
Sandy Oaks	\$0	\$0
Schertz	\$0	\$0
Shavano Park	\$0	\$0

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JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Somerset	\$88,430	\$1,340
Terrell Hills	\$0	\$0
Universal City	\$0	\$0
Von Ormy	\$0	\$0
Windcrest	\$0	\$0
Planning Area	\$1,579,984,927	\$23,939,166

Assessment of Impacts

Hail events have the potential to pose a significant risk to people and can create dangerous situations. Impacts to the planning area can include:

- Hail may create hazardous road conditions during and immediately following an event, delaying first responders from preserving or providing for public health and safety.
- Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees, resulting in injuries or possible fatalities.
- Residential structures can be damaged by falling trees, which can result in physical harm to occupants.
- Large hail events will likely cause extensive roof damage to residential structures, along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums.
- Automobile damage may be extensive depending on the size of the hail and length of the storm.
- Hail events can result in power outages over widespread areas, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Downed power lines and large debris, such as downed trees, can result in the inability of emergency response vehicles to access areas of the community.
- Hazardous road conditions may prevent critical staff from reporting for duty, limiting response capabilities.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.

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- Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- Hail events may injure or kill livestock and wildlife.
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.

The economic and financial impacts of hail will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any hail event.

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Hazard Description



A severe winter storm event is identified as a storm with snow, ice, or freezing rain. This type of storm can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow, and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

Winter storms that threaten Bexar County usually begin as powerful cold fronts that push south from central Canada. The County is at risk to ice hazards, extremely cold temperatures, and snow. However, the effects and frequencies of winter storm events are generally mild and short-lived. As indicated in Figure 10-1, on average, the area experiences 1-10 cold days a year, meaning 1-10 days per year are at or around freezing temperatures. During these times of ice and snow accumulation, response times will increase until public works road crews are able to assist in making the major roads passable. Table 10-1 describes the types of winter storms possible to occur in Bexar County.

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Figure 10-1. Extreme Cold Days 1960-2003¹

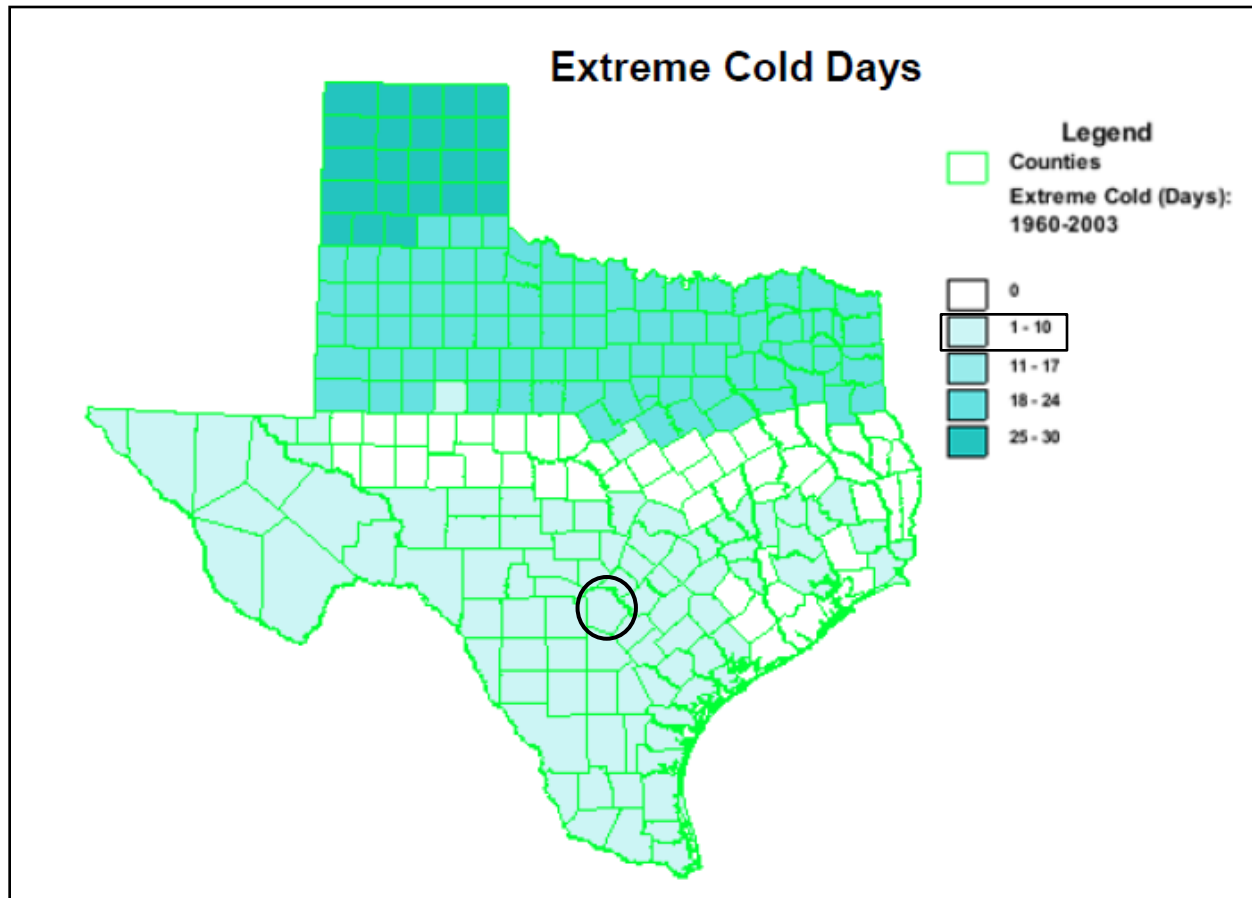


Table 10-1. Types of Winter Storms

TYPE OF WINTER STORM	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet, or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.

¹ Source: National Weather Service (NWS). The black circle indicates the Bexar County planning area.

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TYPE OF WINTER STORM	DESCRIPTION
Blizzard Warning	Sustained wind speeds of at least 35 miles per hour (mph) are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm, with visibility dangerously restricted.
Frost/Freeze Warning	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind chill factor.

Location

Winter storm events are not confined to specific geographic boundaries. Therefore, all existing and future buildings, facilities, and populations in the Bexar County planning area, including all participating jurisdictions, are considered to be exposed to a winter storm hazard and could potentially be impacted.

Extent

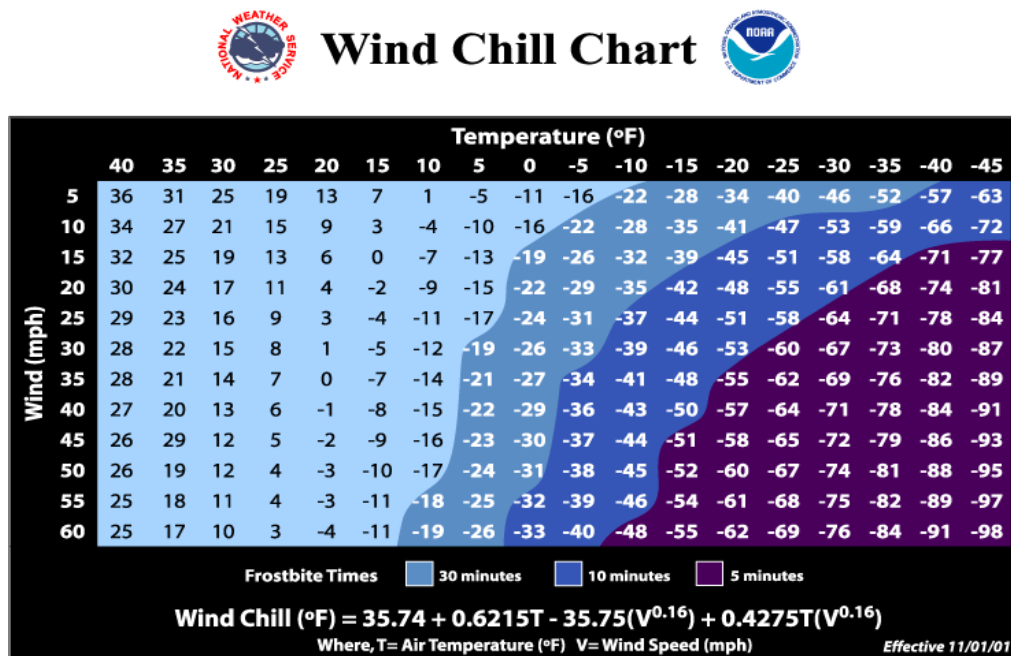
The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 10-2. To determine the intensity of a winter storm, Table 10-2 should be read in conjunction with the wind-chill factor chart described in Figure 10-2. The chart is an index developed by the National Weather Service (NWS) and is not applicable when temperatures are over 50°F or winds are calm.

Table 10-2. Magnitude of Severe Winter Storms

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Mild	40° – 50°	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations.
Moderate	30° – 40°	Winds 10 to 15 mph and sleet and/or snow up to 4 inches.
Significant	25° – 30°	Intense snow showers accompanied with strong gusty winds between 15 to 20 mph, with significant accumulation.
Extreme	20° – 25°	Wind driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter.
Severe	Below 20°	Winds of 35 mph or more and snow and sleet greater than 4 inches.

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Figure 10-2. Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. Bexar County has never experienced a blizzard, but based on 16 previous occurrences recorded from 1996 through December 2016, it has been subject to winter storm watches, warnings, freezing rain, sleet, snow, and wind chill.

The average number of cold days is similar for the entire planning area, including the county and all participating jurisdictions. Therefore, the intensity or extent of a winter storm event to be mitigated for the area ranges from mild to moderate, according to the definitions from Table 10-2. During a winter storm event, the Bexar County planning area, including all participating jurisdictions, can expect anywhere between 0.1 to 3.0 inches of ice and snow, temperatures between 25 and 50 degrees, with winds ranging from 0 to 15 mph.

Historical Occurrences

Table 10-3 shows historical occurrences for Bexar County from 1996 through December 2016 provided by the National Center for Environmental Information (NCEI) database. There have been 16 recorded winter storm events in Bexar County. Historical winter storm information, as provided by the NCEI, identifies winter storm activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical winter storm data for all participating jurisdictions are provided on a county-wide basis per the NCEI database. Table 10-3 shows historical incident information which resulted in property or crop damage for the Bexar County planning area.

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Table 10-3. Historical Winter Storm Events, 1996-2016²

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	2/1/1996	0	0	\$0	\$0
Bexar County	1/11/1997	0	0	\$0	\$0
Bexar County	12/23/1998	0	0	\$0	\$0
Bexar County	12/12/2000	0	0	\$0	\$0
Bexar County	11/28/2001	0	0	\$0	\$0
Bexar County	2/24/2003	0	0	\$0	\$0
Bexar County	1/16/2007	0	0	\$0	\$0
Bexar County	11/23/2007	1	0	\$0	\$0
Bexar County	12/9/2008	0	0	\$0	\$0
Bexar County	2/3/2011	0	0	\$0	\$0
Bexar County	12/7/2013	0	0	\$0	\$0
Bexar County	2/7/2014	0	0	\$0	\$0
Bexar County	1/10/2015	0	0	\$0	\$0
Bexar County	1/23/2015	0	0	\$0	\$0
Bexar County	2/16/2015	0	0	\$0	\$0
Bexar County	3/4/2015	0	0	\$0	\$0
TOTALS		1	0	\$0	\$0

Significant Past Events

January 16, 2007 – Bexar County

A combination of freezing rain and drizzle began falling over the county near 6 PM on January 15th and continued through noon of the following day. Overpasses and elevated roads became iced-over and were closed on the evening of January 15th. City and County offices and schools, which had been closed for the Martin Luther King Holiday, remained closed on January 16th. Main offices and schools did not re-open until January 18th. The ice caused power outages to more than 65,000 persons, along with widespread traffic accidents. Over 500 accidents were reported in a 12-hour period.

February 7, 2014 – Bexar County

Southerly low level winds and an approaching upper level trough allowed warm and moist air to move over a cold air mass at the surface. This led to freezing drizzle and light freezing rain developing during the early morning hours on February 7th. The first report of freezing drizzle was at 2:50 AM CST in Kerr County. Icy roads

² Values are in 2016 dollars.

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were reported in several counties. The Shin Oak Drive Bridge over I-35 was closed in Live Oak, as were the flyover ramps connecting Highway 281 and Loop 1604 in San Antonio, both of these in Bexar County. The precipitation transitioned from freezing to liquid during the late morning hours as temperatures warmed above freezing.

Probability of Future Events

According to historical records, Bexar County experiences approximately 1 winter storm event per year. Hence, the probability of a future winter storm event affecting the Bexar County planning area is highly likely, with a winter storm likely to occur within the next year. All participating jurisdictions' events are included under the County.

Vulnerability and Impact

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack and ice can build up on power lines, causing them to break under the weight or causing tree limbs to fall on the lines. These events can disrupt electric service for long periods.

An economic impact may occur due to increased consumption of heating fuel, which can lead to energy shortages and higher prices. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter storms also present a greater danger because water supplies may freeze and impede firefighting efforts.

All populations, buildings, critical facilities, and infrastructure in the entire Bexar County planning area, including all participating jurisdictions, are vulnerable to severe winter events.

People and animals are subject to health risks from extended exposure to cold air. Elderly people are at greater risk of death from hypothermia during these events, especially in the rural areas of the county where populations are sparse, icy roads may impede travel, and there are fewer neighbors to check in on the elderly. According to the U.S. Center for Disease Control (CDC), every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

Populations over the age of 65 in the Bexar County planning area are approximately 11% of the total population; there is an estimated total of 200,444³ potentially vulnerable residents in the planning area based on age (Table 10-4).

Table 10-4. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER
Alamo Heights	941
Balcones Heights	239
Castle Hills	1,298

³ Source: U.S. Census Bureau 2014 data for Bexar County

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JURISDICTION	POPULATION 65 AND OLDER
China Grove	222
Converse	1,736
Elmendorf	152
Fair Oaks Ranch	1,702
Grey Forest	101
Helotes	1,448
Hill Country Village	168
Hollywood Park	1,138
Kirby	1,097
Leon Valley	1,788
Live Oak	1,734
Olmos Park	338
St. Hedwig	337
Sandy Oaks	141
Schertz	4,529
Shavano Park	715
Somerset	222
Terrell Hills	737
Universal City	2,575
Von Ormy	144
Windcrest	1,868
Bexar County⁴	32,774

The following critical facilities would be vulnerable to winter storm events in each participating jurisdiction:

⁴ County totals includes all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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Table 10-5. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	3 Government Facilities, EOC, Sheriff's Office, Police Station, 4 Power Stations, 3 Public Works Facilities, Fire Marshall Office, 11 Fire Stations, 71 Schools
Alamo Heights	Hospital, 2 Government Facilities, 6 Schools, AT&T Facility (communications HUB), College
Balcones Heights	Hospital, Police Station, Government Facility, Fire Station, School
Castle Hills	Police Station (includes administration and communications), Fire Station, 2 Government Facilities, 6 Schools, 3 Water Facilities, AT&T Facility (switching station)
China Grove	Government Facility, Fire Station
Converse	Government Facility, Police Department, 2 Fire Stations, 4 Water Facilities, 2 Pump Stations, 4 Lift Stations
Elmendorf	Police Station (includes City Hall and Water Department), Church, Public Service Facility (Electrical)
Fair Oaks Ranch	Police Station (includes EOC), Fire Station, School, 5 Water Facilities, Sewer Treatment Facility
Grey Forest	Police Department (includes City Hall), Fire Department, Water facility
Helotes	Police Department (includes City Hall, Fire Department, and dispatch center), Evacuation Center, 7 Schools, School Transportation Center, 2 Medical Facilities, 3 Fire Stations, 2 Evacuation Routes, 3 Lift Stations, 5 Water Facilities, Utility Offices and 2 Distribution Centers, Emergency Equipment Provider, Government Facility, Radio Tower
Hill Country Village	None
Hollywood Park	AT&T Facility (communications HUB), 2 Government Facilities, Water Storage Facility
Kirby	Police Station, Fire Station, Public Works, Government Facility, 2 Schools, Community Center
Leon Valley	Fire Station, Government Facility, Police Station, Public Works, 6 Water Facilities, 4 Shelters, 3 Schools, Dispatch/Communications Center
Live Oak	Police Station, Fire Station, Public Works, 5 Water Facilities, Government Facility, Hospital, 3 Schools, 2 School Support Facilities, 2 Colleges, Power Sub-Station
Olmos Park	Fire Department
St. Hedwig	2 Government Facilities, Fire Department, School
Sandy Oaks	Government Facility
Schertz	Police Station (includes EMS, Fire Department, EOC, Community Center, City Hall, Civic Center, and Administration), Fire Station, 9 Schools, Hospital, 7 Water Facilities, 18 Sewer Facilities (including lift stations and treatment plants)
Shavano Park	Government Facility, Police Station, Communication/Dispatch Facility, Fire Station, Public Works, 8 Water Facilities
Somerset	Sewer Treatment Facility, 4 Schools

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JURISDICTION	CRITICAL FACILITIES
Terrell Hills	2 Government Facilities, Fire Department, School
Universal City	Police Station, Fire Station, 5 Schools
Von Ormy	Police Station
Windcrest	Police Station (includes City Hall, Communications/Dispatch Center, and Fire Department), 8 Water Facilities, 3 Government Facilities, School

One fatality, no injuries, and no damages were reported in the Bexar County planning area over the 21-year recording period. While annual losses due to winter storms are considered negligible, the risk of injury or death may elevate the potential severity of impact for the planning area. Based on historic reporting, the severity of impact for the planning area, including all participating jurisdictions, is “Minor,” meaning injuries are treatable with first aid, shutdown of facilities and services for more than one week, and more than 10 percent of property destroyed or sustains major damage.

Table 10-6. Potential Annualized Losses for Bexar County, 1996-2016⁵

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Bexar County	\$0	\$0

Assessment of Impacts

The greatest risk from a winter storm hazard is to public health and safety. Potential impacts for the planning area may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat sources can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders are subject to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the safety risk due to accidents and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.

⁵ Values are in 2016 dollars.

Section 10: Winter Storm

- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A winter storm event could lead to tree, shrub, and plant damage or death.
- Severe cold and ice could significantly damage agricultural crops.
- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

The economic and financial impacts of winter weather on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by businesses and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

Section 11: Wildfire

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Vulnerability and Impact.....	56
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Hazard Description

A wildfire event can rapidly spread out of control and occurs most often in the summer, when the brush is dry and flames can move unchecked through a highly vegetative area. Wildfires can start as a slow burning fire along the forest floor, killing and damaging trees. The fires often spread more rapidly as they reach the tops of trees, with wind carrying the flames from tree to tree. Usually, dense smoke is the first indication of a wildfire.

A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson.

Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, interface, or intermix fires. Wildland Urban Interface or Intermix (WUI) fires occur in areas where structures and other human improvements meet or intermingle with undeveloped wildland or vegetative fuels. Wildland fires are fueled almost exclusively by natural vegetation, while interface or intermix fires are urban/wildland fires in which vegetation and the built-environment provide the fuel.

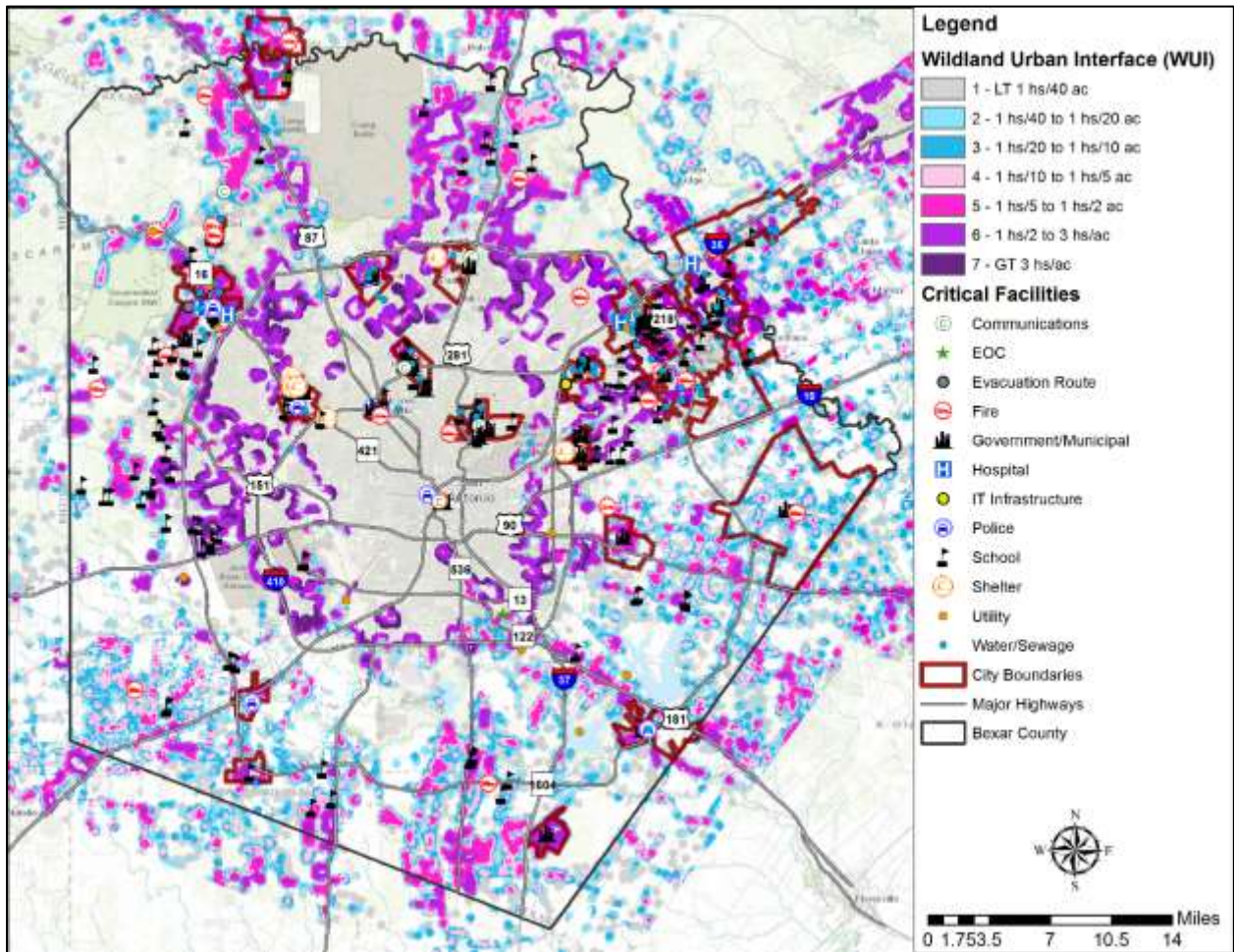
It should be noted that jurisdictions with no designated WUI are still at risk for wildfires. While the risk is greater within the identified WUI, wildfires have no geographical boundary and can impact any jurisdiction. Densely populated areas may have limited risk in the absence of a WUI, however, residential neighborhoods contain wildfire fuels similar to wildland areas including trees, grass, shrubs and other vegetative fuels. Coupled with the built-environment, densely populated areas may face sweeping structural fires resulting from a small brush fire in a low risk area. In Texas, nearly 80% of all wildfires occur within two miles of a community.

Location

A wildfire event can be a potentially damaging consequence of drought. Wildfires can vary greatly in terms of size, location, intensity, and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands. The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the WUI. (Figures 11-1 through 11-25). It is estimated that 28 percent of the total population in Bexar County live within the WUI. However, the entire Bexar County planning area is at risk for wildfires.

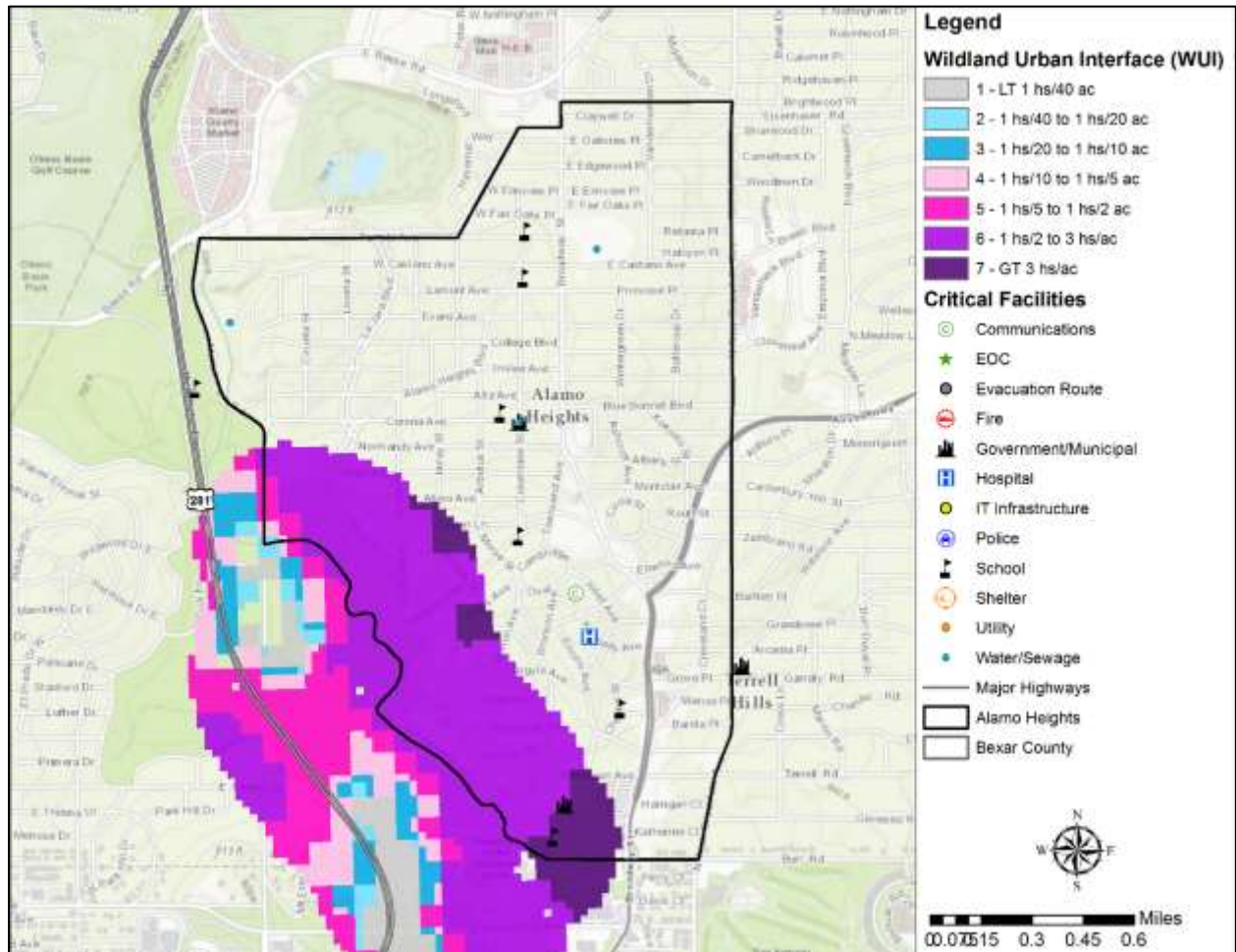
Section 11: Wildfire

Figure 11-1. Wildland Urban Interface Map – Bexar County



Section 11: Wildfire

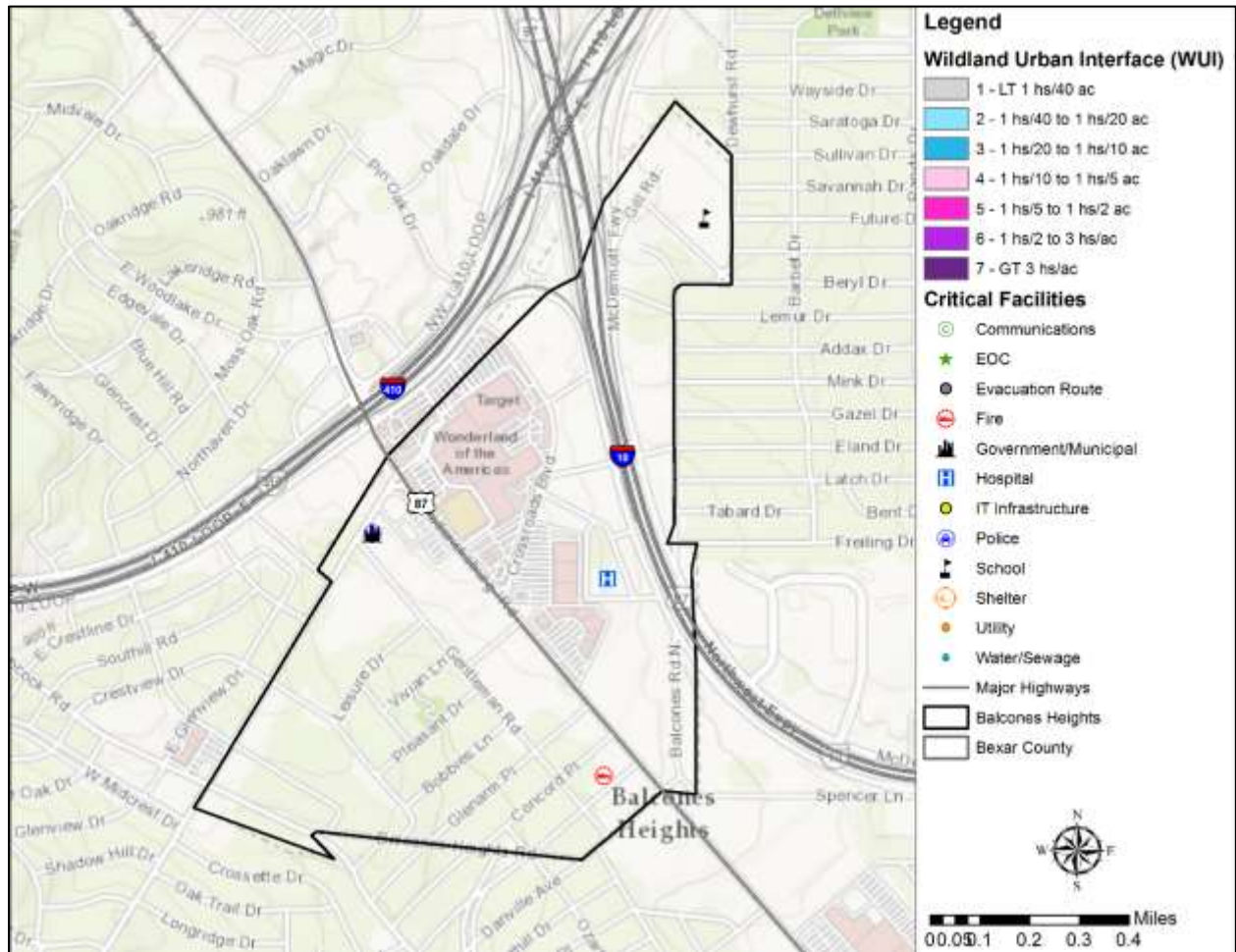
Figure 11-2. Wildland Urban Interface Map – City of Alamo Heights



It is estimated that 14 percent of the total population in Alamo Heights live within the WUI. However, the entire City of Alamo Heights is at risk for wildfires.

Section 11: Wildfire

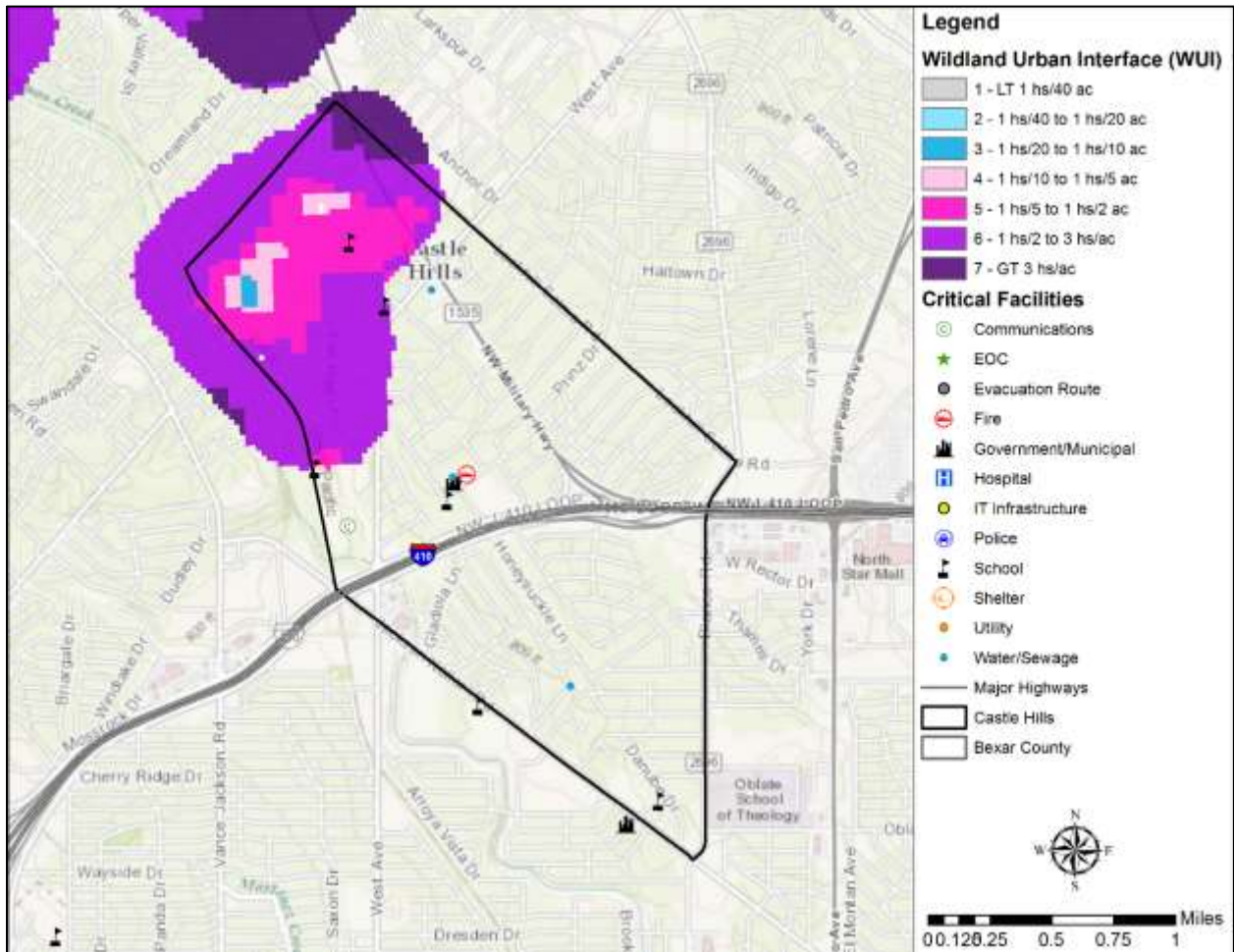
Figure 11-3. Wildland Urban Interface Map – City of Balcones Heights



It is estimated that zero percent of the total population in Balcones Heights live within the WUI, the area at greatest risk for wildfire. However, the entire City of Balcones Heights is at some risk for wildfires as the hazard has no geographic boundaries. While densely populated areas may have limited risk in the absence of a WUI, residential neighborhoods throughout the city contain wildfire fuels similar to wildland areas including trees, grass, shrubs and other vegetative fuels, with the area south of Fredericksburg Road/U.S. 87 being the most vulnerable as it is primarily residential with wildfire fuels.

Section 11: Wildfire

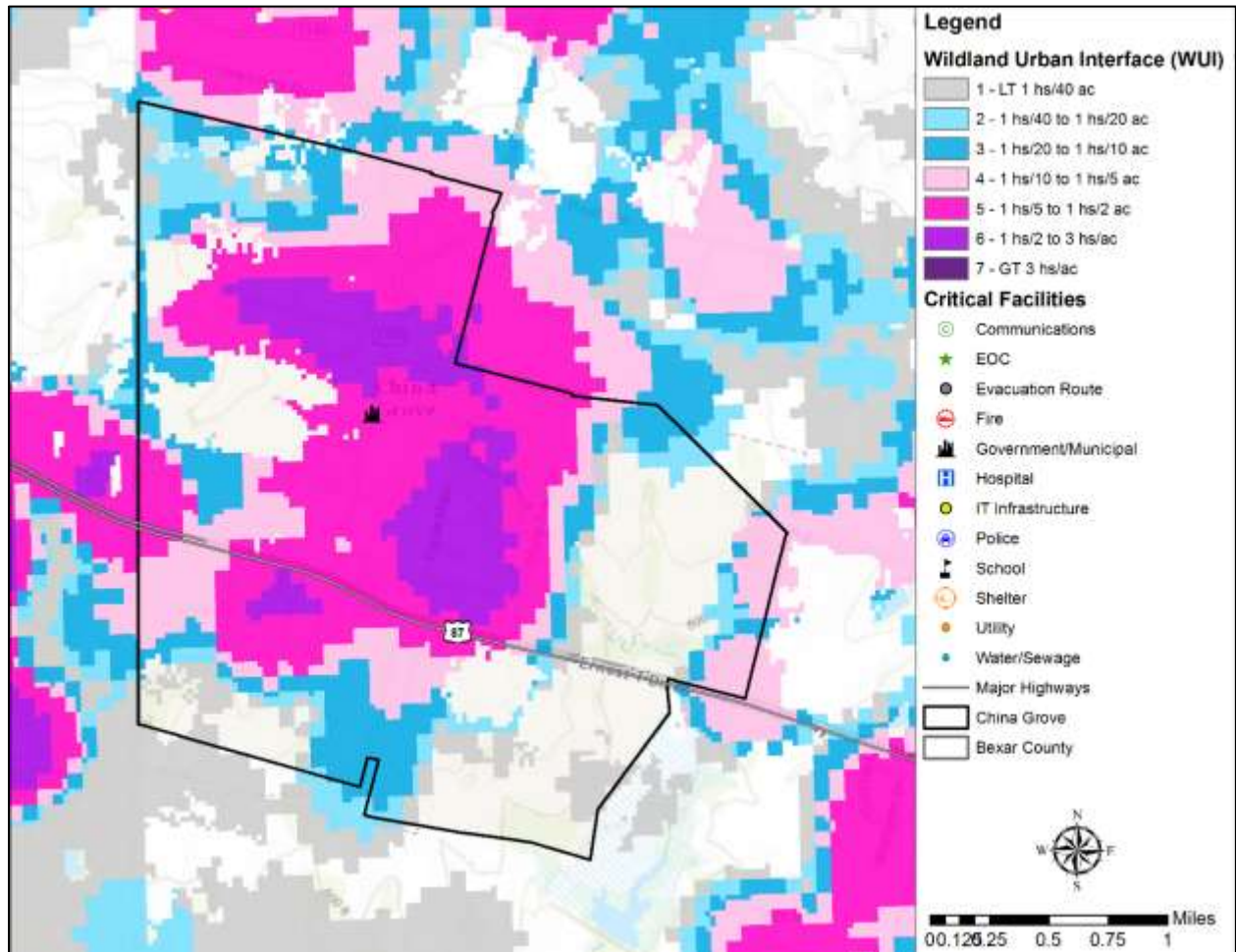
Figure 11-4. Wildland Urban Interface Map – City of Castle Hills



It is estimated that 7 percent of the total population in Castle Hills live within the WUI. However, the entire City of Castle Hills is at risk for wildfires.

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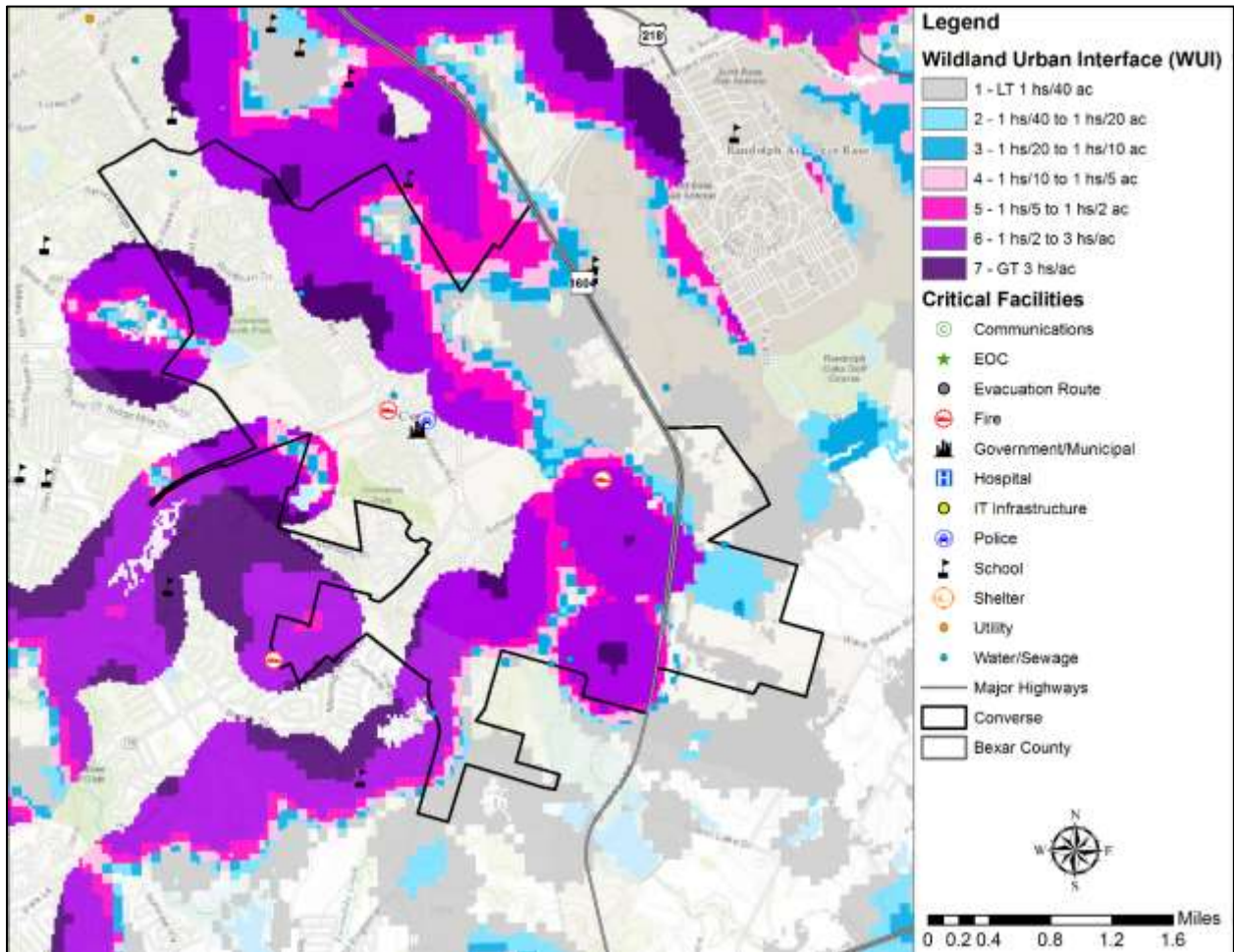
Figure 11-5. Wildland Urban Interface Map – City of China Grove



It is estimated that 99 percent of the total population in China Grove live within the WUI. However, the entire City of China Grove is at risk for wildfires.

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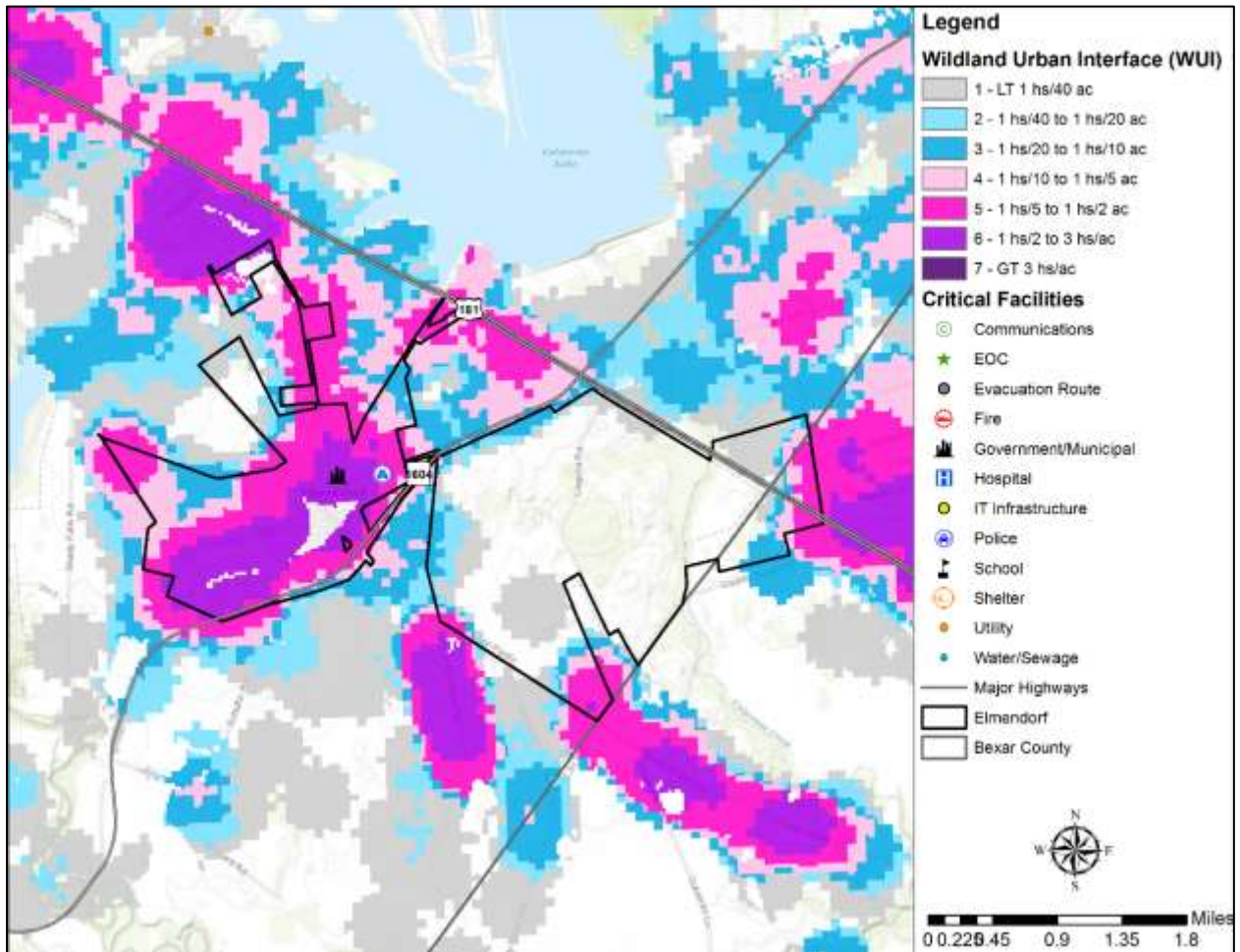
Figure 11-6. Wildland Urban Interface Map – City of Converse



It is estimated that 43 percent of the total population in Converse live within the WUI. However, the entire City of Converse is at risk for wildfires.

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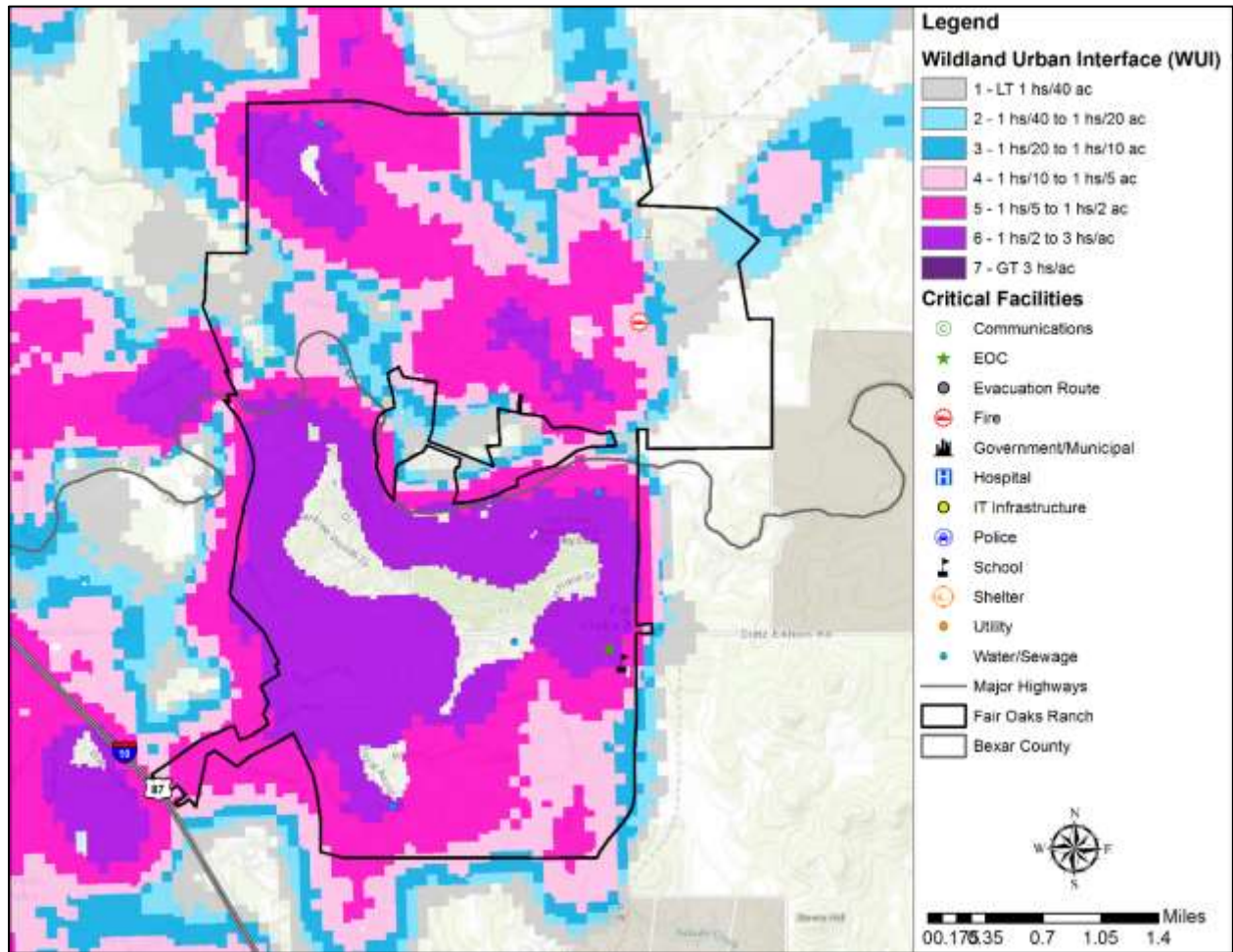
Figure 11-7. Wildland Urban Interface Map – City of Elmendorf



It is estimated that 89 percent of the total population in Elmendorf live within the WUI. However, the entire City of Elmendorf is at risk for wildfires.

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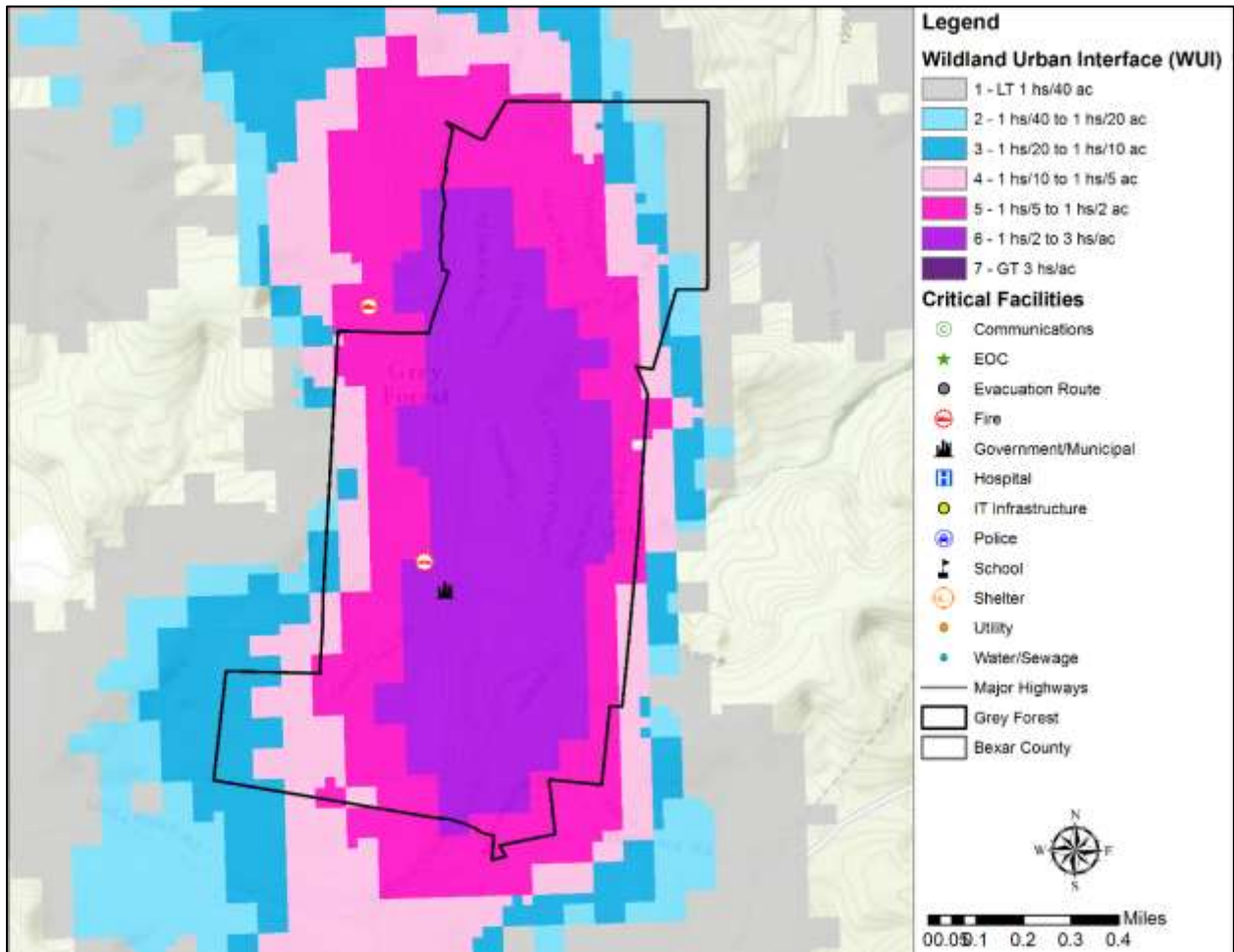
Figure 11-8. Wildland Urban Interface Map – City of Fair Oaks Ranch



It is estimated that 84 percent of the total population in Fair Oaks Ranch live within the WUI. However, the entire City of Fair Oaks Ranch is at risk for wildfires.

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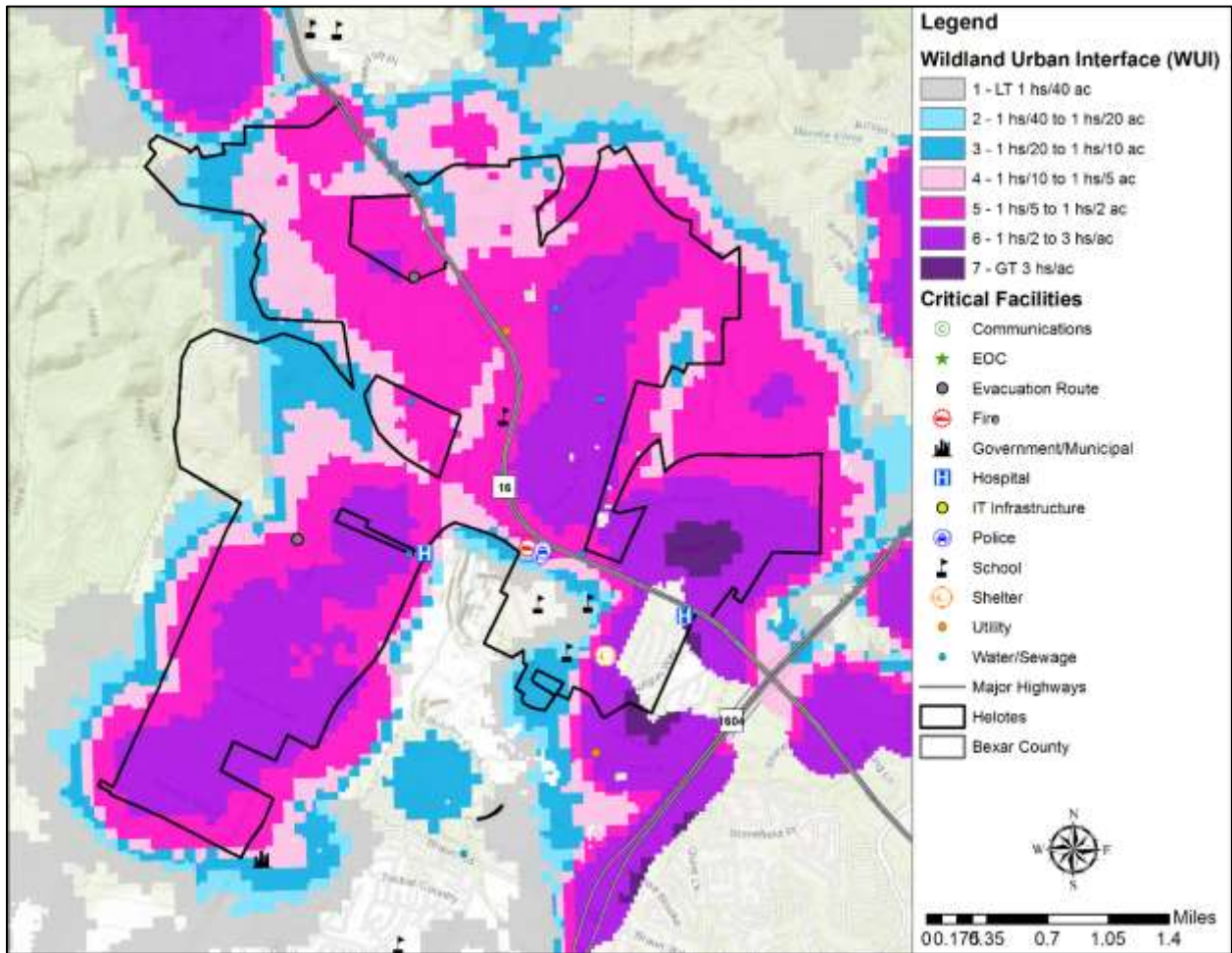
Figure 11-9. Wildland Urban Interface Map – City of Grey Forest



It is estimated that 100 percent of the total population in Grey Forest live within the WUI. However, the entire City of Grey Forest is at risk for wildfires.

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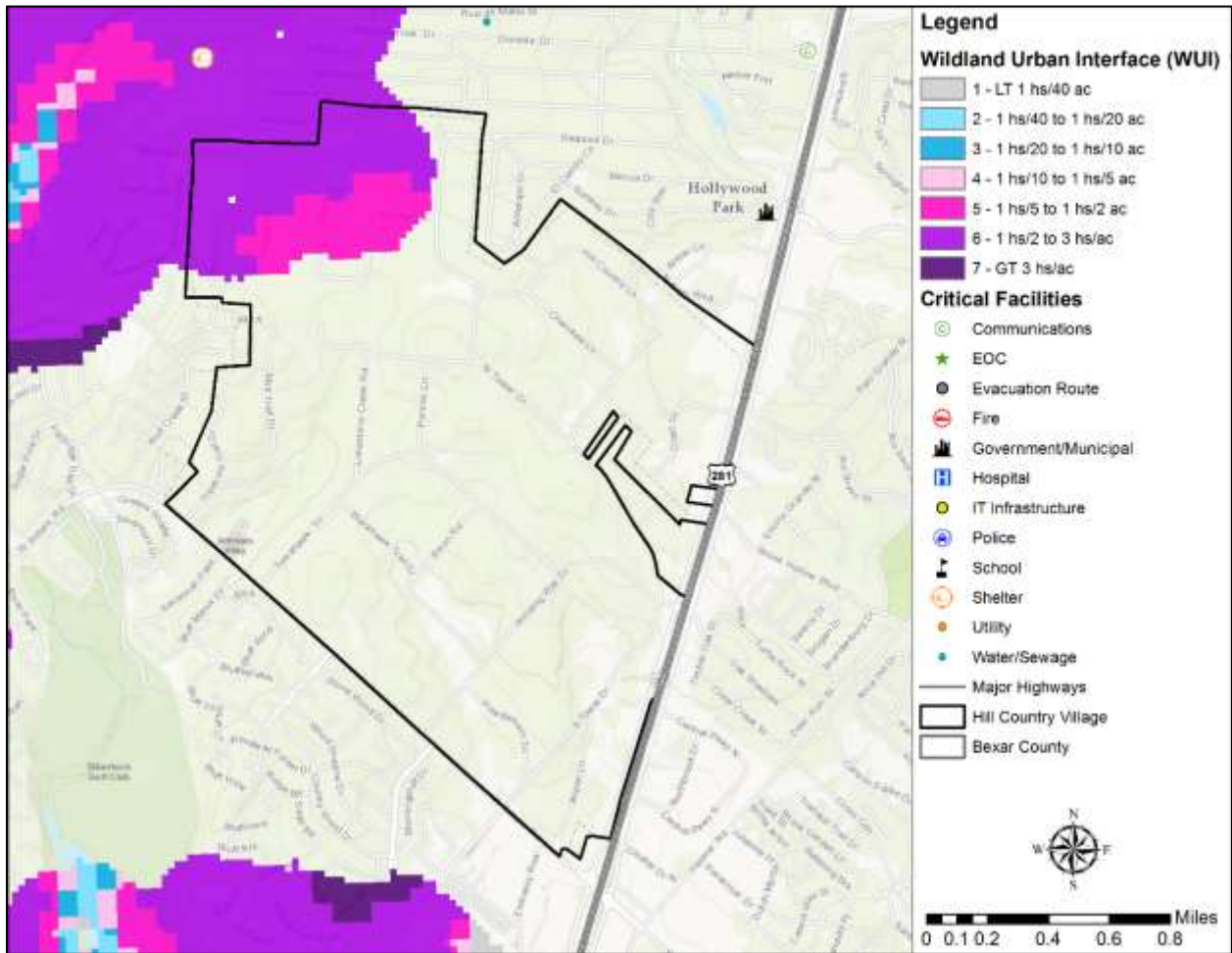
Figure 11-10. Wildland Urban Interface Map – City of Helotes



It is estimated that 90 percent of the total population in Helotes live within the WUI. However, the entire City of Helotes is at risk for wildfires.

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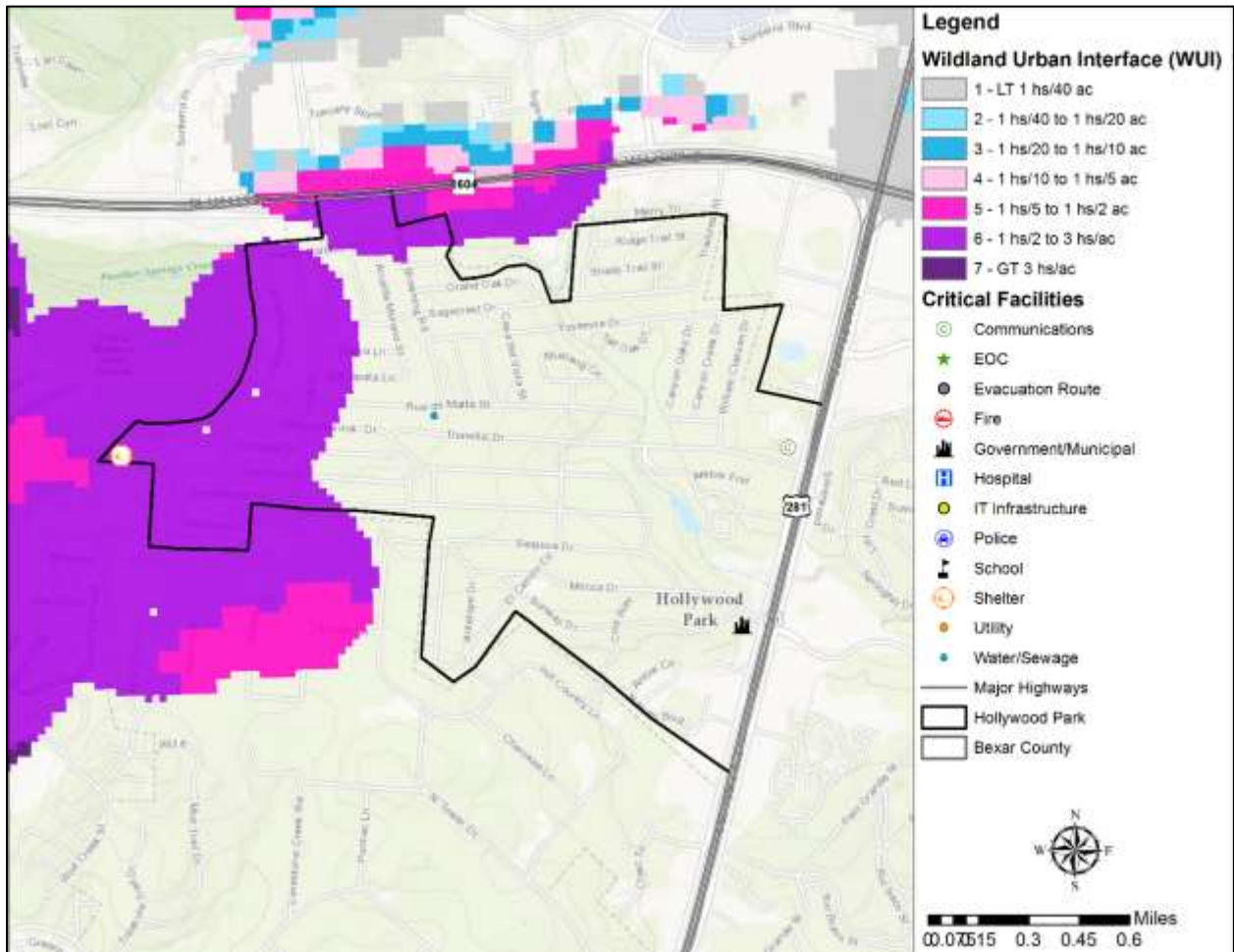
Figure 11-11. Wildland Urban Interface Map – City of Hill Country Village



It is estimated that 21 percent of the total population in Hill Country Village live within the WUI. However, the entire City of Hill Country Village is at risk for wildfires.

Section 11: Wildfire

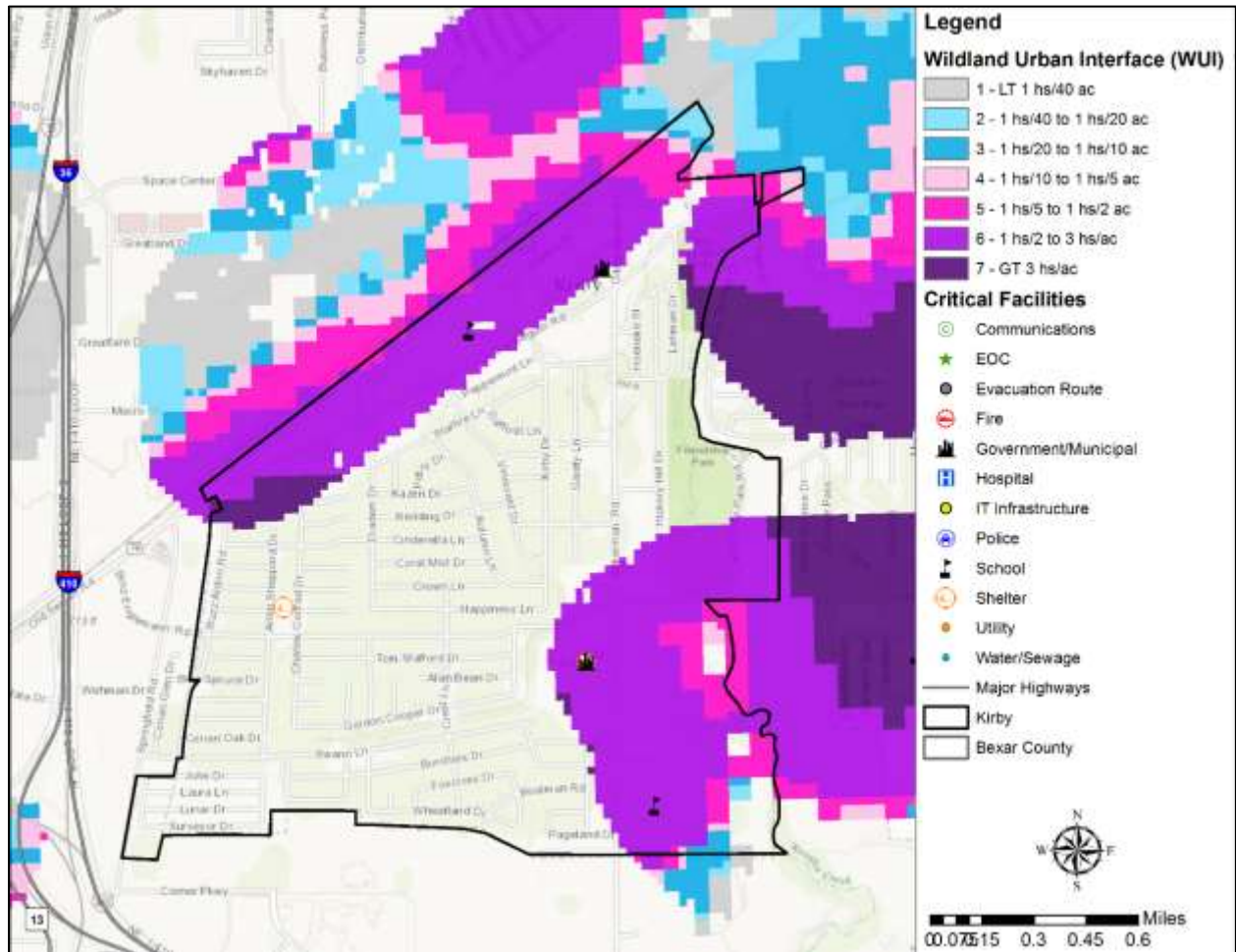
Figure 11-12. Wildland Urban Interface Map – Town of Hollywood Park



It is estimated that 24 percent of the total population in Hollywood Park live within the WUI. However, the entire Town of Hollywood Park is at risk for wildfires.

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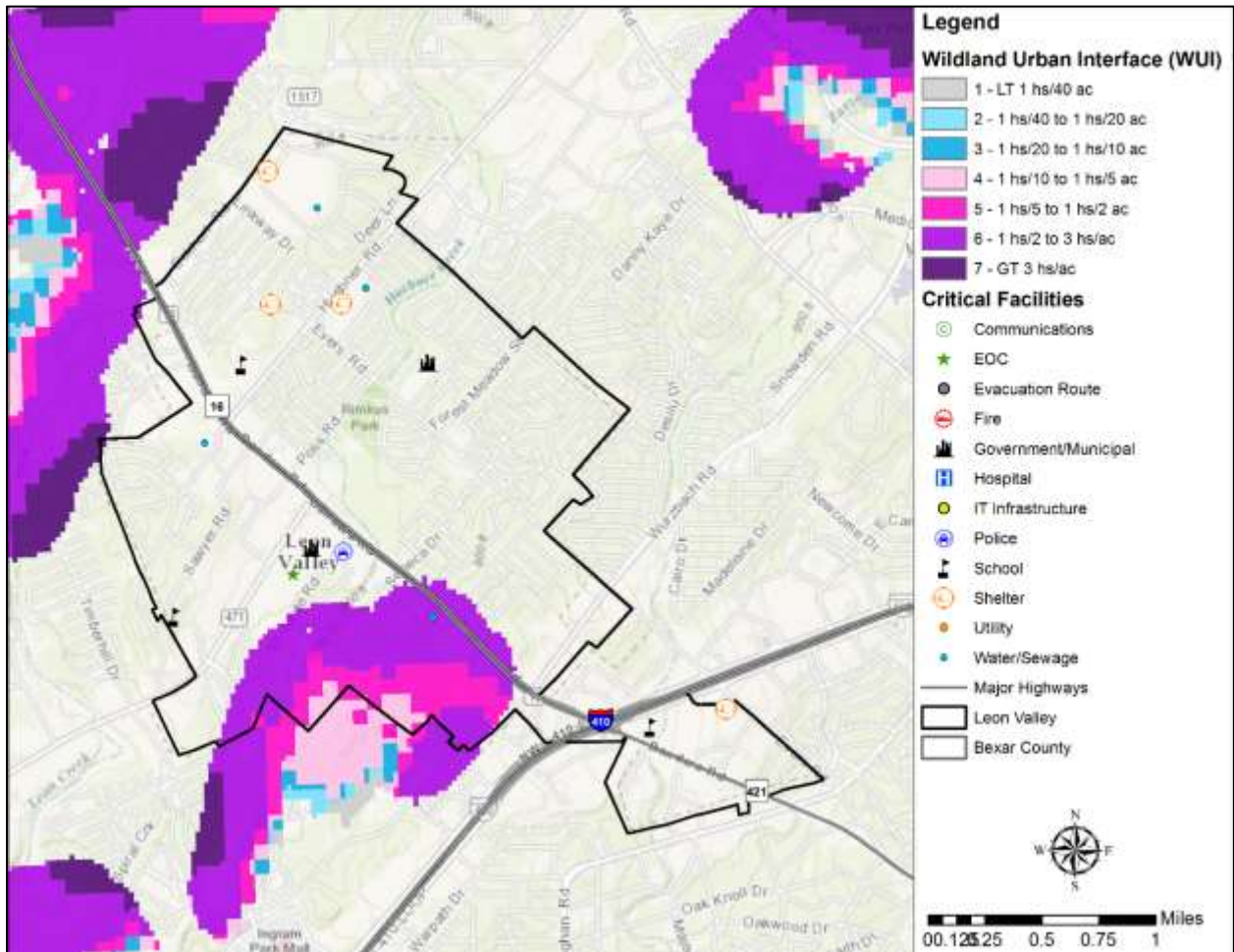
Figure 11-13. Wildland Urban Interface Map – City of Kirby



It is estimated that 14 percent of the total population in Kirby live within the WUI. However, the entire City of Kirby is at risk for wildfires.

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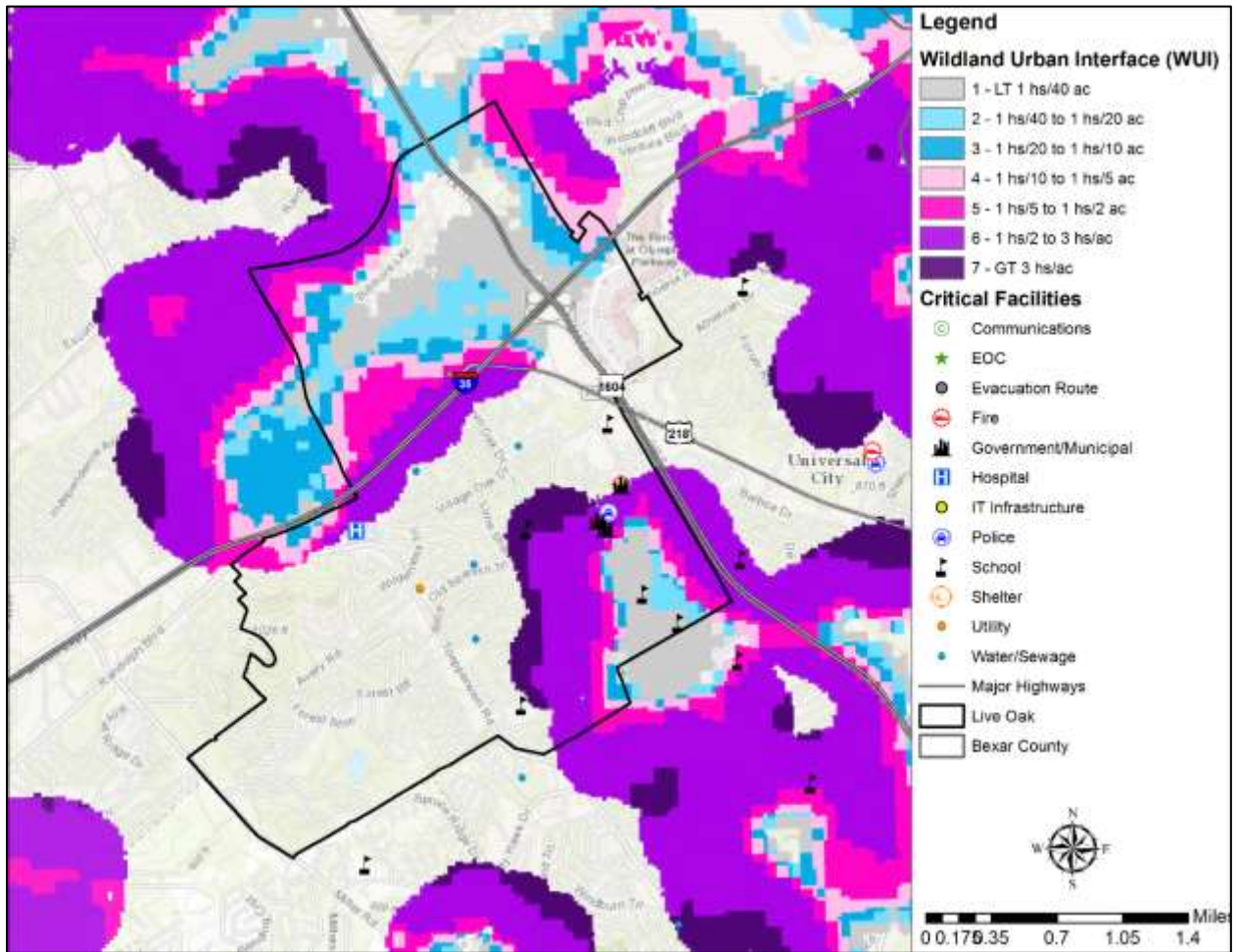
Figure 11-14. Wildland Urban Interface Map – City of Leon Valley



It is estimated that 6 percent of the total population in Leon Valley live within the WUI. However, the entire City of Leon Valley is at risk for wildfires.

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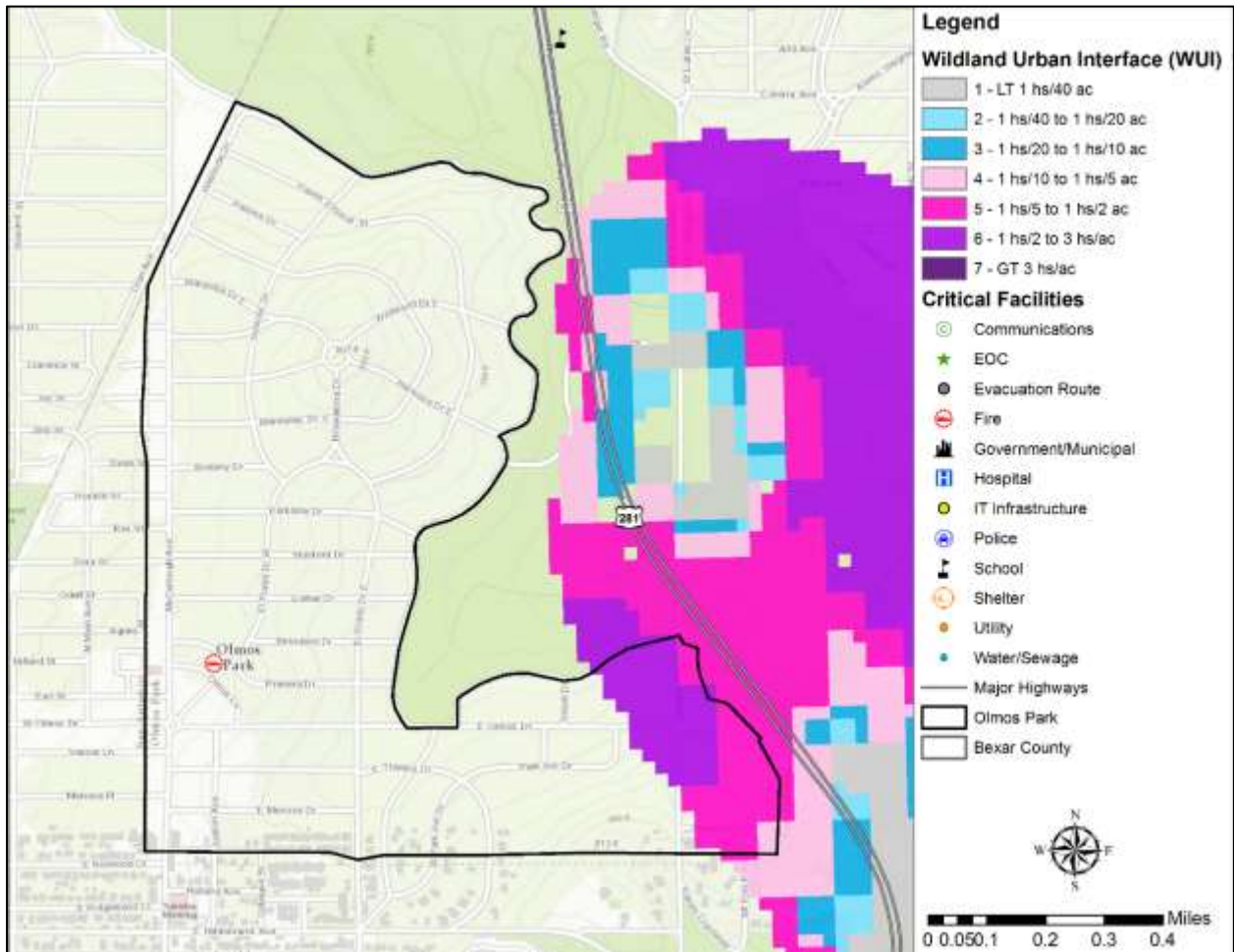
Figure 11-15. Wildland Urban Interface Map – City of Live Oak



It is estimated that 19 percent of the total population in Live Oak live within the WUI. However, the entire City of Live Oak is at risk for wildfires.

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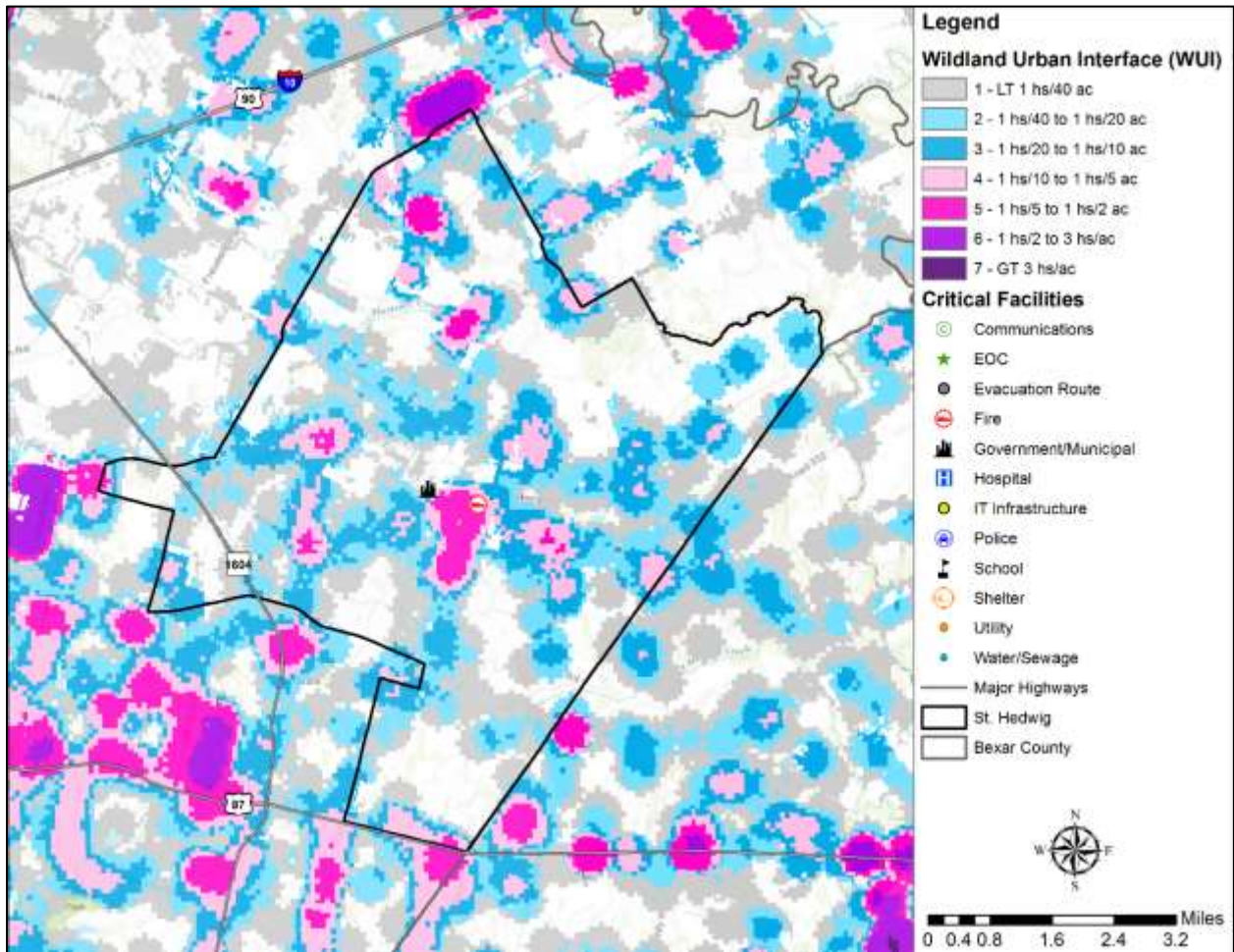
Figure 11-16. Wildland Urban Interface Map – City of Olmos Park



It is estimated that 3 percent of the total population in Olmos Park live within the WUI. However, the entire City of Olmos Park is at risk for wildfires.

Section 11: Wildfire

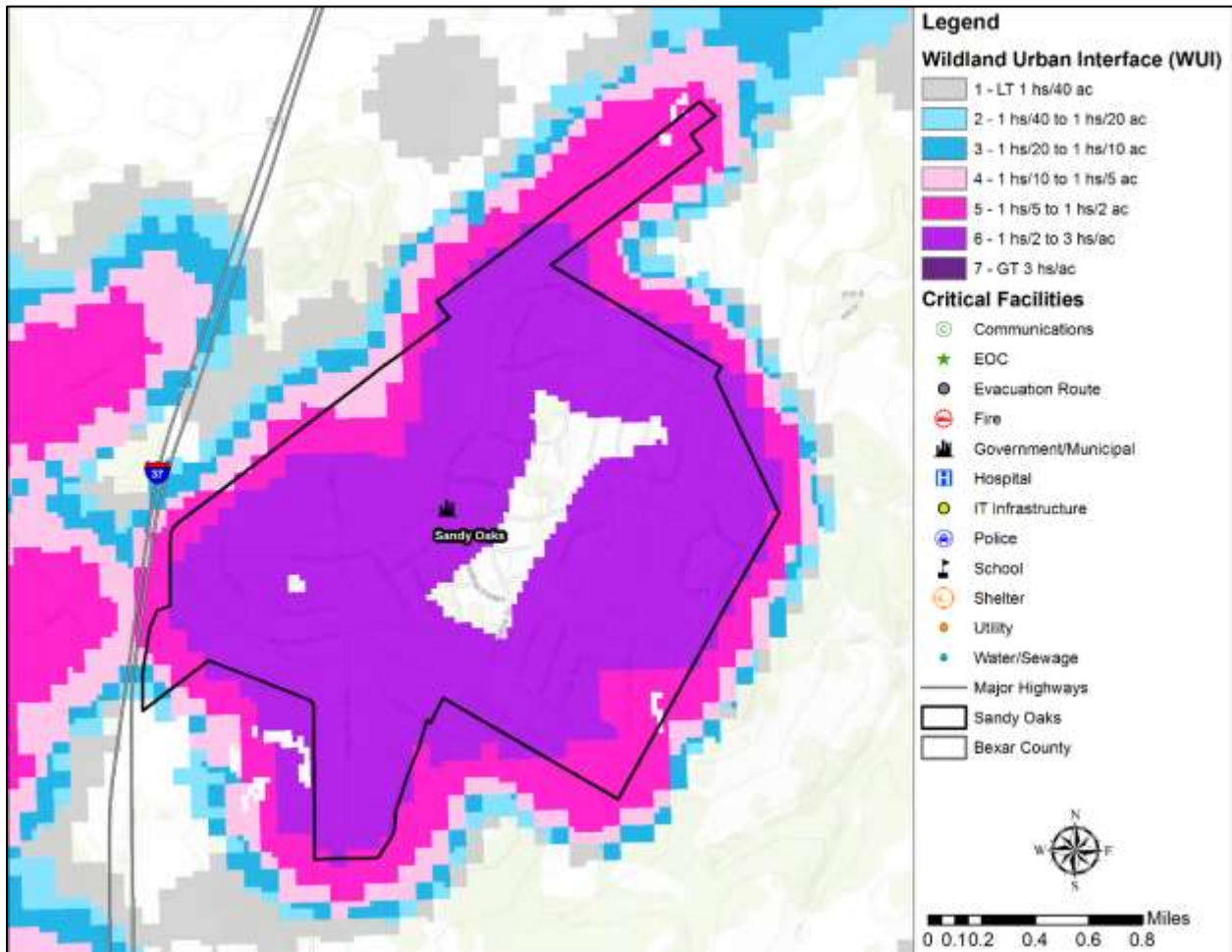
Figure 11-17. Wildland Urban Interface Map – City of Saint Hedwig



It is estimated that 95 percent of the total population in Saint Hedwig live within the WUI. However, the entire City of Saint Hedwig is at risk for wildfires.

Section 11: Wildfire

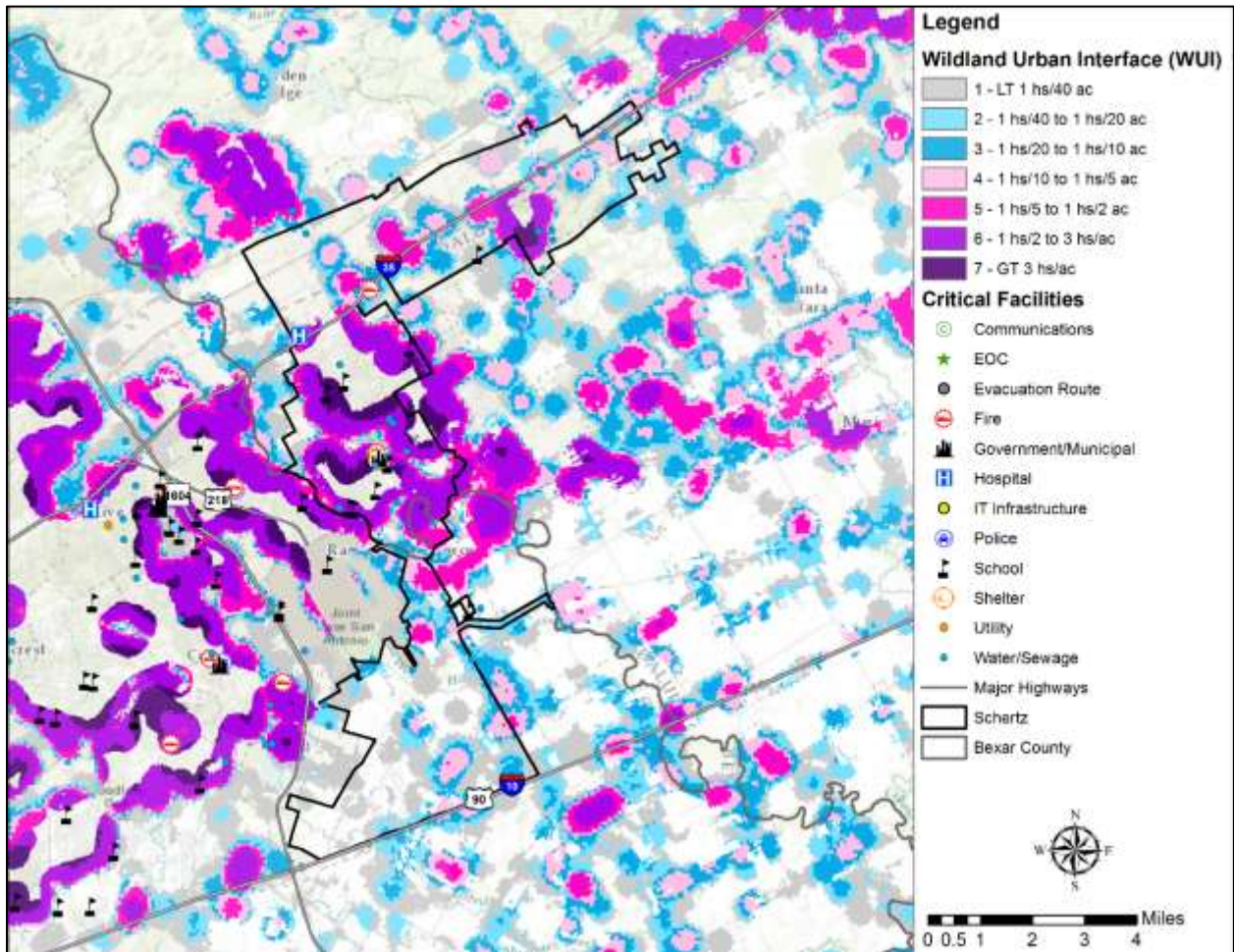
Figure 11-18. Wildland Urban Interface Map – City of Sandy Oaks



It is estimated that 90 percent of the total population in Sandy Oaks live within the WUI. However, the entire City of Sandy Oaks is at risk for wildfires.

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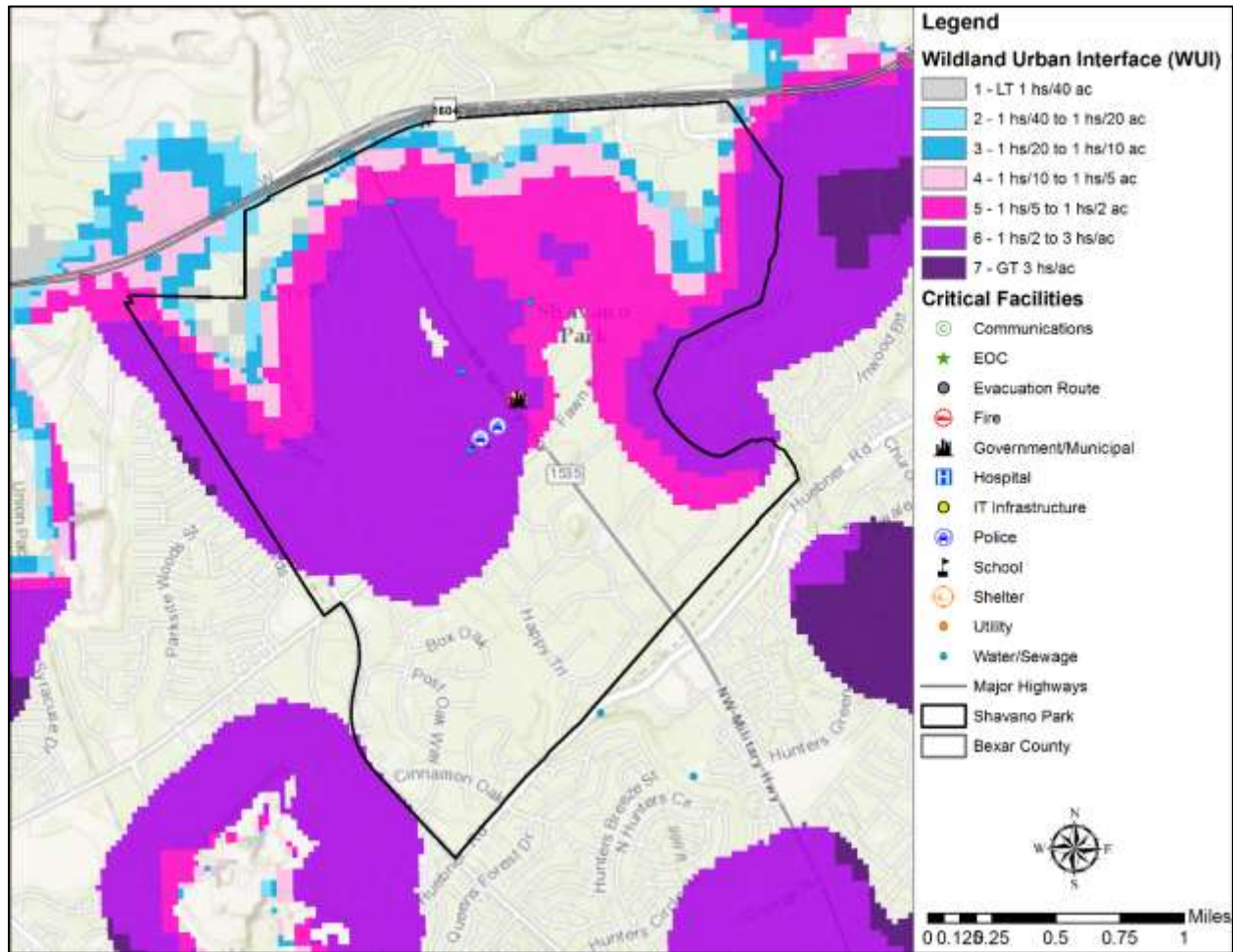
Figure 11-19. Wildland Urban Interface Map – City of Schertz



It is estimated that 59 percent of the total population in Schertz live within the WUI. However, the entire City of Schertz is at risk for wildfires.

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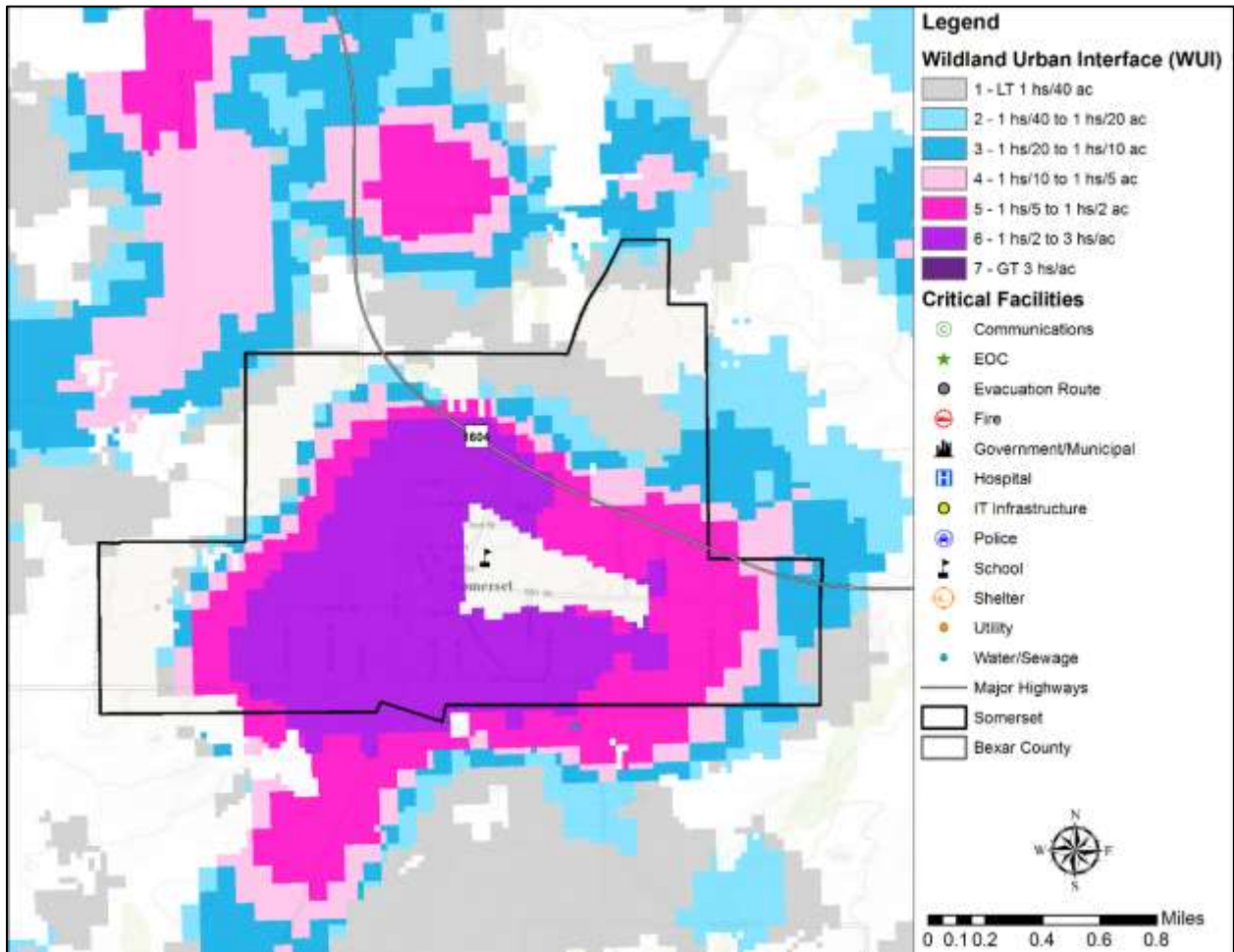
Figure 11-20. Wildland Urban Interface Map – City of Shavano Park



It is estimated that 58 percent of the total population in Shavano Park live within the WUI. However, the entire City of Shavano Park is at risk for wildfires.

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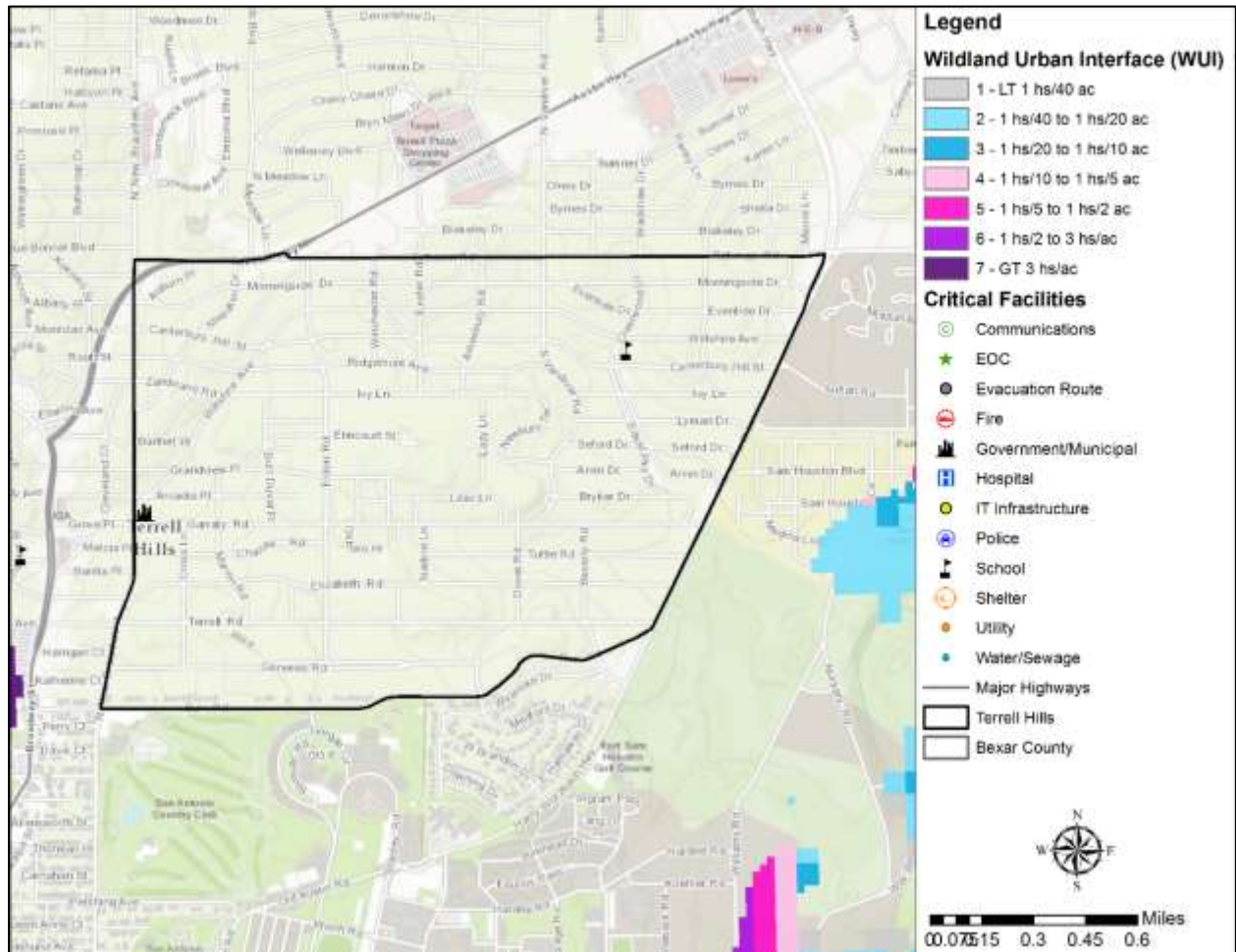
Figure 11-21. Wildland Urban Interface Map – City of Somerset



It is estimated that 94 percent of the total population in Somerset live within the WUI. However, the entire City of Somerset is at risk for wildfires.

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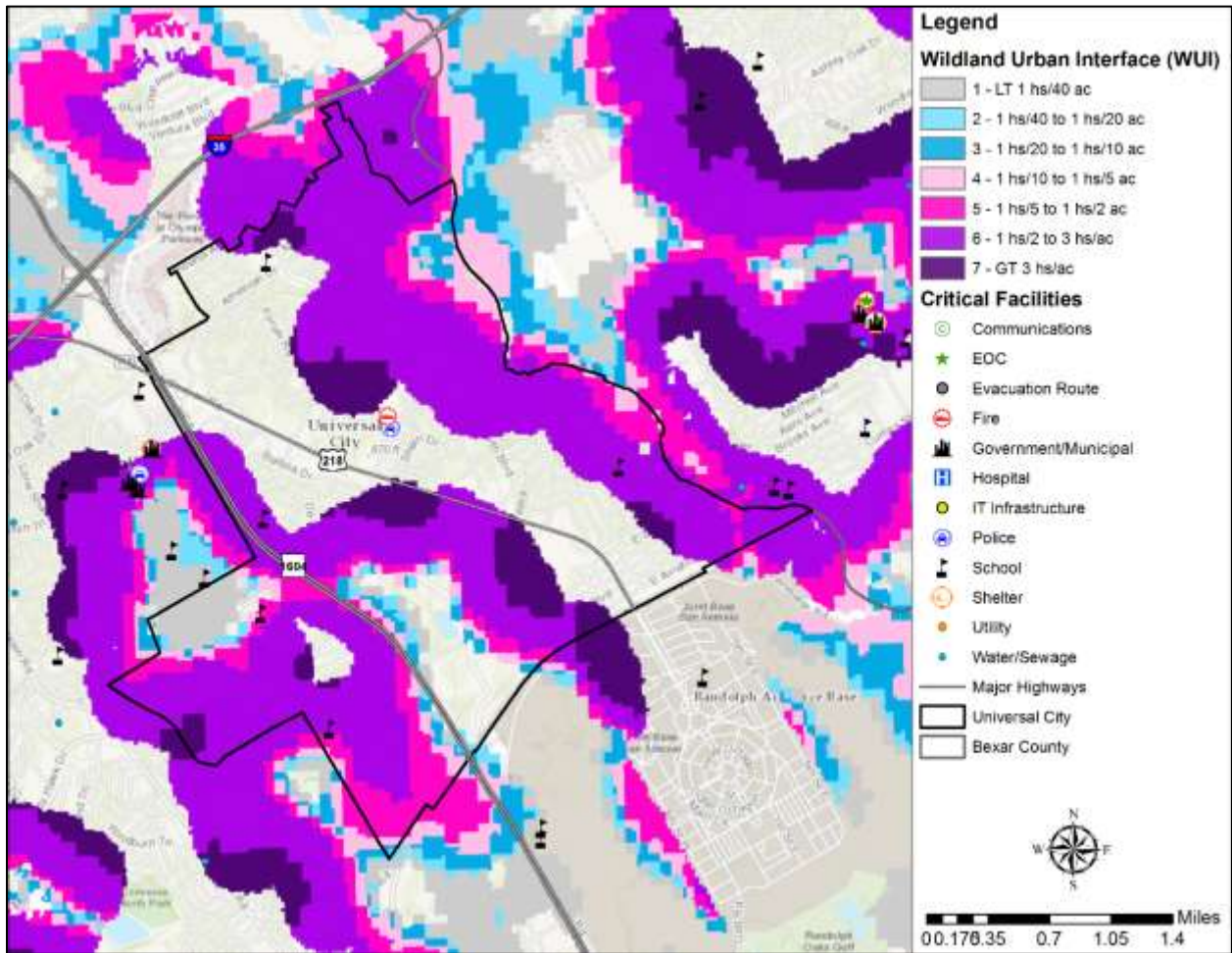
Figure 11-22. Wildland Urban Interface Map – City of Terrell Hills



It is estimated that zero percent of the total population in Terrell Hills live within the WUI, the area at greatest risk for wildfire. However, the entire City of Terrell Hills is at some risk for wildfires as the hazard has no geographic boundaries. While densely populated areas may have limited risk in the absence of a WUI, residential neighborhoods throughout the city contain wildfire fuels similar to wildland areas including trees, grass, shrubs and other vegetative fuels, the entire city limits is primarily residential with wildfire fuels, therefore the entire City of Terrell Hills is vulnerable.

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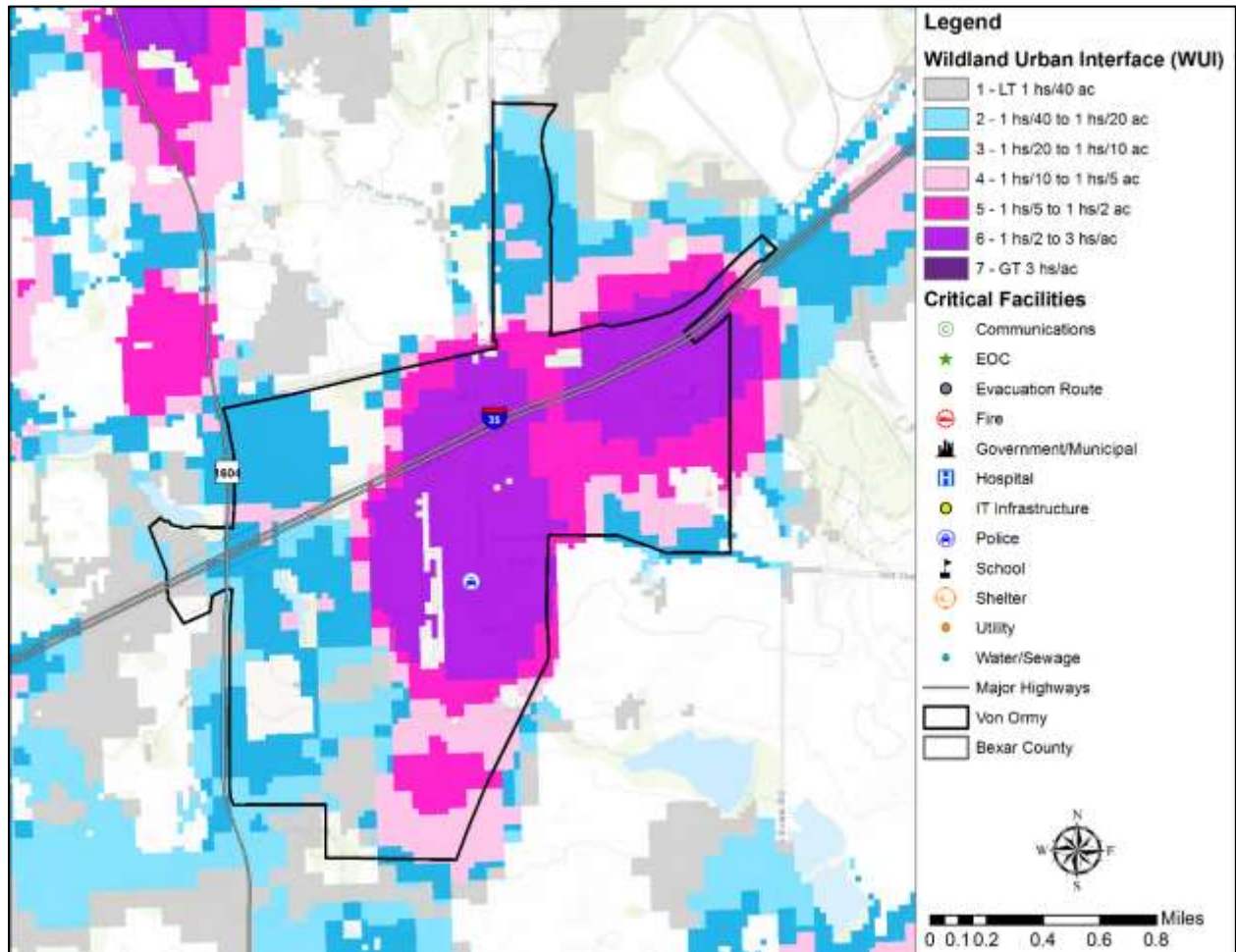
Figure 11-23. Wildland Urban Interface Map – City of Universal City



It is estimated that 55 percent of the total population in Universal City live within the WUI. However, the entire City of Universal City is at risk for wildfires.

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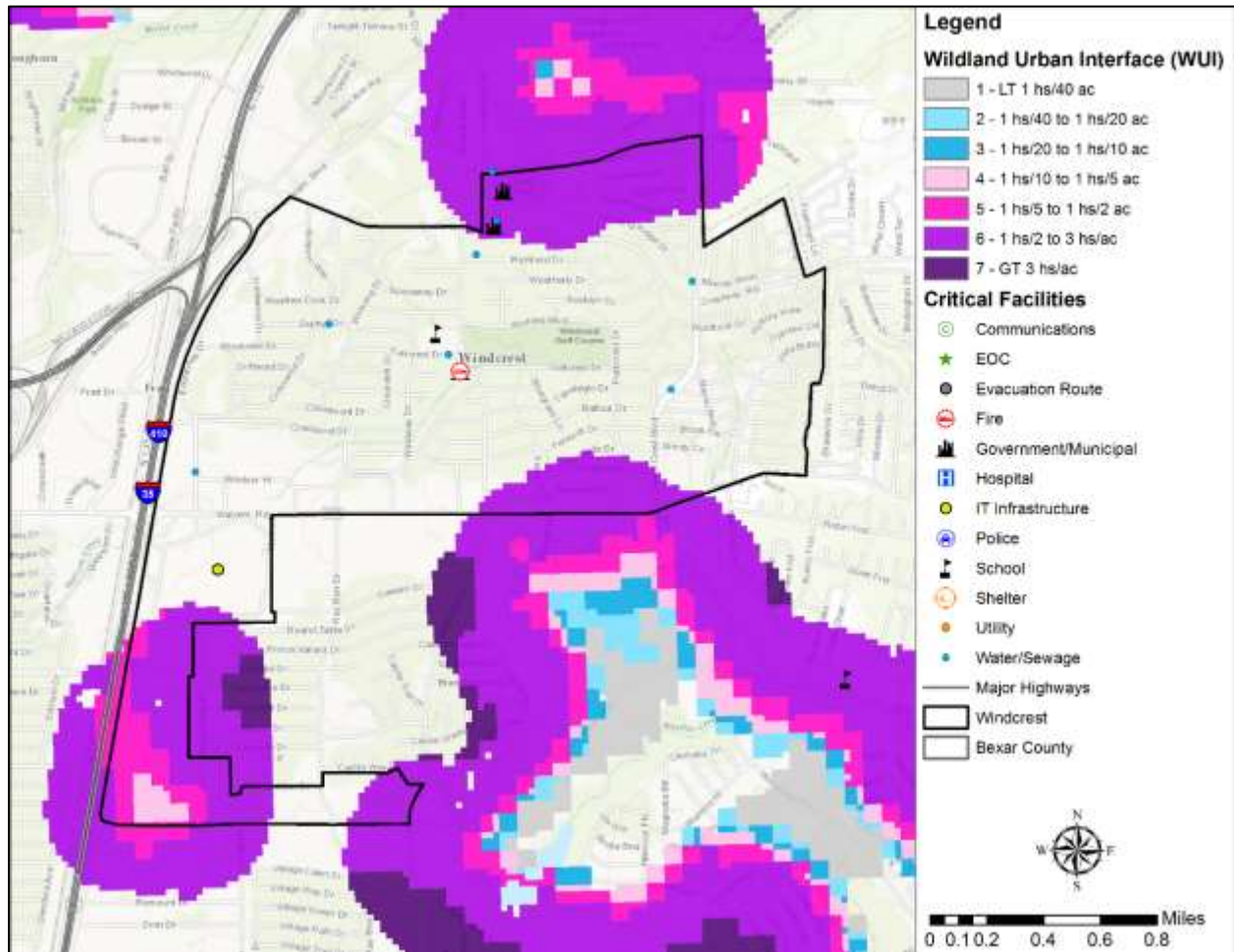
Figure 11-24. Wildland Urban Interface Map – City of Von Ormy



It is estimated that 97 percent of the total population in Von Ormy live within the WUI. However, the entire City of Von Ormy is at risk for wildfires.

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Figure 11-25. Wildland Urban Interface Map – City of Windcrest



It is estimated that 14 percent of the total population in Windcrest live within the WUI. However, the entire City of Windcrest is at risk for wildfires.

Extent

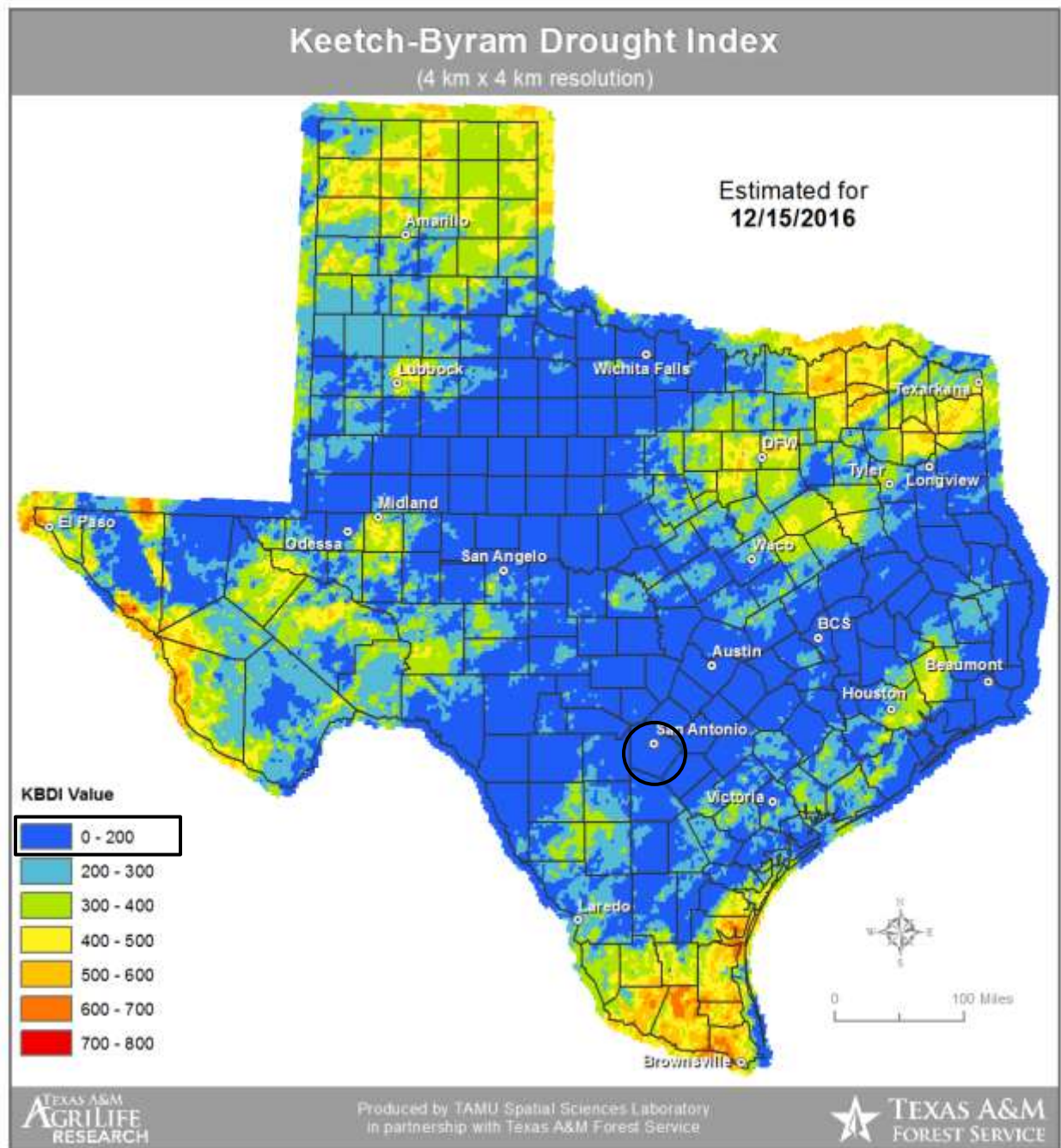


Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor with precipitation and soil moisture (assumed to have a maximum storage capacity of 8 inches), and is expressed in hundredths of an inch of soil moisture depletion.

Each color in Figure 11-26 represents the drought index at that location. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

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Figure 11-26. Keetch-Byram Drought Index (KBDI) for the State of Texas, December 2016¹



Fire behavior can be categorized at four distinct levels on the KBDI:

- **0-200:** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.

¹ The black circle indicates the Bexar County planning area.

Section 11: Wildfire

- **200-400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **400-600:** Fires intensity begins to significantly increase. Fires will readily burn in all directions, exposing mineral soils in some locations. Larger fuels may burn or smolder for several days, creating possible smoke and control problems.
- **600-800:** Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

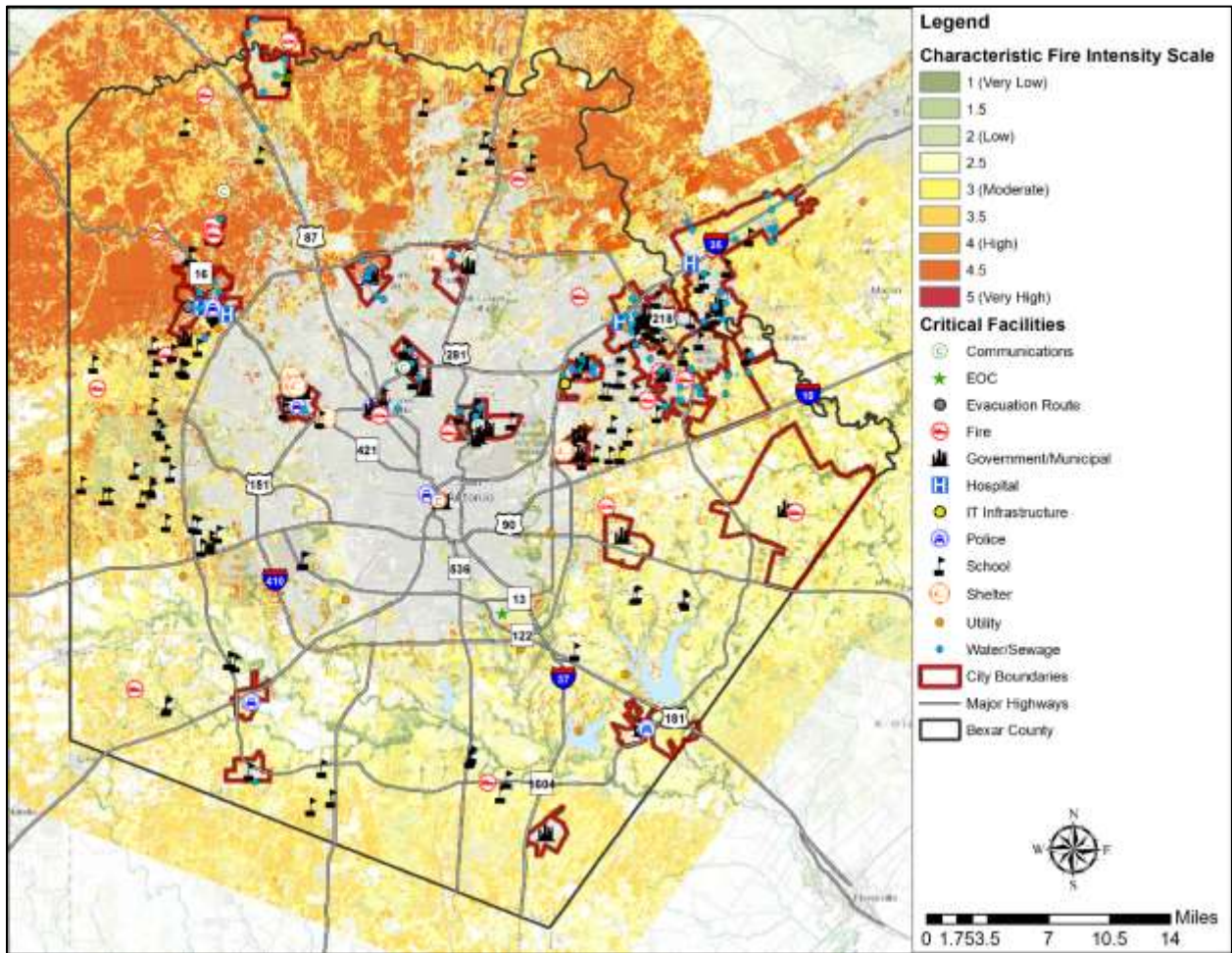
The KBDI is a good measure of the readiness of fuels for a wildfire event. The KBDI should be referenced as the area experiences changes in precipitation and soil moisture, and caution exercised in dryer, hotter conditions.

The current range of intensity for Bexar County in a wildfire event is within 0 to 200. The average extent to be mitigated for the Bexar County planning area, including all participating jurisdictions, is a KBDI of 422. At this level, the intensity of fires begins to significantly increase and fires readily burn in all directions, exposing mineral soils in some locations.

The Texas Forest Service's Fire Intensity Scale identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on the weighted average of 4 percentile weather categories. Bexar County, including all participating jurisdictions, ranges from low to potential high wildfire intensities. Figures 11-27 through 11-51 identify the wildfire intensity for the Bexar County planning area.

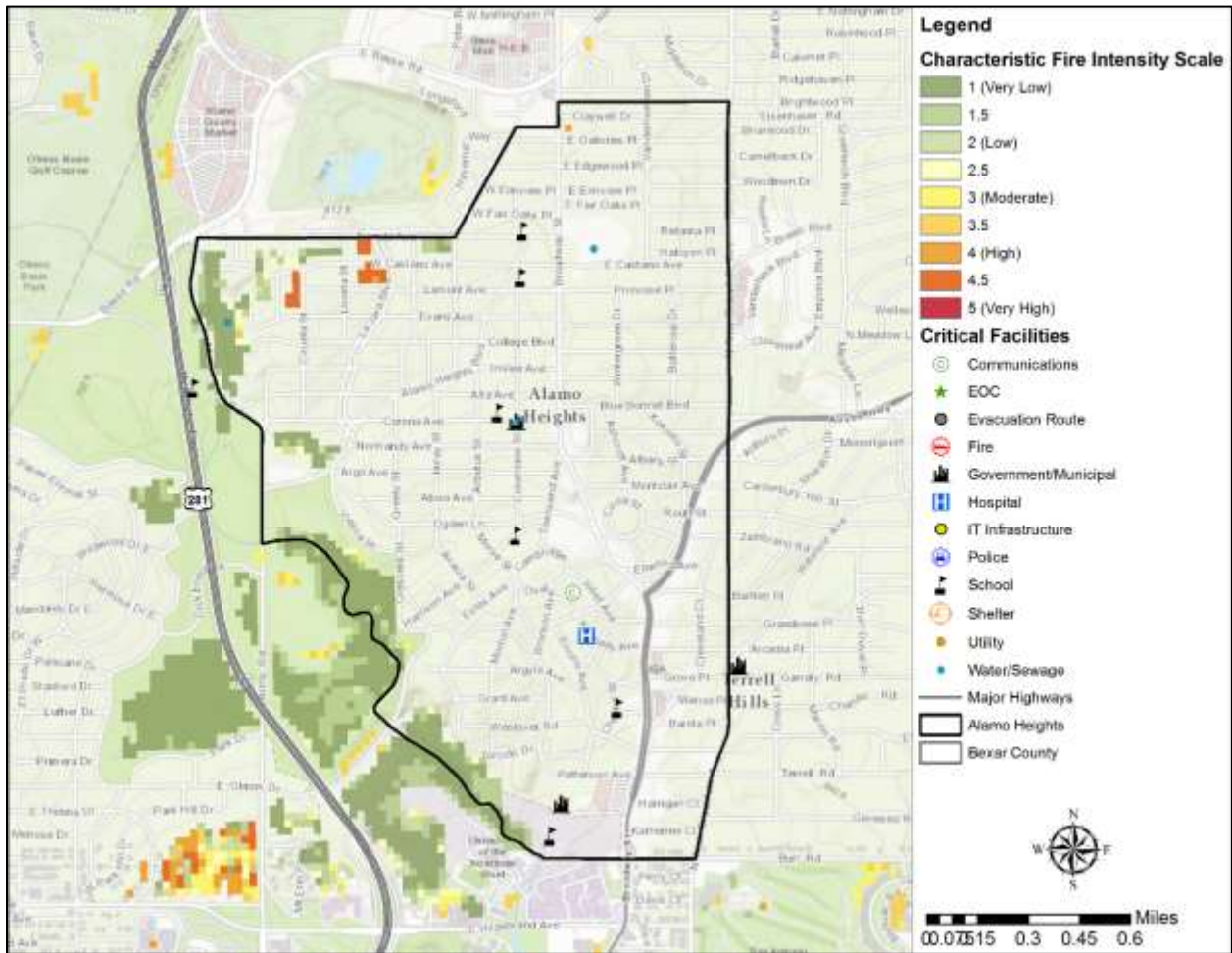
Section 11: Wildfire

Figure 11-27. Fire Intensity Scale Map – Bexar County



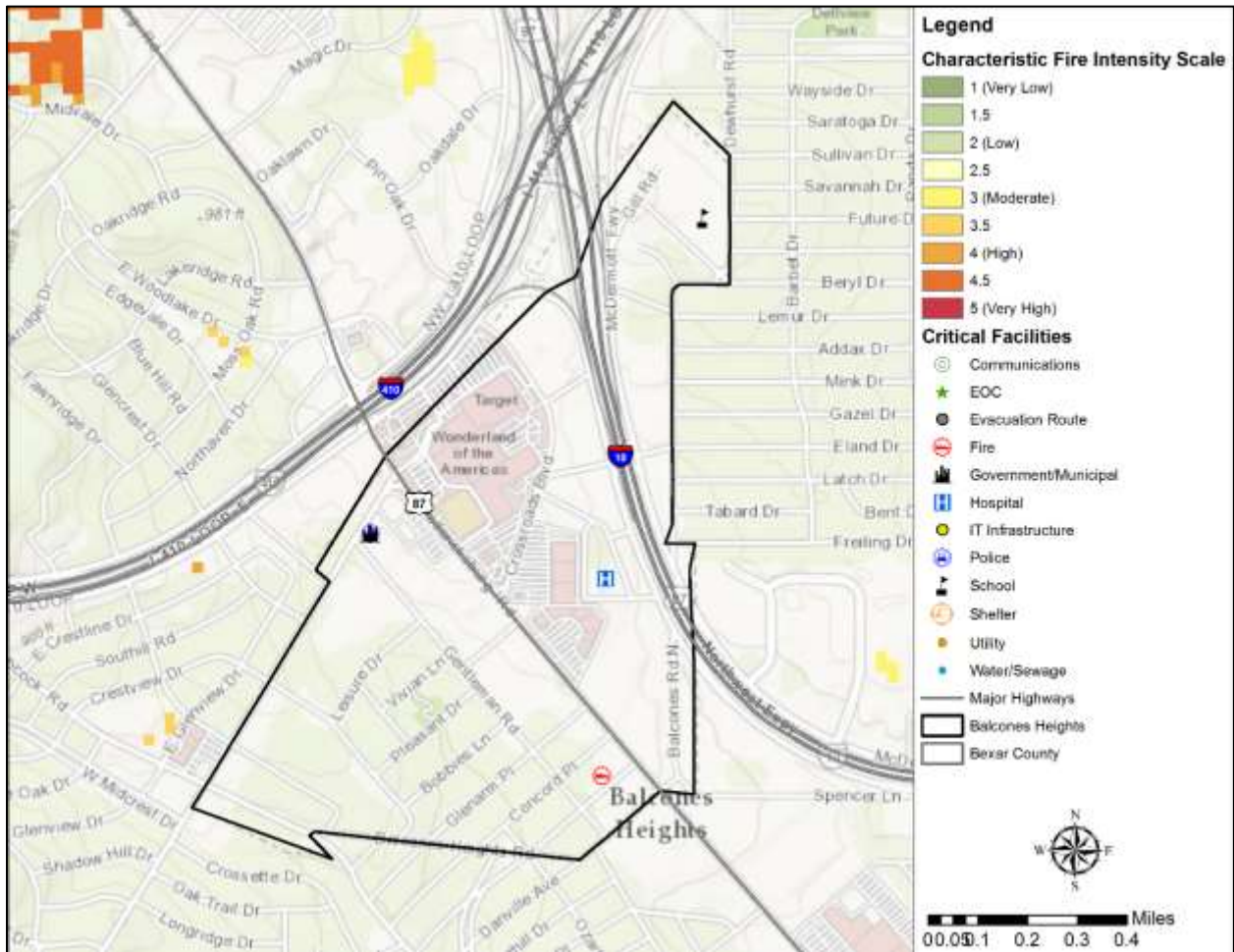
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Figure 11-28. Fire Intensity Scale Map – Alamo Heights



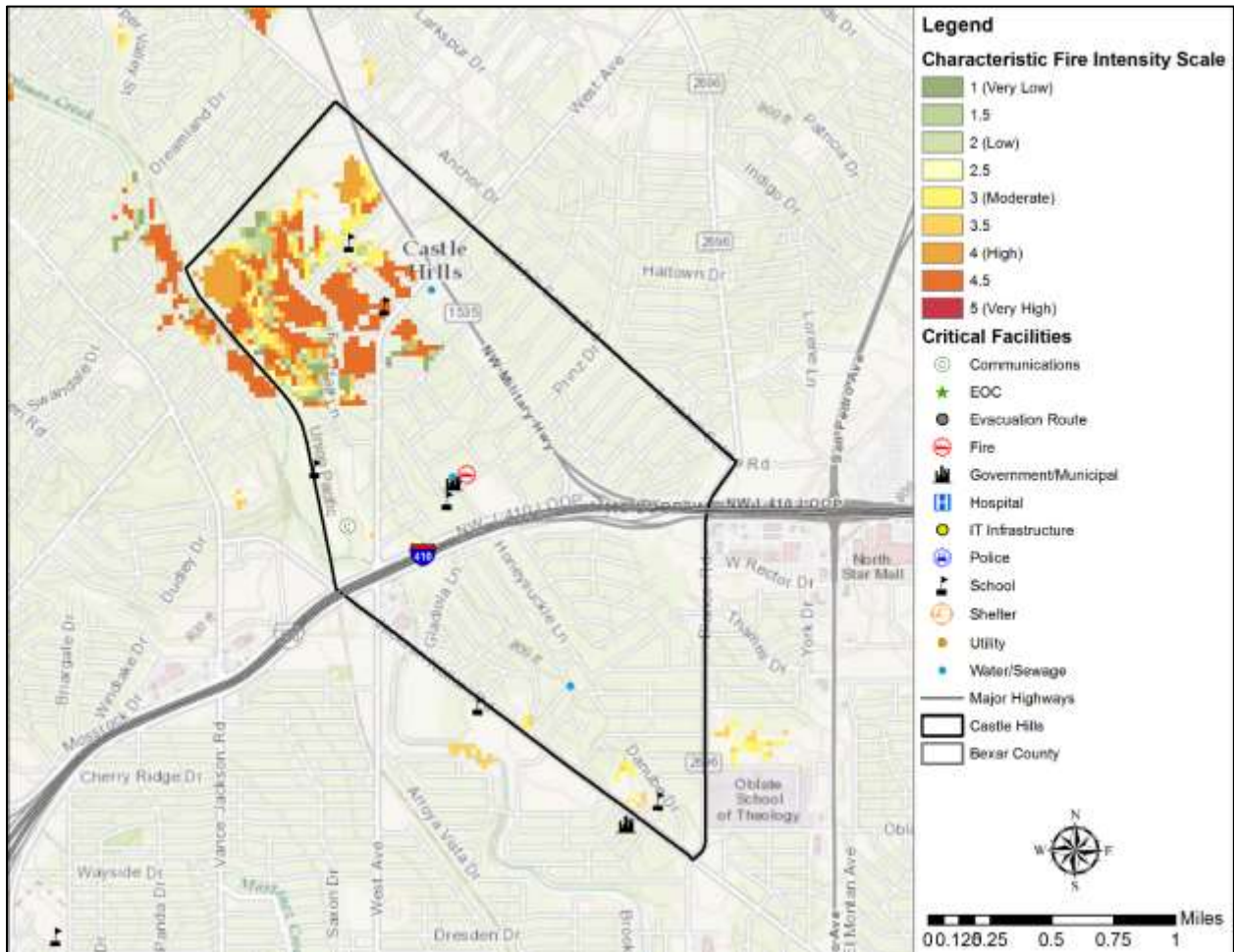
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Figure 11-29. Fire Intensity Scale Map – Balcones Heights



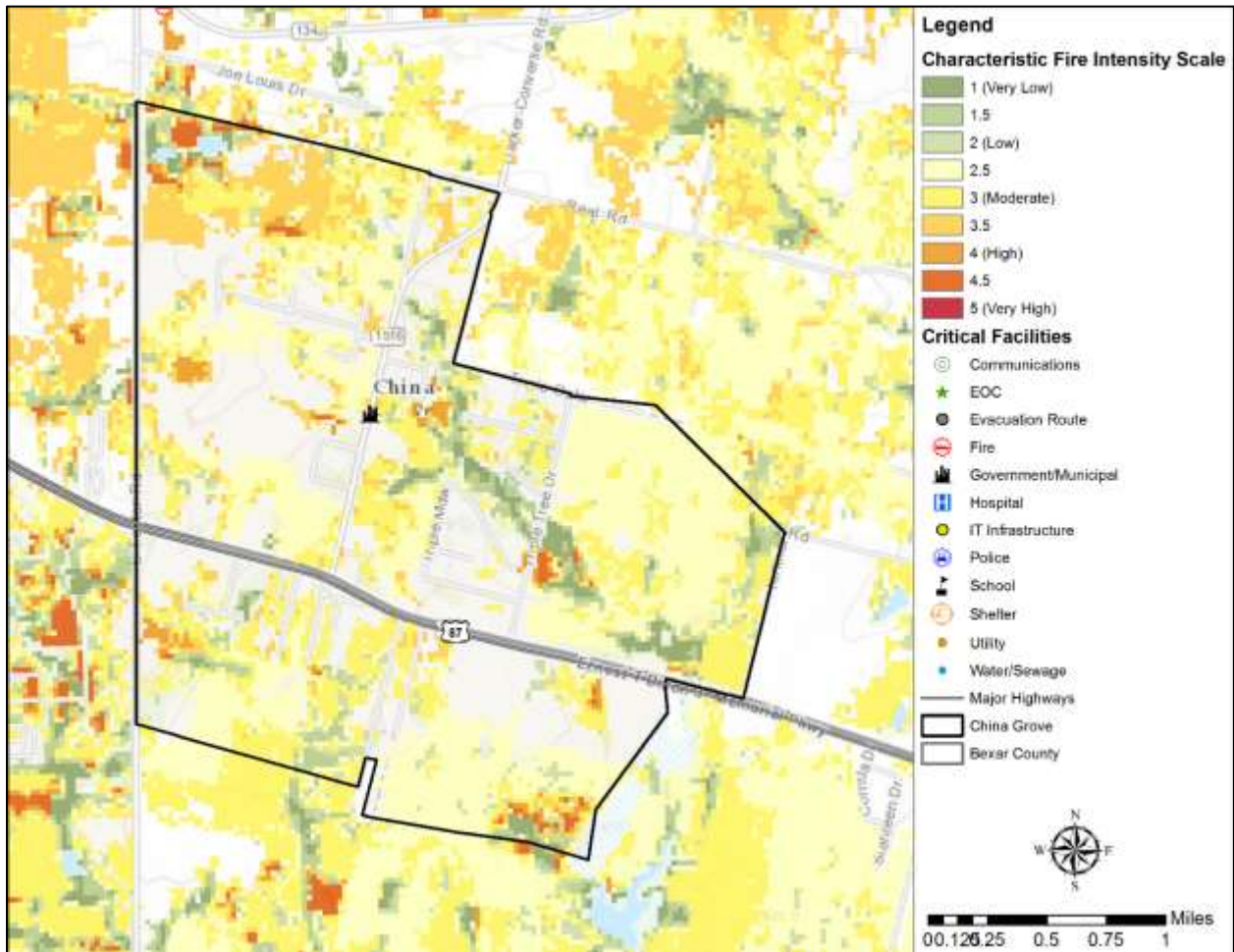
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Figure 11-30. Fire Intensity Scale Map – Castle Hills



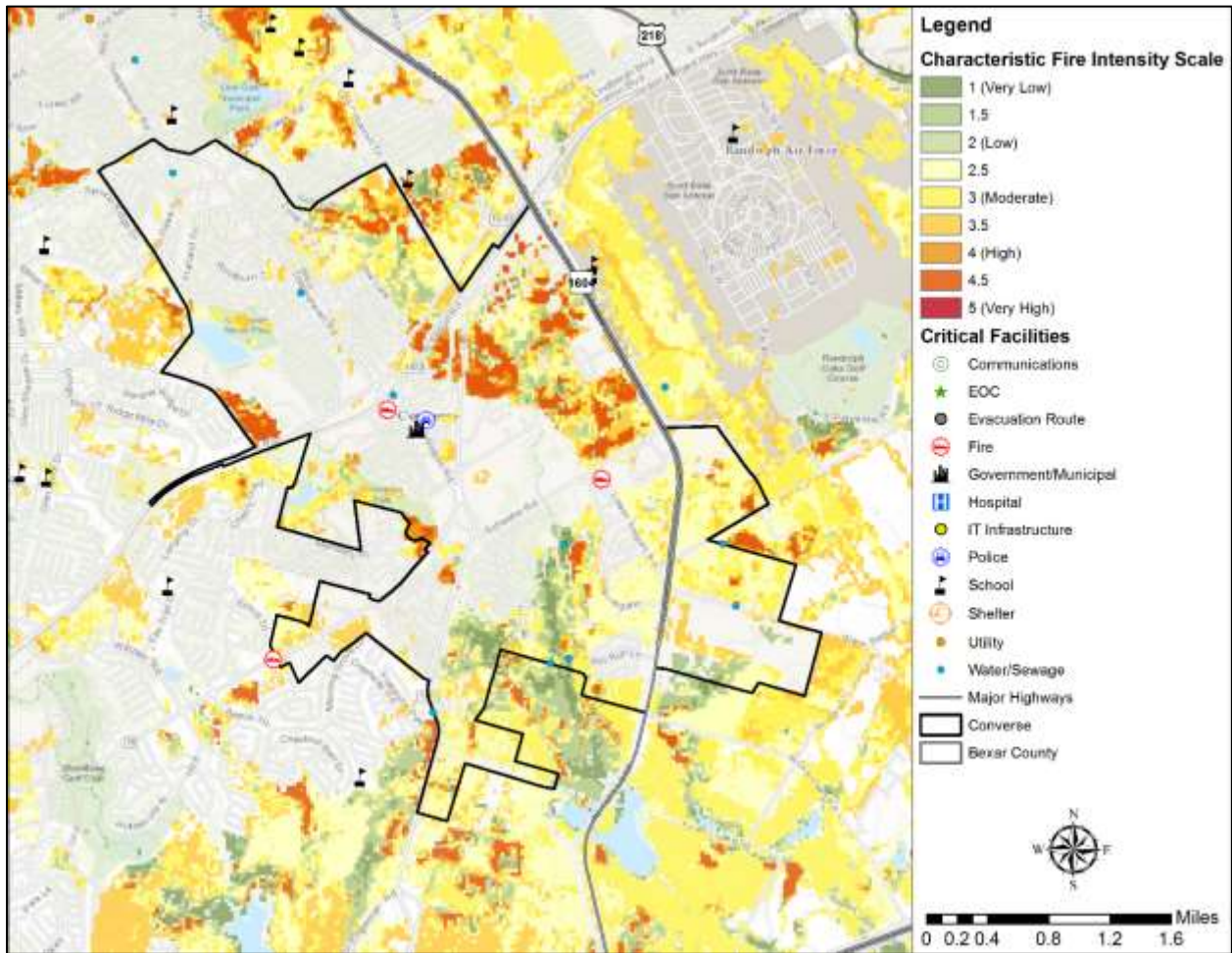
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Figure 11-31. Fire Intensity Scale Map – China Grove



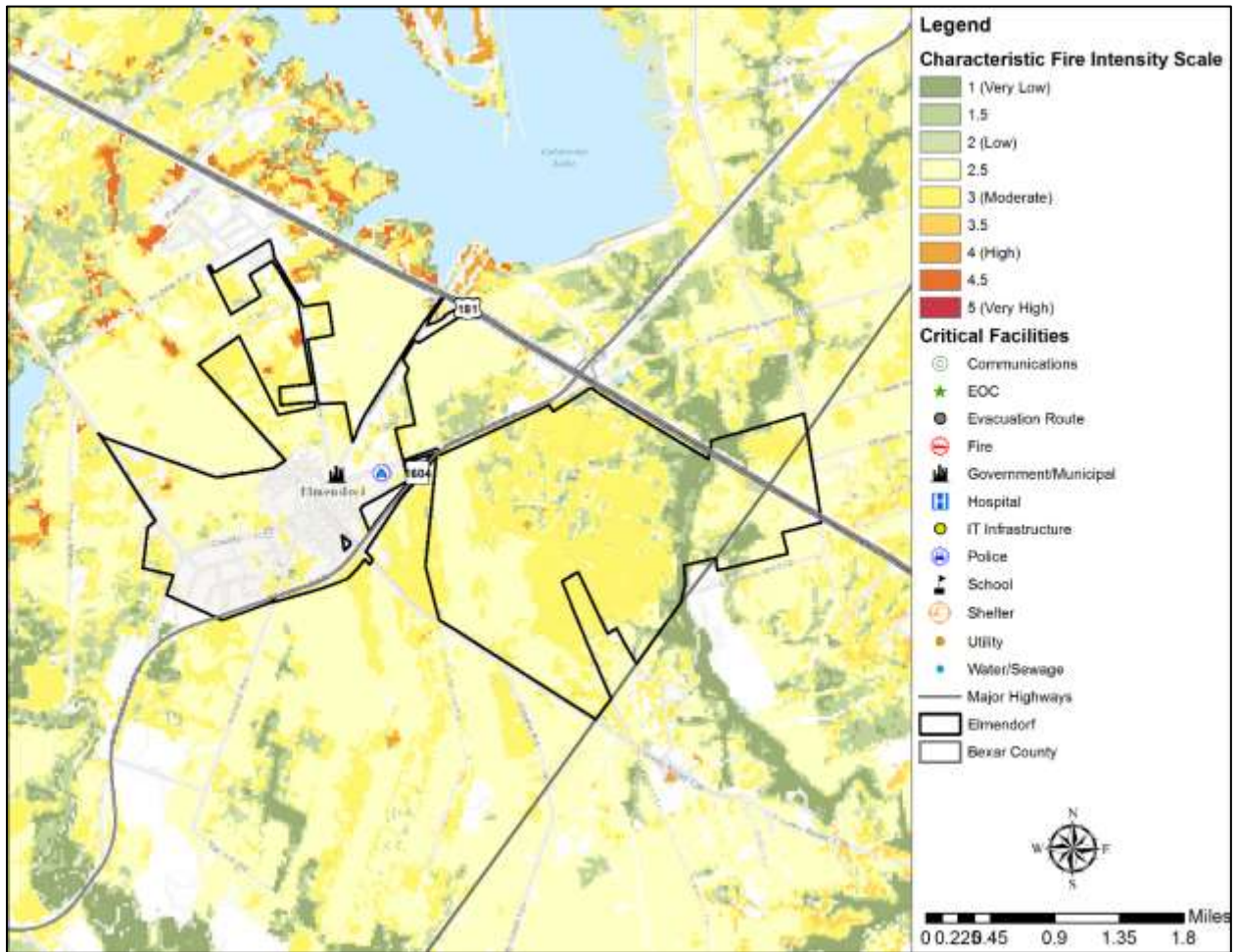
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Figure 11-32. Fire Intensity Scale Map – Converse



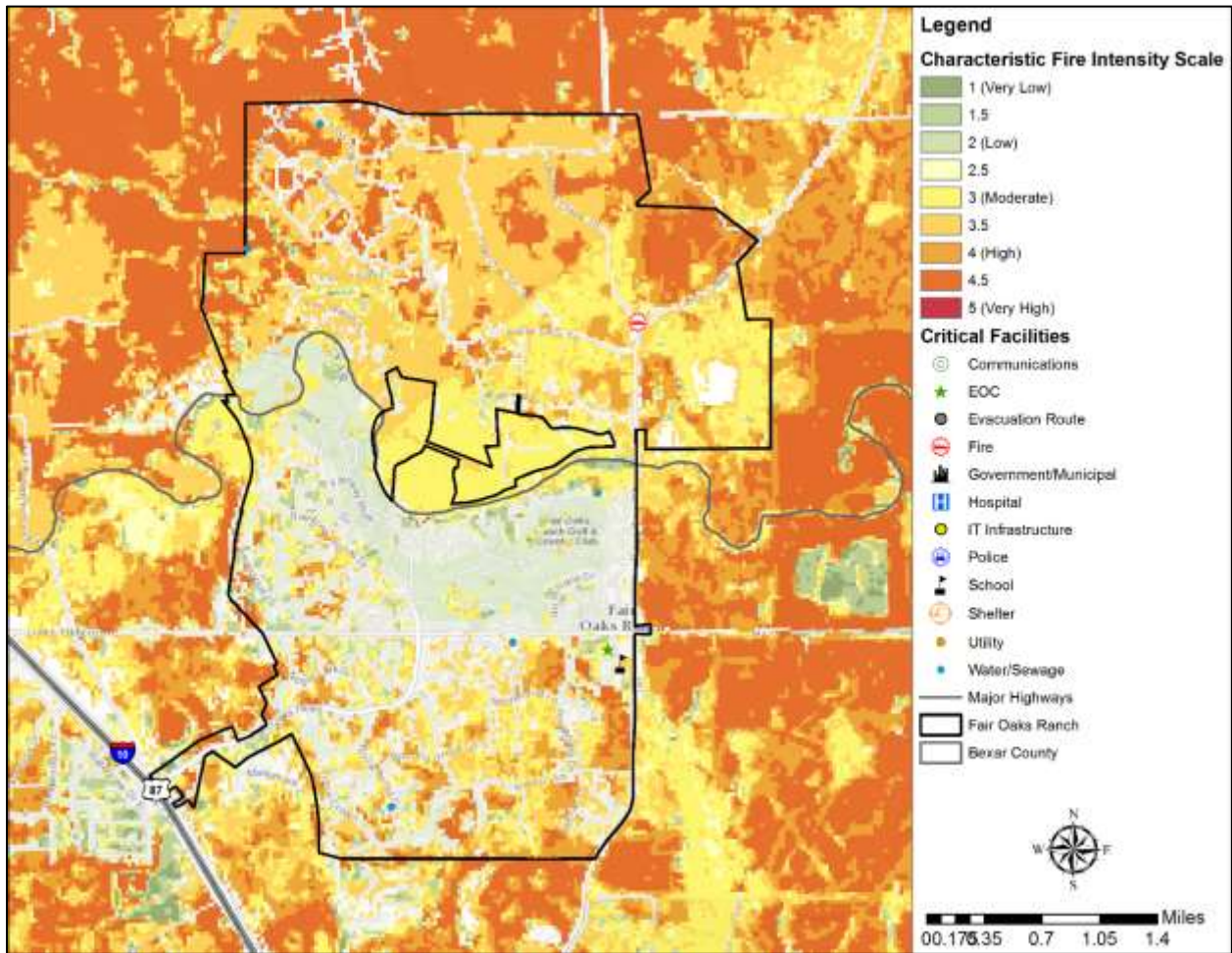
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Figure 11-33. Fire Intensity Scale Map – Elmendorf



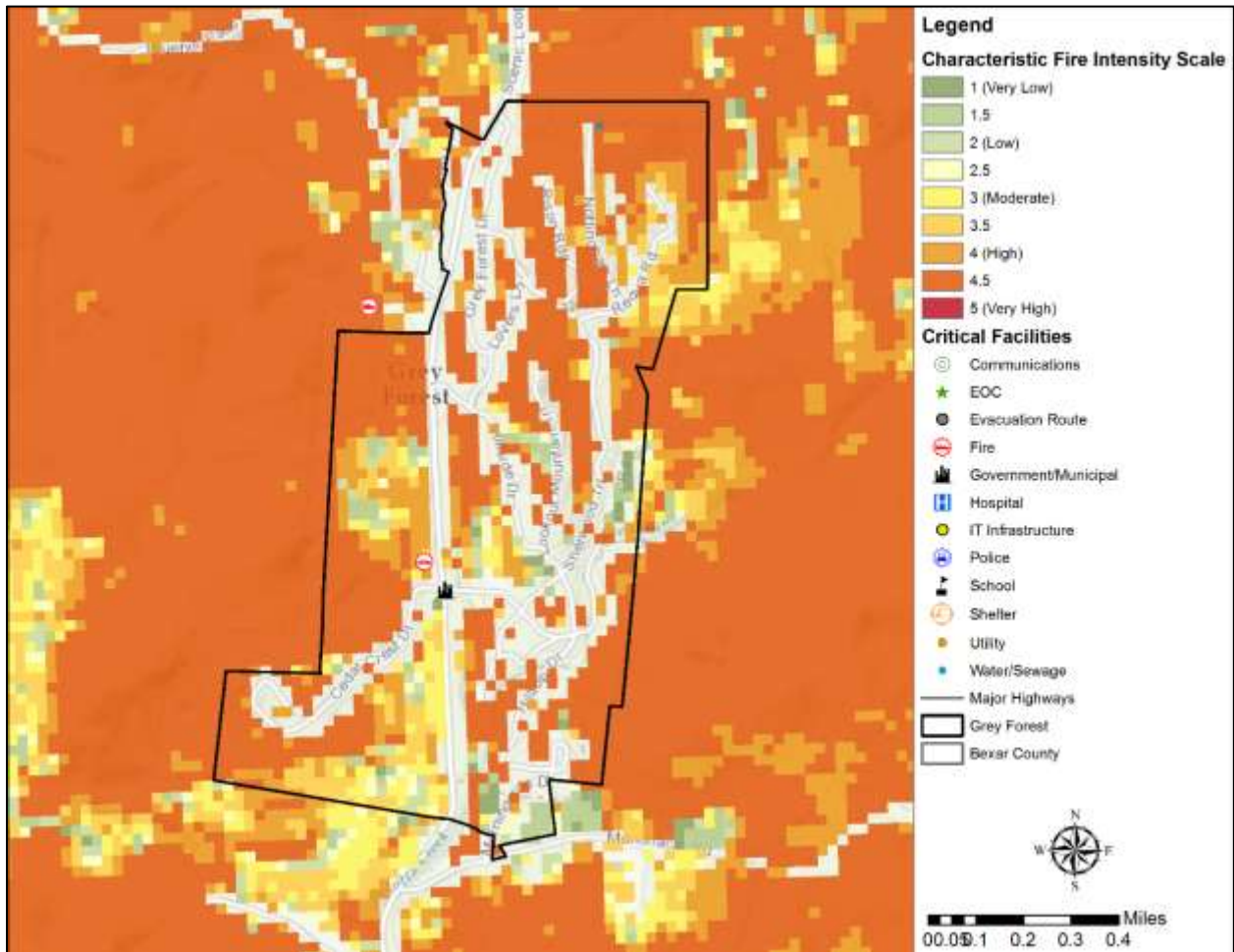
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Figure 11-34. Fire Intensity Scale Map – Fair Oaks Ranch



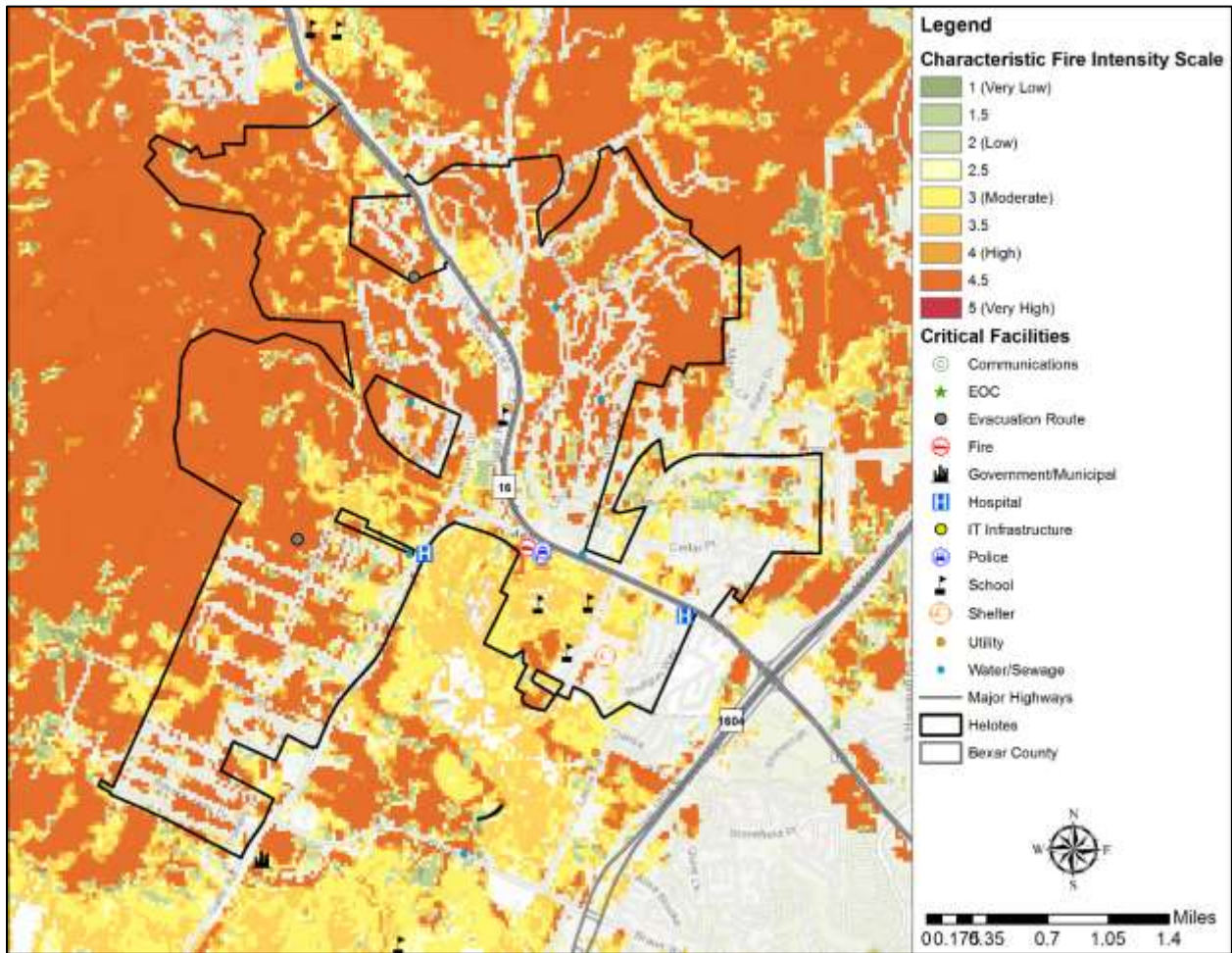
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Figure 11-35. Fire Intensity Scale Map – Grey Forest



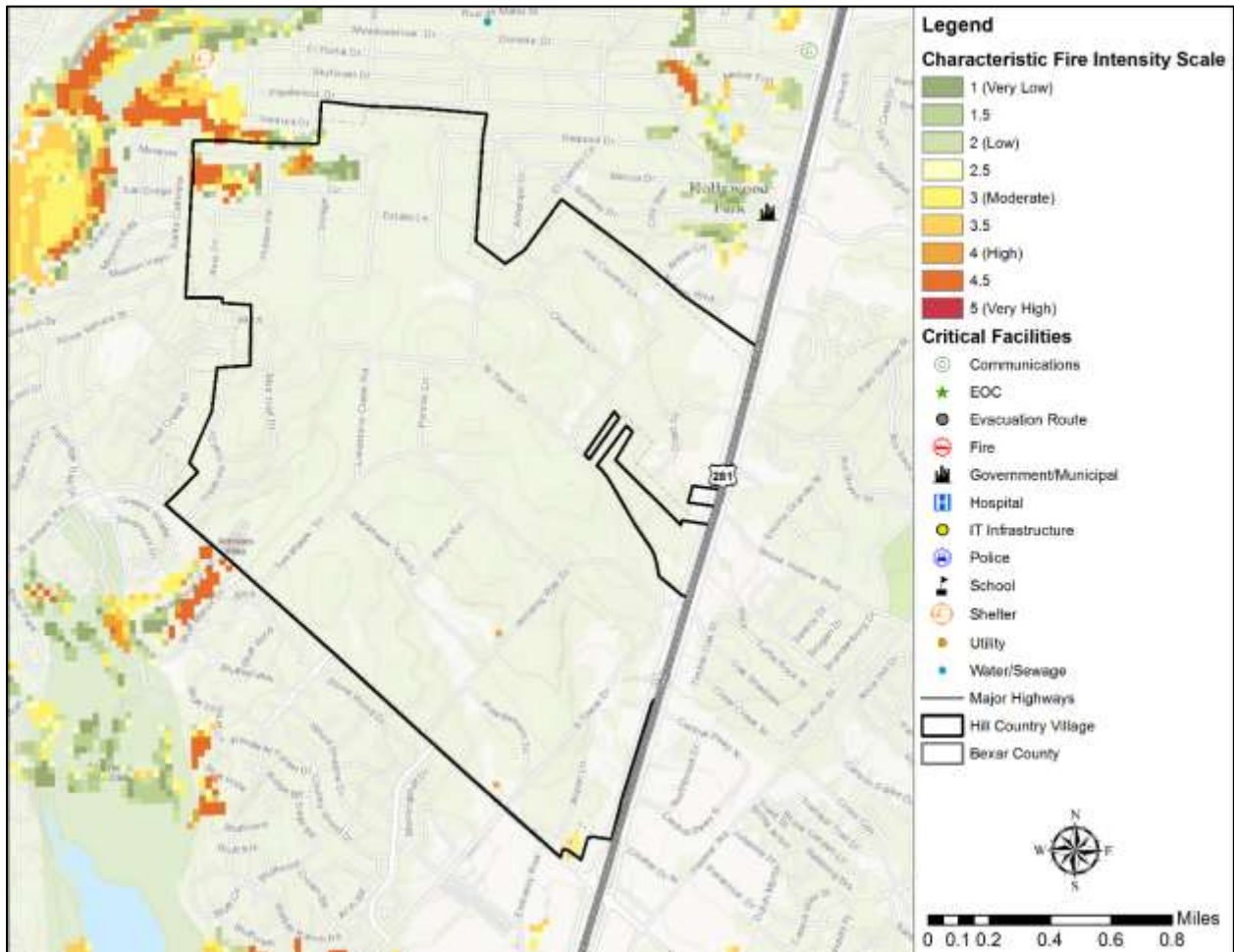
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Figure 11-36. Fire Intensity Scale Map – Helotes



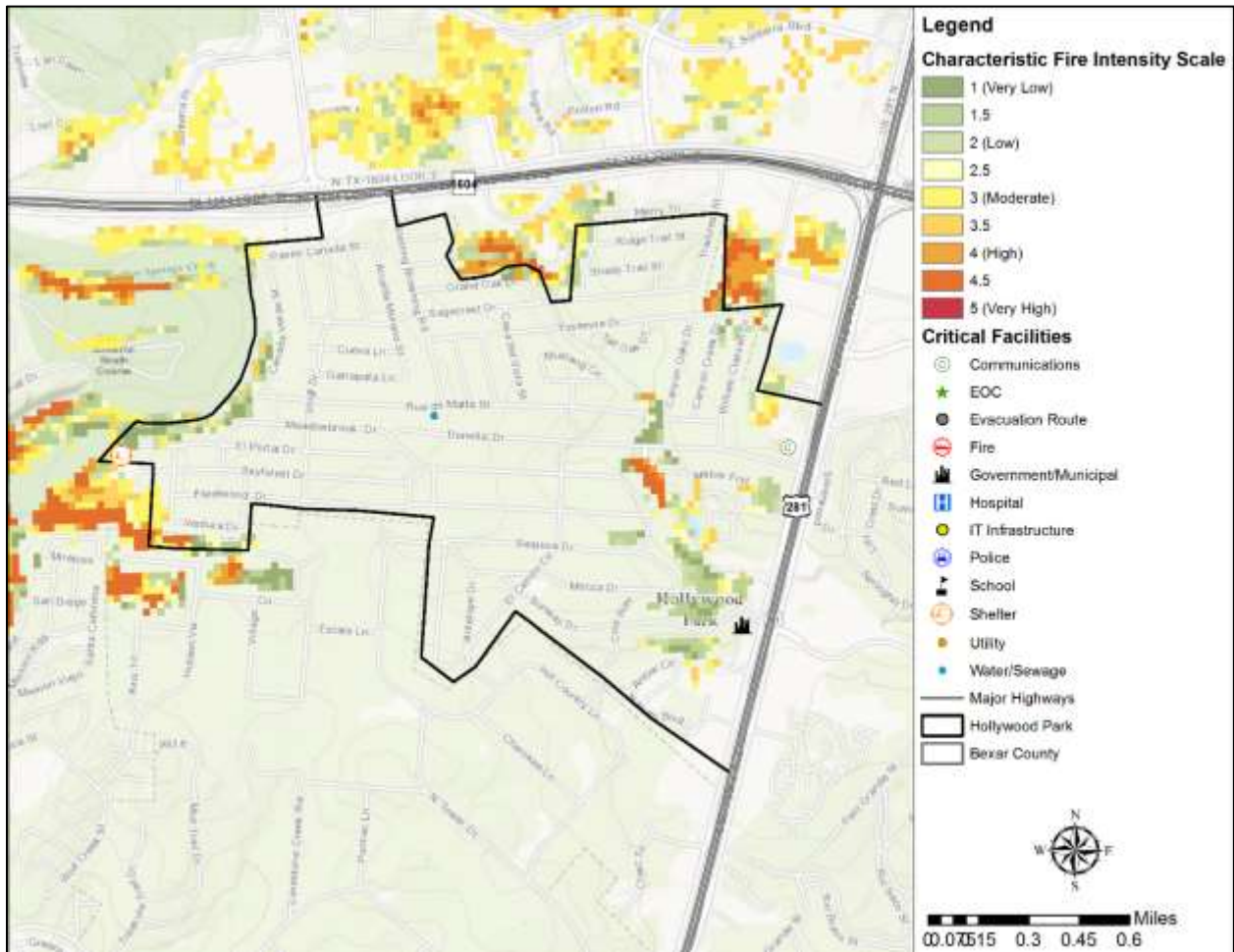
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Figure 11-37. Fire Intensity Scale Map – Hill Country Village



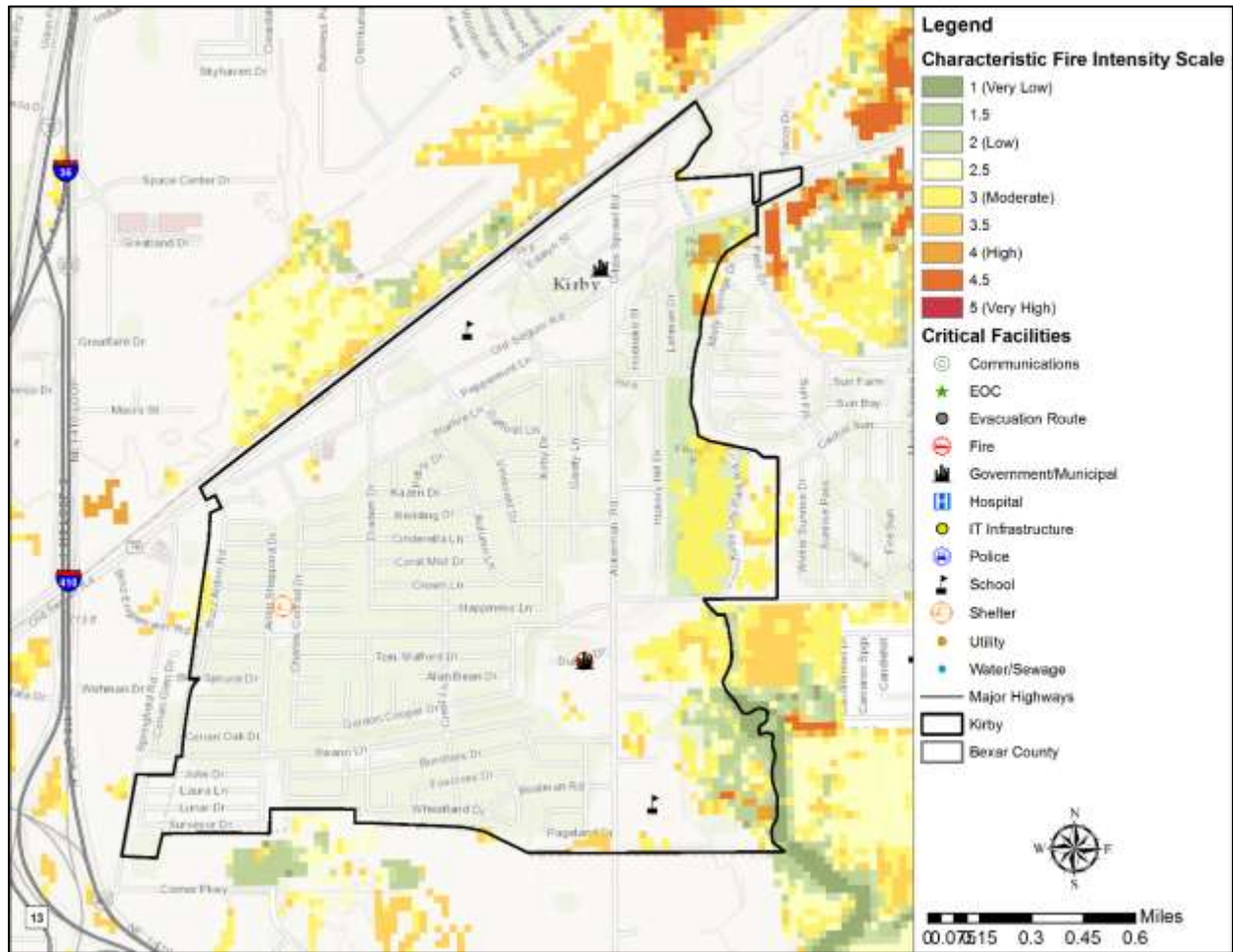
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Figure 11-38. Fire Intensity Scale Map – Hollywood Park



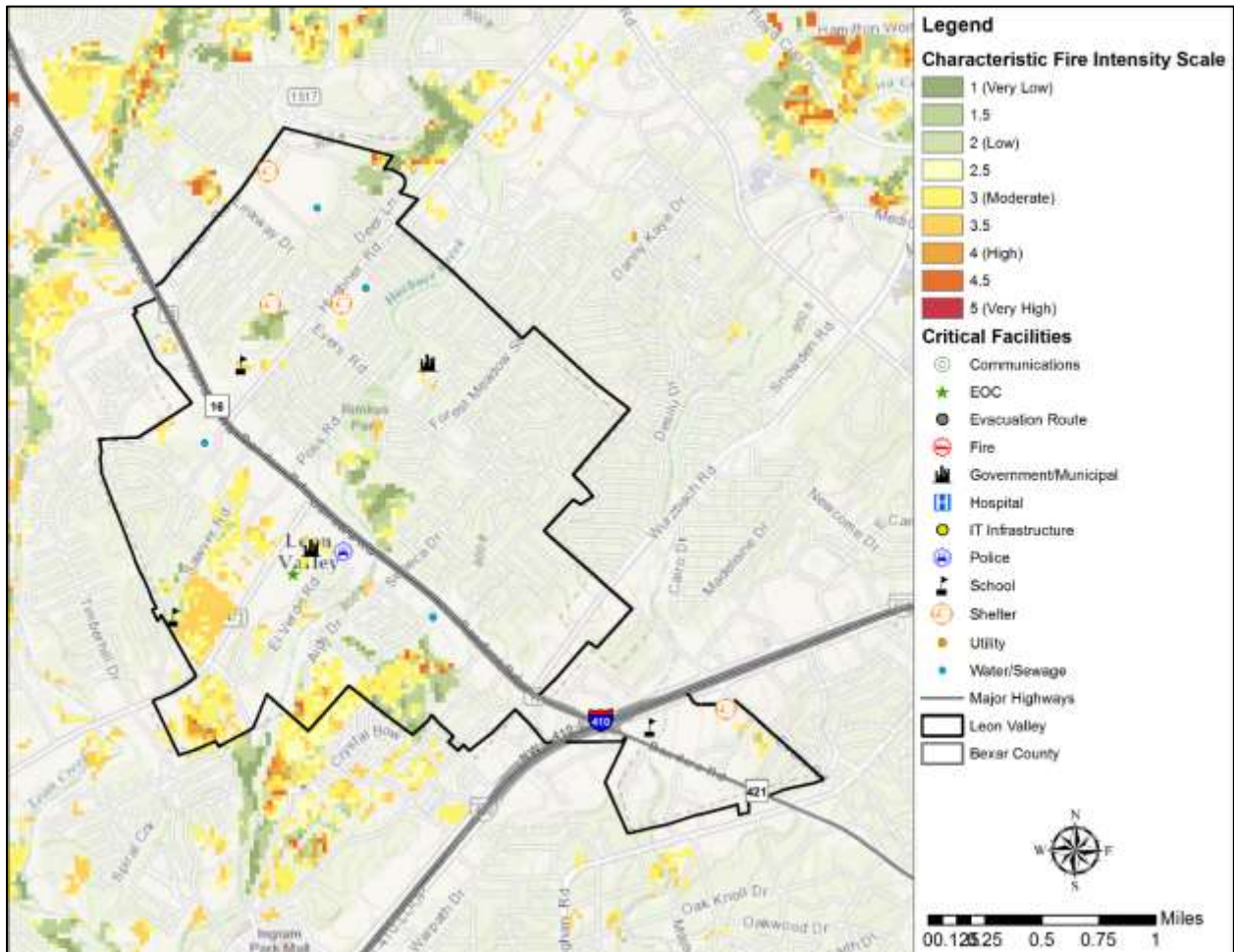
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Figure 11-39. Fire Intensity Scale Map – Kirby



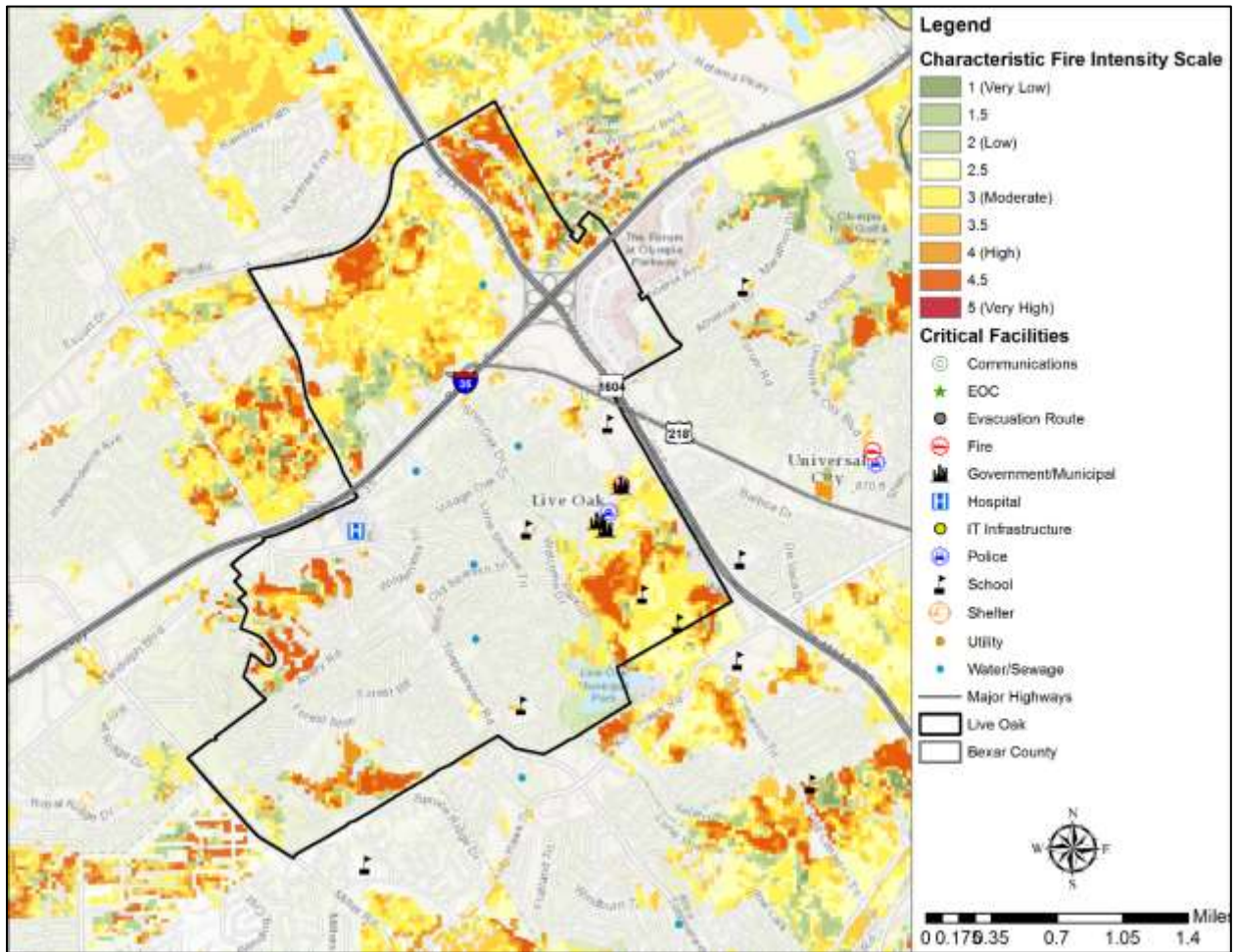
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Figure 11-40. Fire Intensity Scale Map – Leon Valley



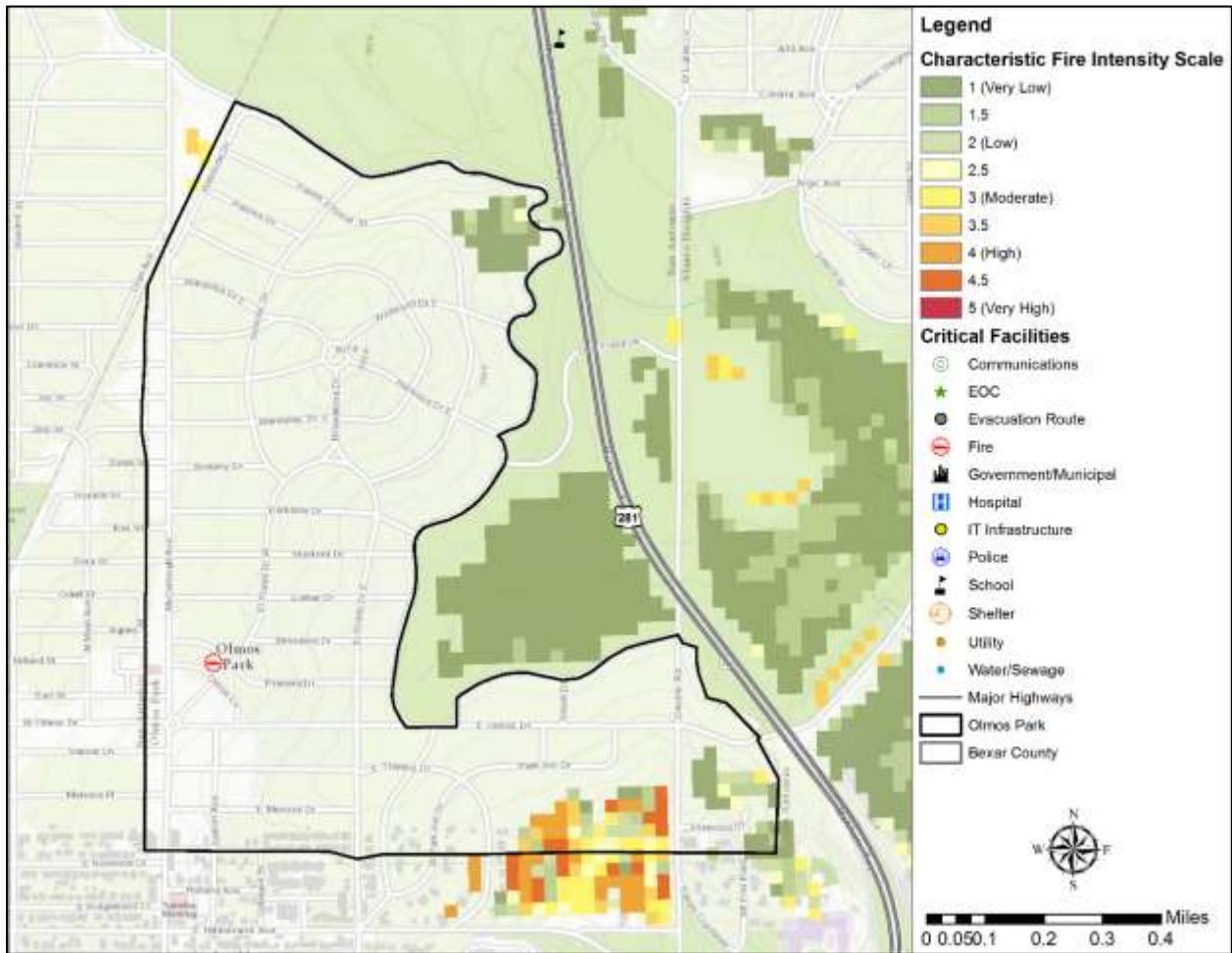
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Figure 11-41. Fire Intensity Scale Map – Live Oak



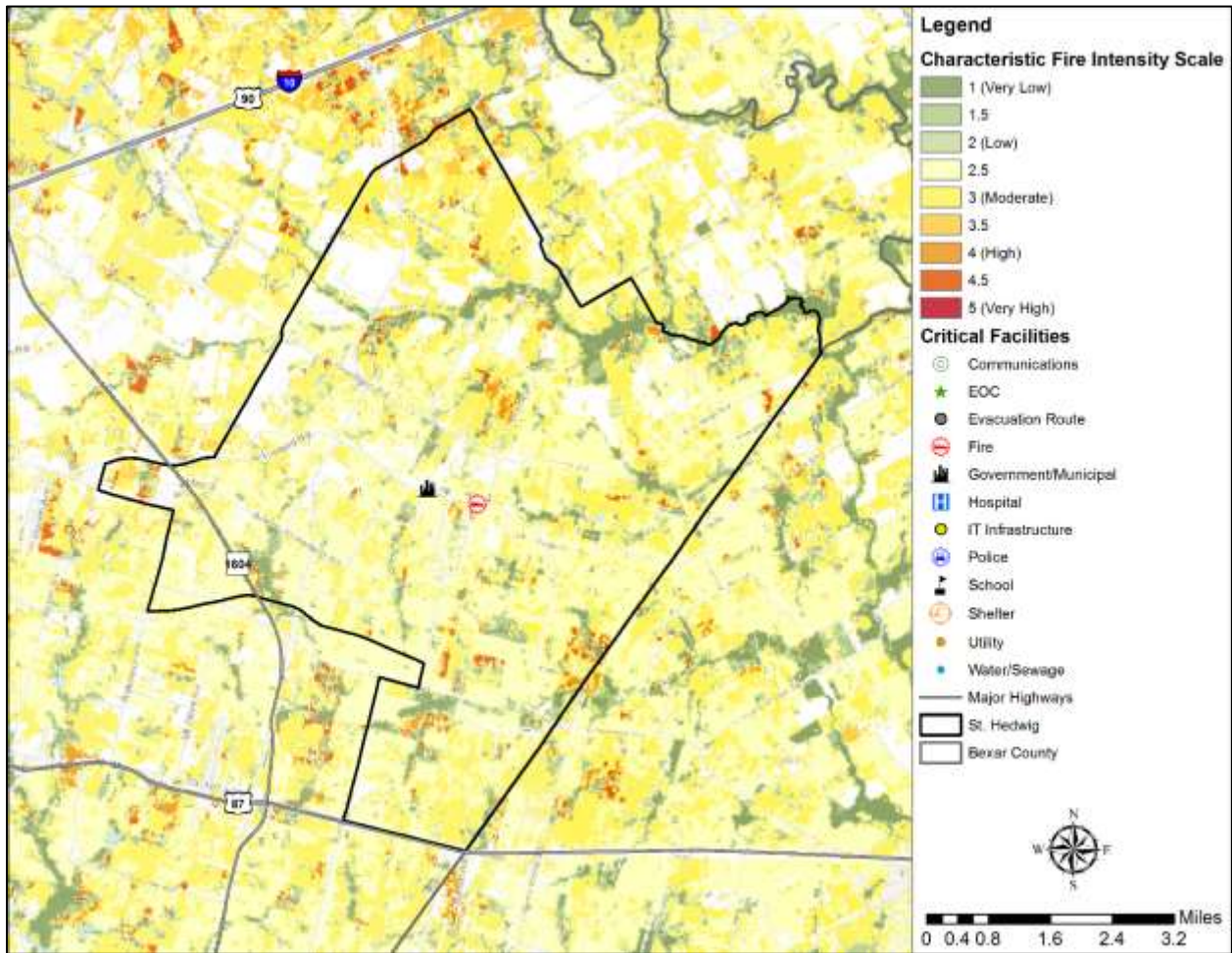
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Figure 11-42. Fire Intensity Scale Map – Olmos Park



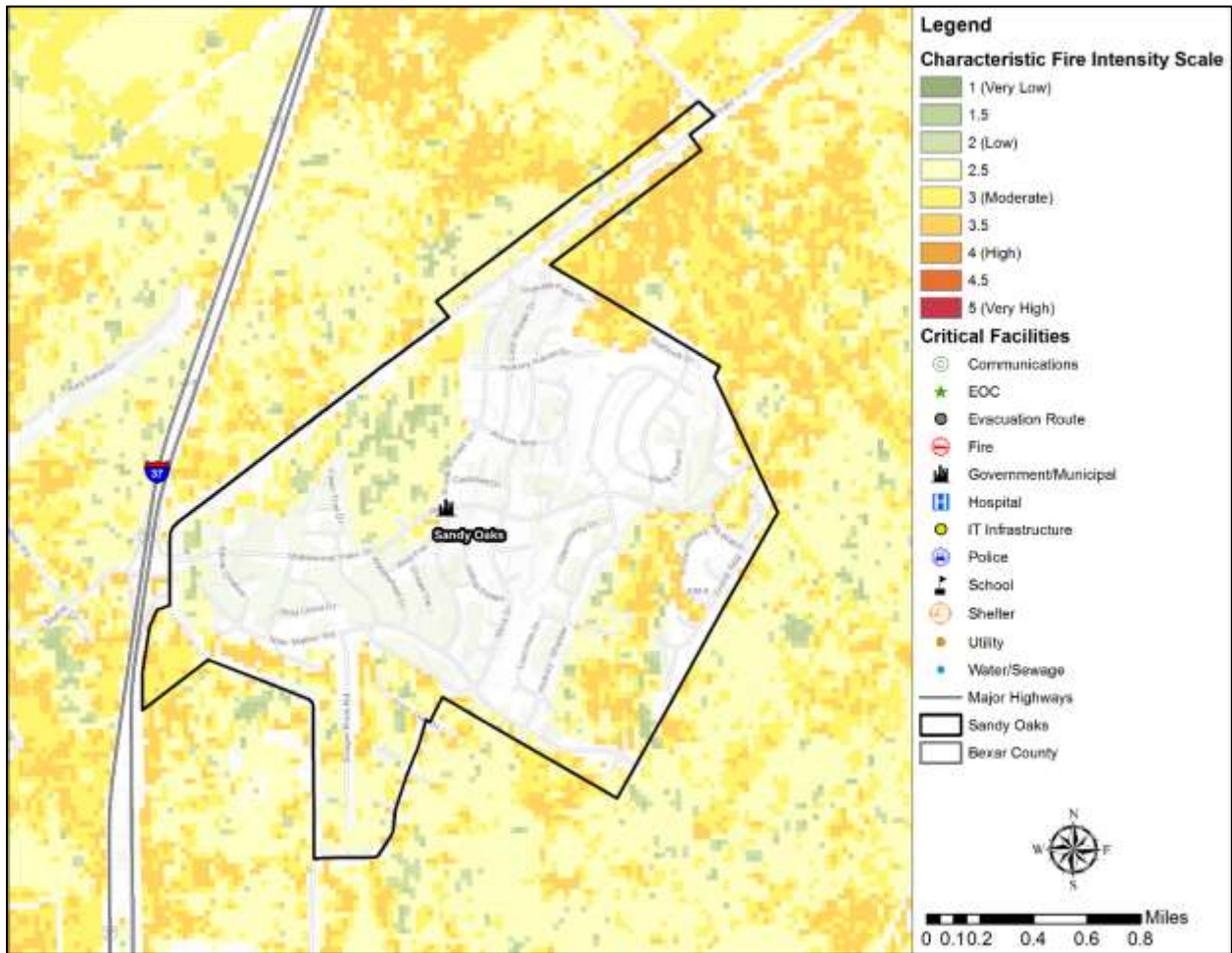
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Figure 11-43. Fire Intensity Scale Map – Saint Hedwig



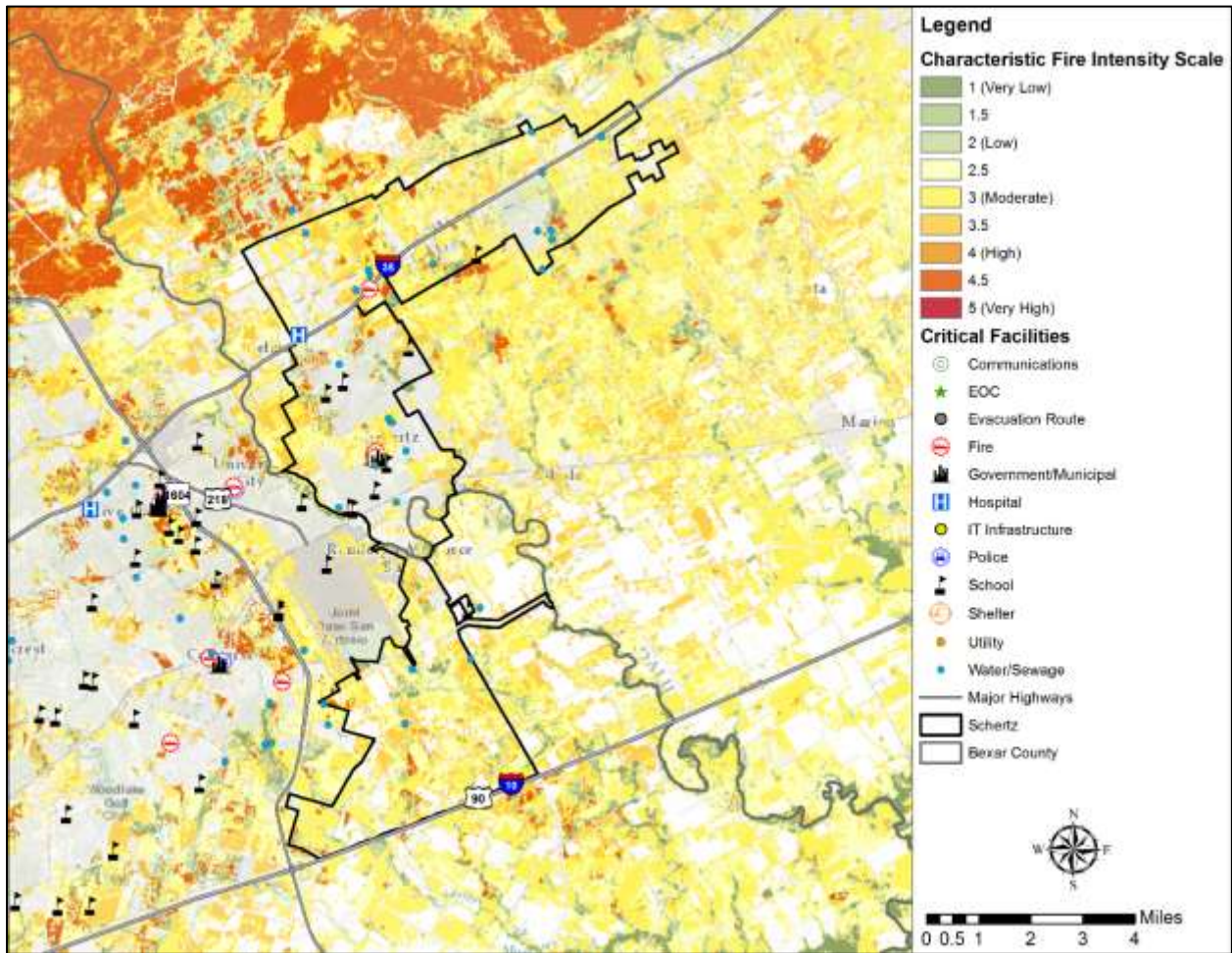
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Figure 11-44. Fire Intensity Scale Map – Sandy Oaks



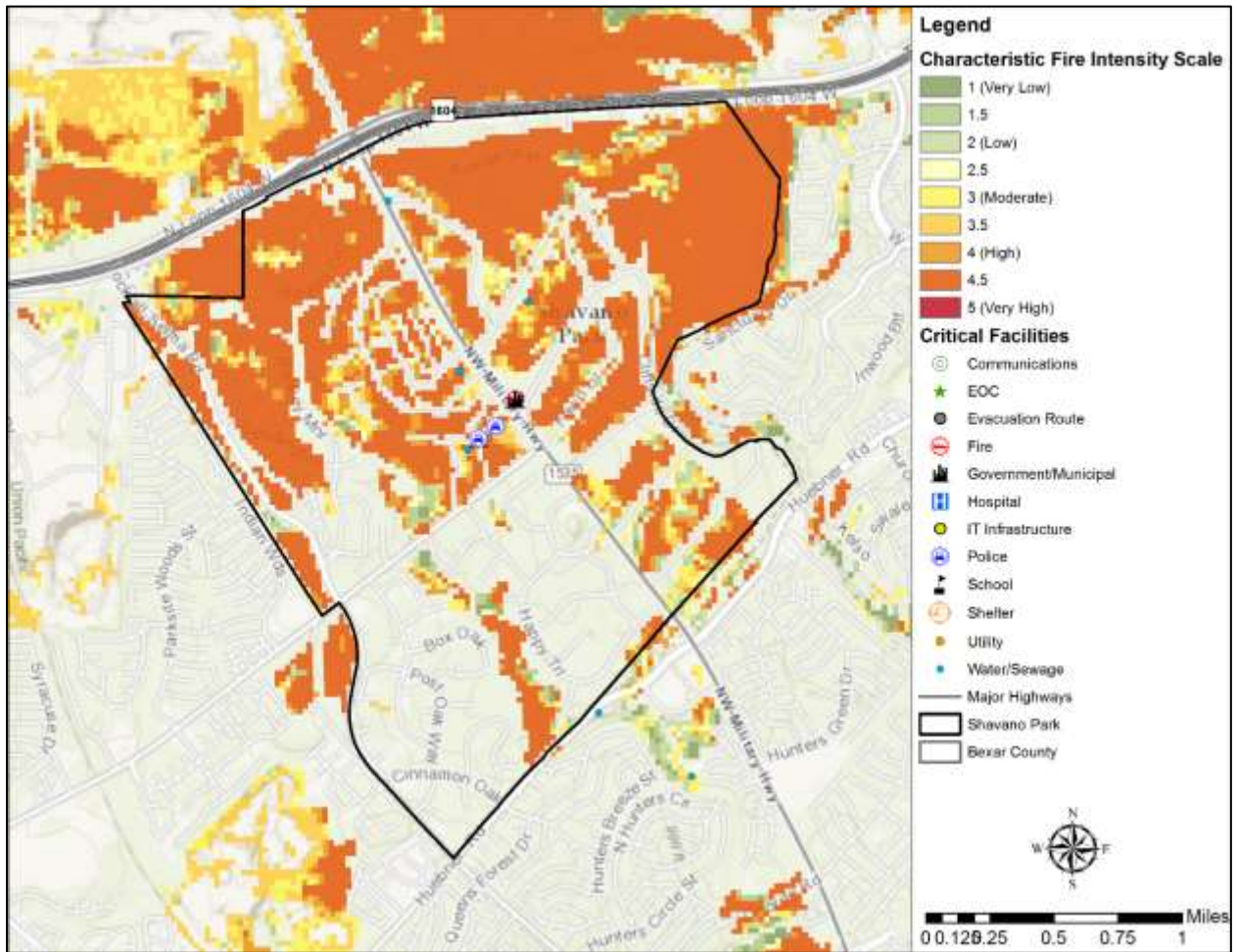
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Figure 11-45. Fire Intensity Scale Map – Schertz



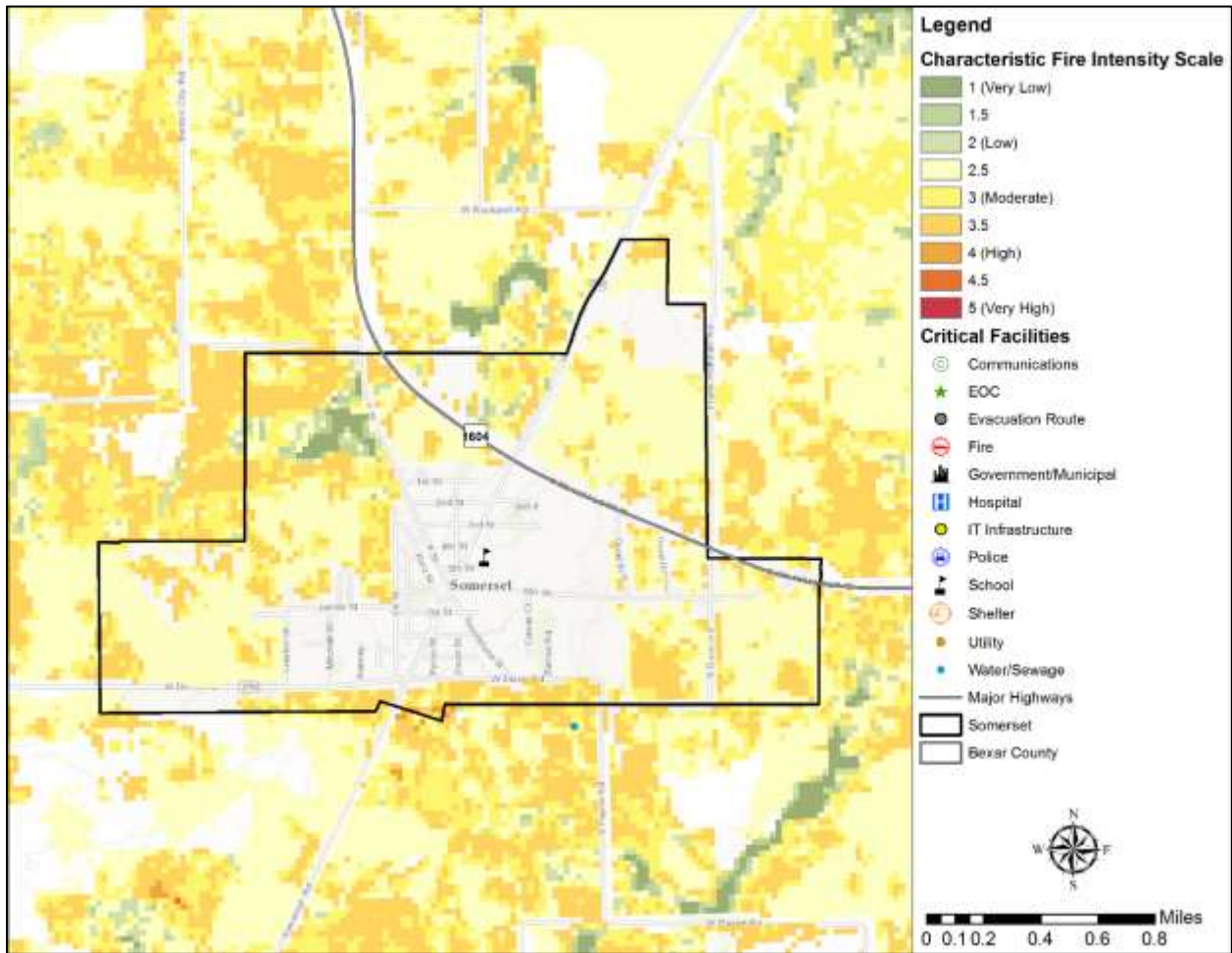
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Figure 11-46. Fire Intensity Scale Map – Shavano Park



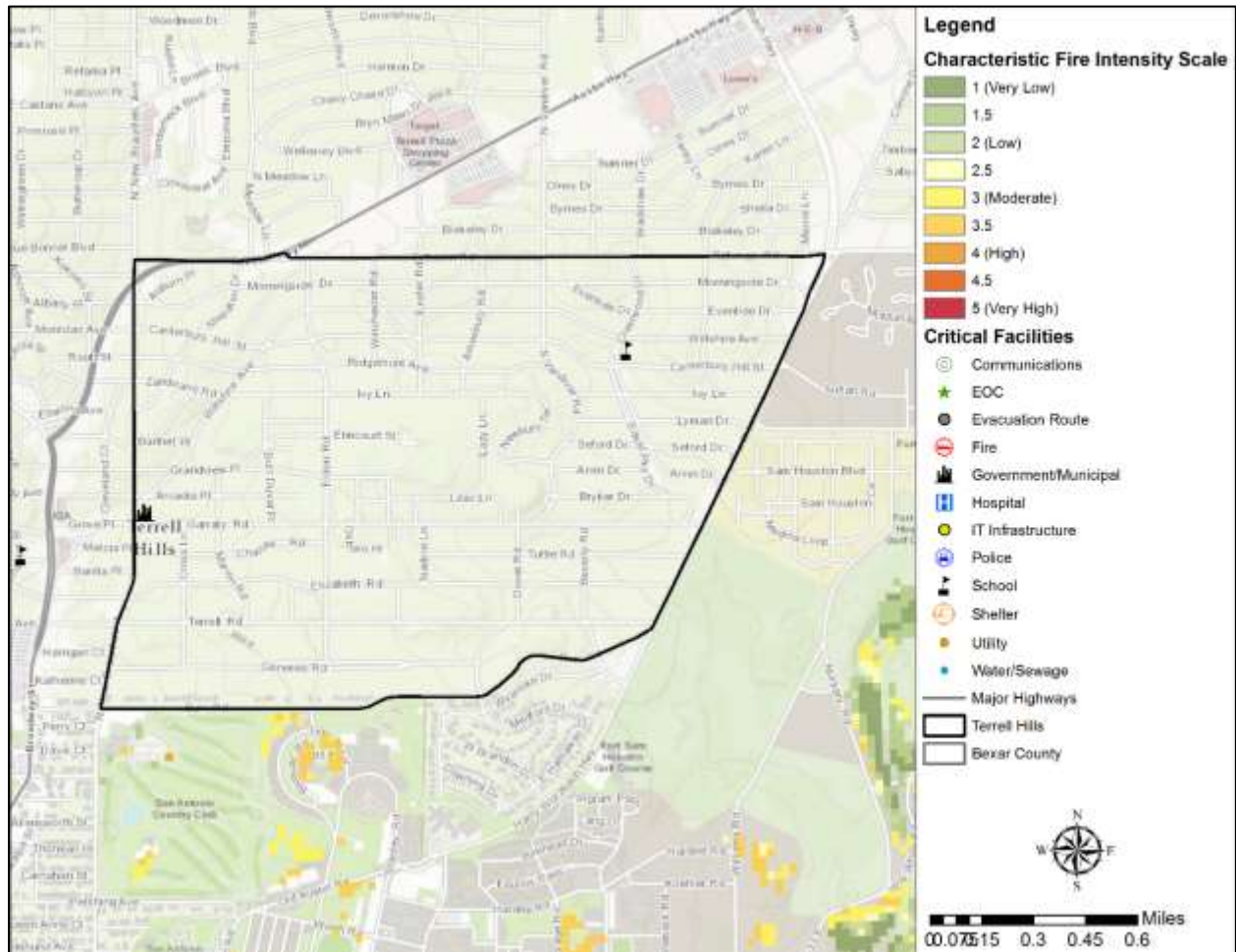
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Figure 11-47. Fire Intensity Scale Map – Somerset



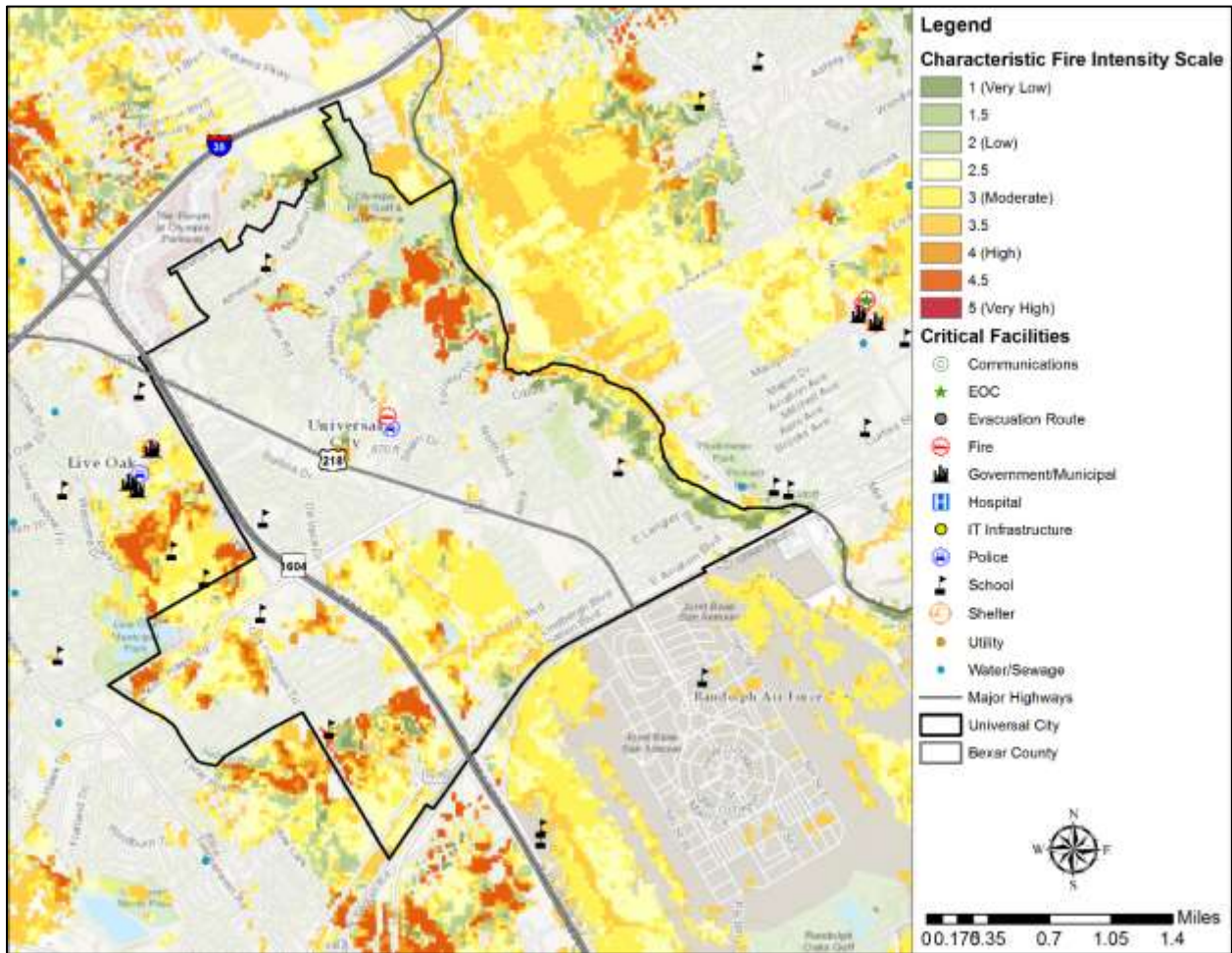
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Figure 11-48. Fire Intensity Scale Map – Terrell Hills



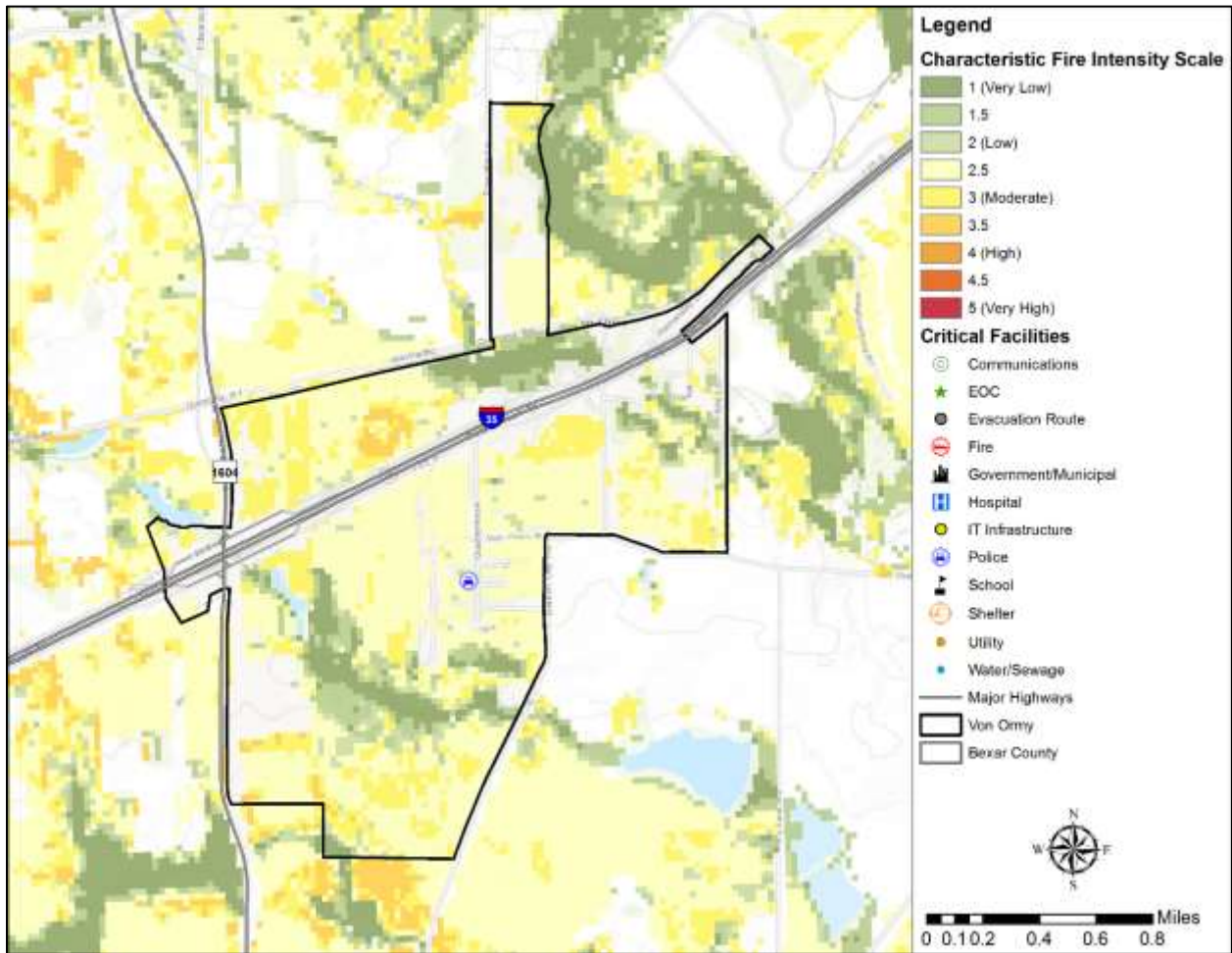
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Figure 11-49. Fire Intensity Scale Map – Universal City



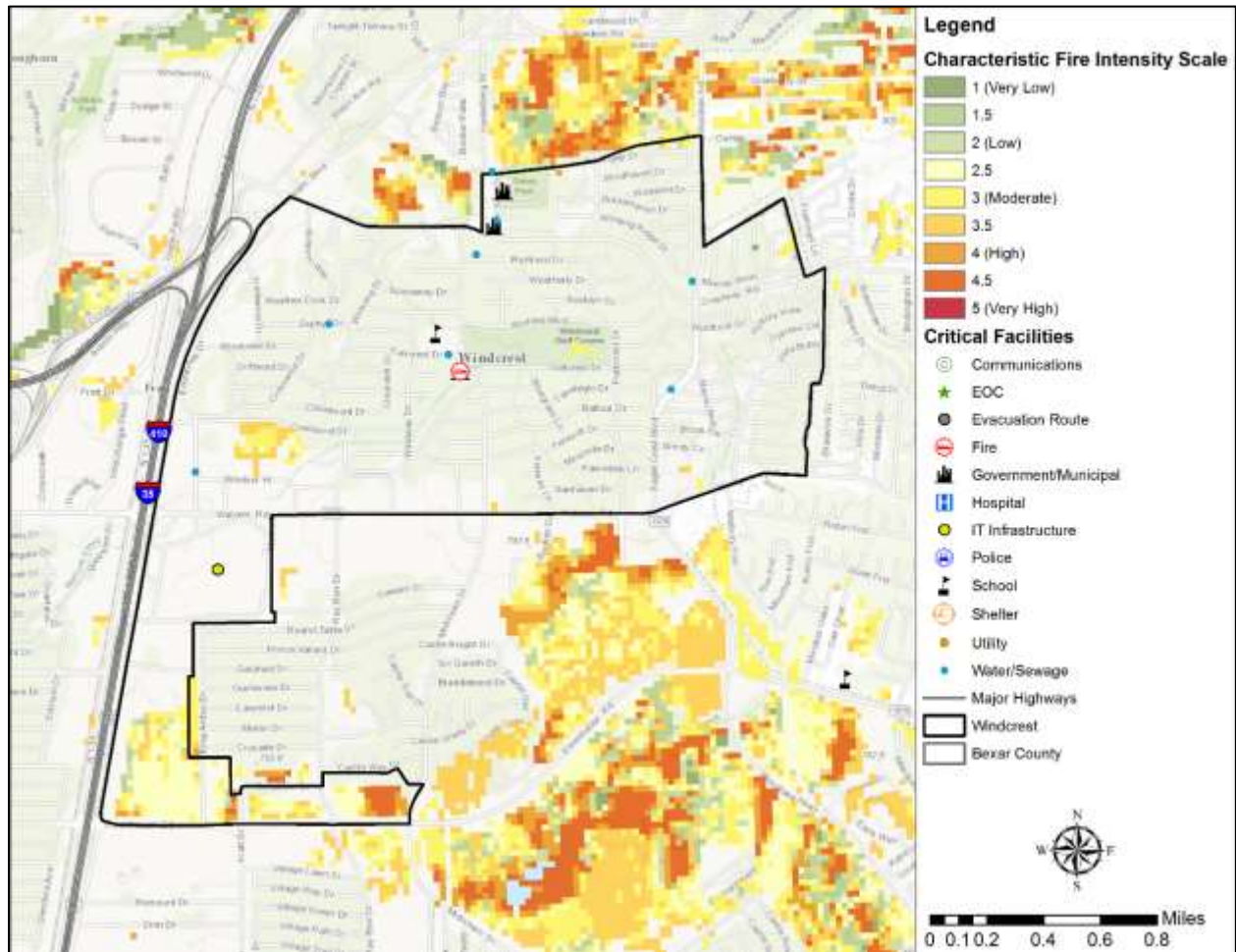
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Figure 11-50. Fire Intensity Scale Map – Von Ormy



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Figure 11-51. Fire Intensity Scale Map – Windcrest



Historical Occurrences

The Texas Forest Service reported 1,840 wildfire events between 2005 and 2015. The Texas Forest Service (TFS) started collecting wildfire data in 1985 and volunteer fire departments started reporting events after 2005. Due to a lack of recorded data for wildfire events prior to 2005, frequency calculations are based on an eleven-year period, only using data from recorded years. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 11-52). Table 11-1 identifies the number of wildfires by jurisdiction, and total acreage burned. Table 11-2 identifies the acreage of suppresses wildfire by jurisdiction and year.

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Figure 11-52. Location and Historic Wildfire Events for Bexar County

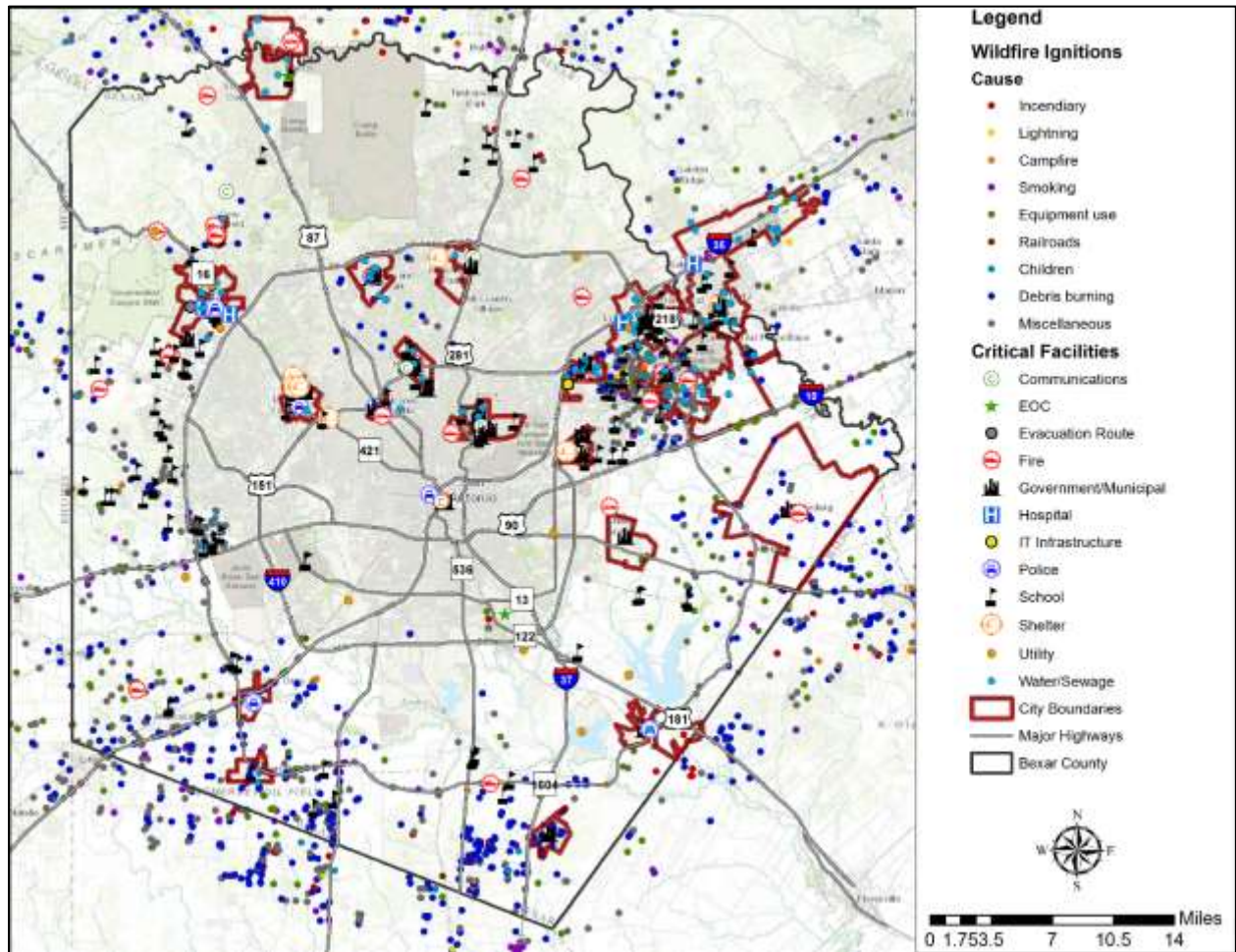


Table 11-1. Historical Wildfire Events Summary

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Bexar County	1,549	14,088
Alamo Heights	0	0
Balcones Heights	0	0
Castle Hills	1	0
China Grove	1	0
Converse	69	233
Elmendorf	6	33
Fair Oaks Ranch	1	25
Grey Forest	1	0

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JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Helotes	0	0
Hill Country Village	1	10
Hollywood Park	0	0
Kirby	6	9
Leon Valley	2	0
Live Oak	6	13
Olmos Park	0	0
Saint Hedwig	41	424
Sandy Oaks	35	27
Schertz	37	249
Shavano Park	6	90
Somerset	31	106
Terrell Hills	0	0
Universal City	21	29
Von Ormy	19	24
Windcrest	7	0

Table 11-2. Acreage of Suppressed Wildfire by Year

JURISDICTION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bexar County	982	1,192	799	2,022	3,100	174	3,969	1,118	338	373	21
Alamo Heights	0	0	0	0	0	0	0	0	0	0	0
Balcones Heights	0	0	0	0	0	0	0	0	0	0	0
Castle Hills	0	0	0	0	0	0	0	0	0	0	0
China Grove	1	0	0	0	0	0	0	0	0	0	0
Converse	0	114	0	52	7	0	60	0	0	0	0
Elmendorf	0	0	1	0	0	0	28	4	0	0	0
Fair Oaks Ranch	0	0	0	0	0	0	25	0	0	0	0
Grey Forest	0	0	0	0	0	0	0	0	0	0	0

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JURISDICTION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Helotes	0	0	0	0	0	0	0	0	0	0	0
Hill Country Village	0	0	0	10	0	0	0	0	0	0	0
Hollywood Park	0	0	0	0	0	0	0	0	0	0	0
Kirby	0	2	0	0	7	0	0	0	0	0	0
Leon Valley	0	0	0	0	0	0	0	0	0	0	0
Live Oak	0	2	0	1	5	0	5	0	0	0	0
Olmos Park	0	0	0	0	0	0	0	0	0	0	0
Saint Hedwig	98	5	15	0	205	0	101	0	0	0	0
Sandy Oaks	0	2	0	5	0	4	4	4	0	0	0
Schertz	0	3	0	0	7	0	9	208	14	8	0
Shavano Park	0	0	2	3	0	0	85	0	0	0	0
Somerset	4	6	1	6	55	0	34	0	0	0	0
Terrell Hills	0	0	0	0	0	0	0	0	0	0	0
Universal City	0	2	0	0	1	0	11	4	1	0	10
Von Ormy	4	4	0	0	15	0	1	0	0	0	0
Windcrest	0	0	0	0	1	0	0	0	0	0	0

Probability of Future Events

Wildfires can occur at any time of the year. As the jurisdictions within the County move into wildland, the potential area of occurrence of wildfire increases. With 1,840 events in an 11 year period, an event within Bexar County, including all participating jurisdictions, is highly likely, meaning an event is probable within the next year.

Vulnerability and Impact

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Areas along railroads and people whose homes are in woodland settings have an increased risk of being affected by wildfire.

The heavily populated urban areas of Bexar County are not likely to experience large and sweeping fires. Areas outside of city limits and in the unincorporated areas of Bexar County are vulnerable. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located mostly along the perimeter of the study area where wildland and urban areas

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interface. Figures 11-1 through 11-25 (above) illustrate the areas that are the most vulnerable to wildfire throughout the County.

The sparsely populated unincorporated areas of Dowling and Viterbo are capable of experiencing large sweeping fires, especially where areas of vegetation are not maintained. Areas along major highways in Cheek and China, as well as Bexar County, have an increased vulnerability where empty lots and unoccupied areas are located.

The following critical facilities (Table 11-3) are located in the WUI and are more susceptible to wildfire in each participating jurisdiction:

Table 11-3. Critical Facilities Located in WUI by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	EOC, 3 Power Stations, Public Works Facility, 10 Fire Stations, 40 Schools
Alamo Heights	Post Office, School, 3 Water/Sewer Facilities
Balcones Heights	None
Castle Hills	School
China Grove	City Hall/Fire Station (same location)
Converse	Fire Station, Water/Sewer Facilities
Elmendorf	Police Station, Water Department, Church
Fair Oaks Ranch	Police Station, Fire Station, School, 5 Water/Sewer Facilities (including water treatment plant)
Grey Forest	City Hall/Police Station (same location), Fire Station, Water/Sewer Facility
Helotes	City Hall, 3 Fire Stations, Police Station and Dispatch Center, Shelter, 5 Schools, 6 Water/Sewer Facilities, School Transportation Center, 2 Utility Distribution Centers, Utility Department, Radio Tower, Hospital, Evacuation Route
Hill Country Village	None
Hollywood Park	Shelter
Kirby	City Hall, Fire Station and Dispatch Center, Public Works Department, 2 Schools
Leon Valley	3 Water/Sewer Facilities, City Dispatch Center
Live Oak	Police Station, 5 Schools/Administrative Buildings, 2 Water/Sewer Facilities
Olmos Park	None
Saint Hedwig	City Hall
Sandy Oaks	City Hall
Schertz	Police/Fire/EMS Station (all one location), Fire Department, 4 Government Buildings, Hospital, 7 Schools, Community Center, 21 Water/Sewer Facilities

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JURISDICTION	CRITICAL FACILITIES
Shavano Park	City Hall, 2 Police Stations, Fire Station, Public Works Department, 4 Water/Sewer Facilities
Somerset	Water/Sewer Facility
Terrell Hills	None
Universal City	Police Station, 4 Schools
Von Ormy	None
Windcrest	2 Government Facilities, Water/Sewer Facility

Within Bexar County, a total of 1,840 fire events were reported from 2005 to 2015. All of these events were suspected wildfires. Historic acreage loss and annualized estimates due to wildfires are presented in Table 11-4 below. The frequency is approximately 167 events every year.

Table 11-4. Historic Loss Estimates Due to Wildfire²

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	ANNUAL ACRE LOSSES
Bexar County	1,549	14,088	1,280.73
Alamo Heights	0	0	0
Balcones Heights	0	0	0
Castle Hills	1	0	0
China Grove	1	1	0.09
Converse	69	233	21.18
Elmendorf	6	33	3
Fair Oaks Ranch	1	25	2.27
Grey Forest	1	0	0
Helotes	0	0	0
Hill Country Village	1	10	0.91
Hollywood Park	0	0	0
Kirby	6	9	0.82
Leon Valley	2	0	0
Live Oak	6	13	1.18

² Events divided by 11 years of data.

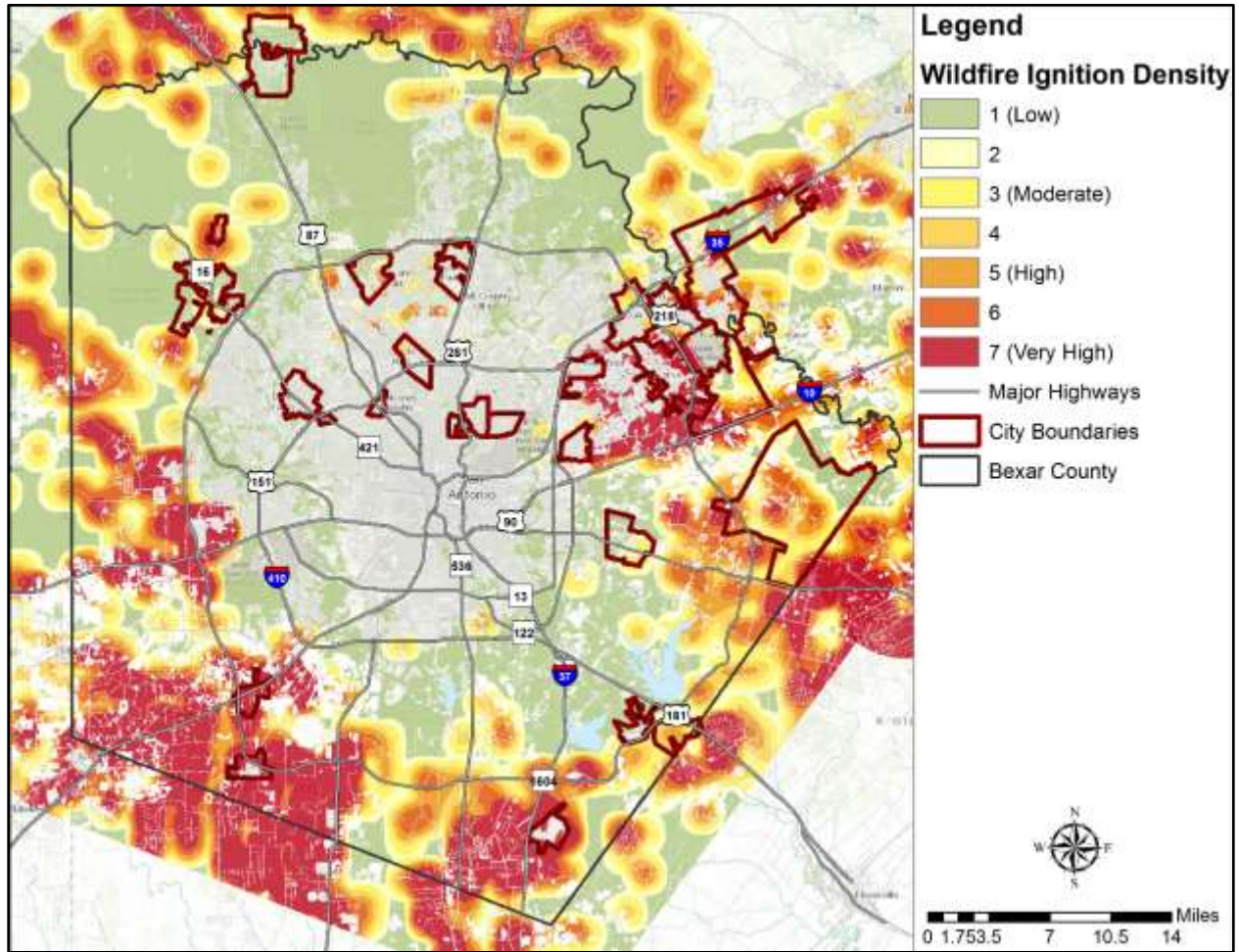
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JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	ANNUAL ACRE LOSSES
Olmos Park	0	0	0
Saint Hedwig	41	424	38.55
Sandy Oaks	35	19	1.73
Schertz	37	249	22.64
Shavano Park	6	90	8.18
Somerset	31	106	9.64
Terrell Hills	0	0	0
Universal City	21	29	2.64
Von Ormy	19	24	2.18
Windcrest	7	1	0.09

Figures 11-53 through 11-77 show Bexar County and the threat of wildfire to the County and participating jurisdictions.

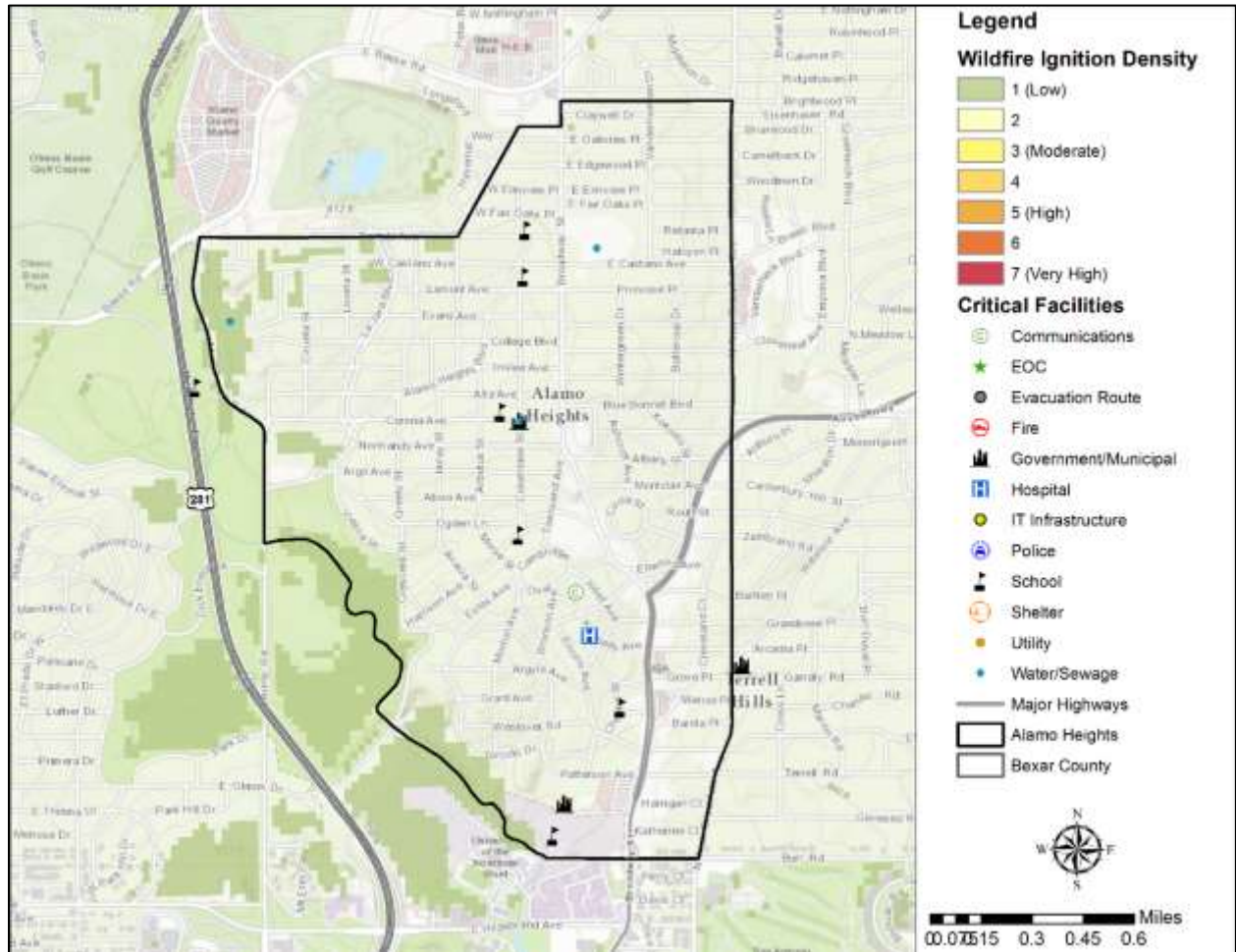
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Figure 11-53. Wildfire Ignition Density – Bexar County



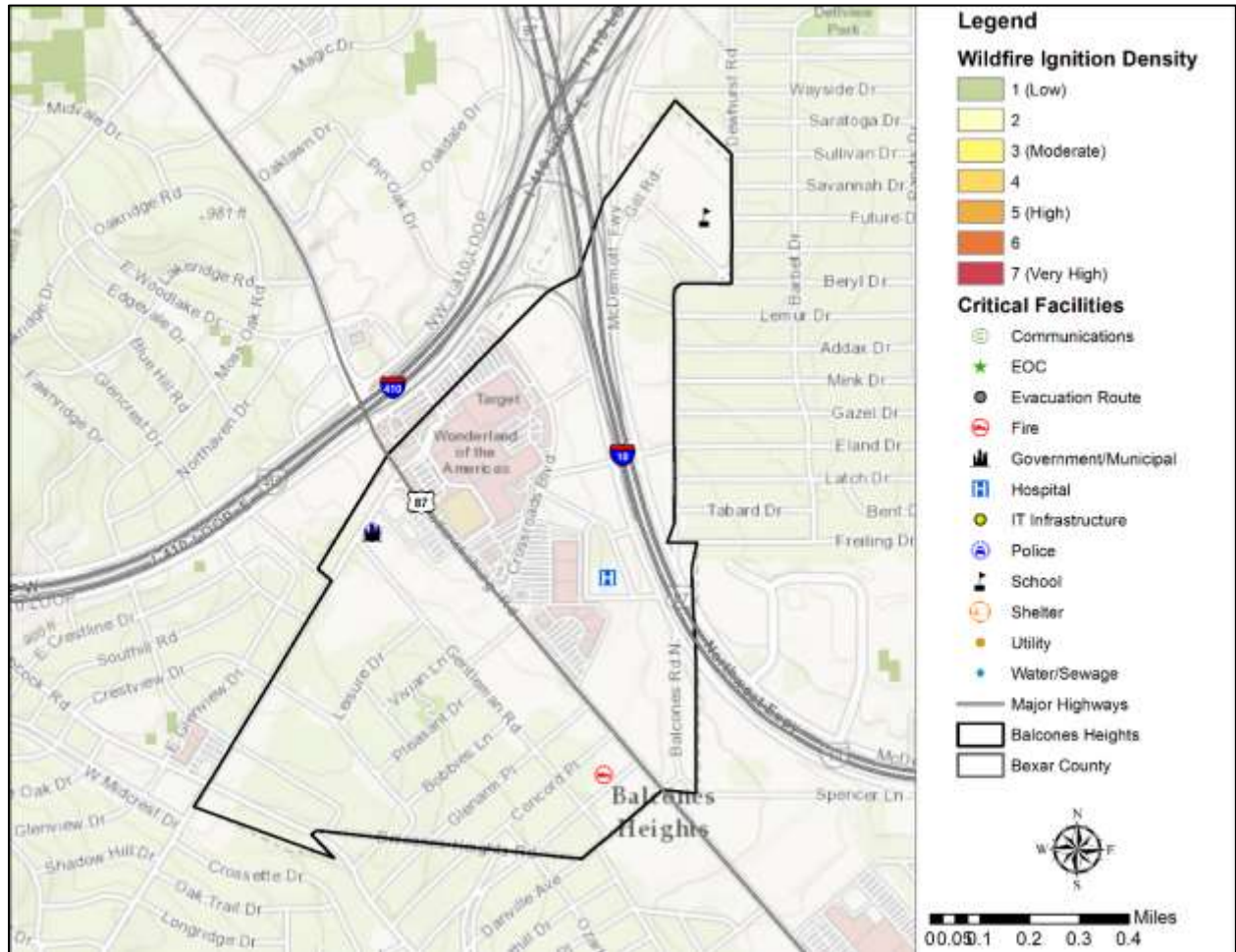
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Figure 11-54. Wildfire Ignition Density – Alamo Heights



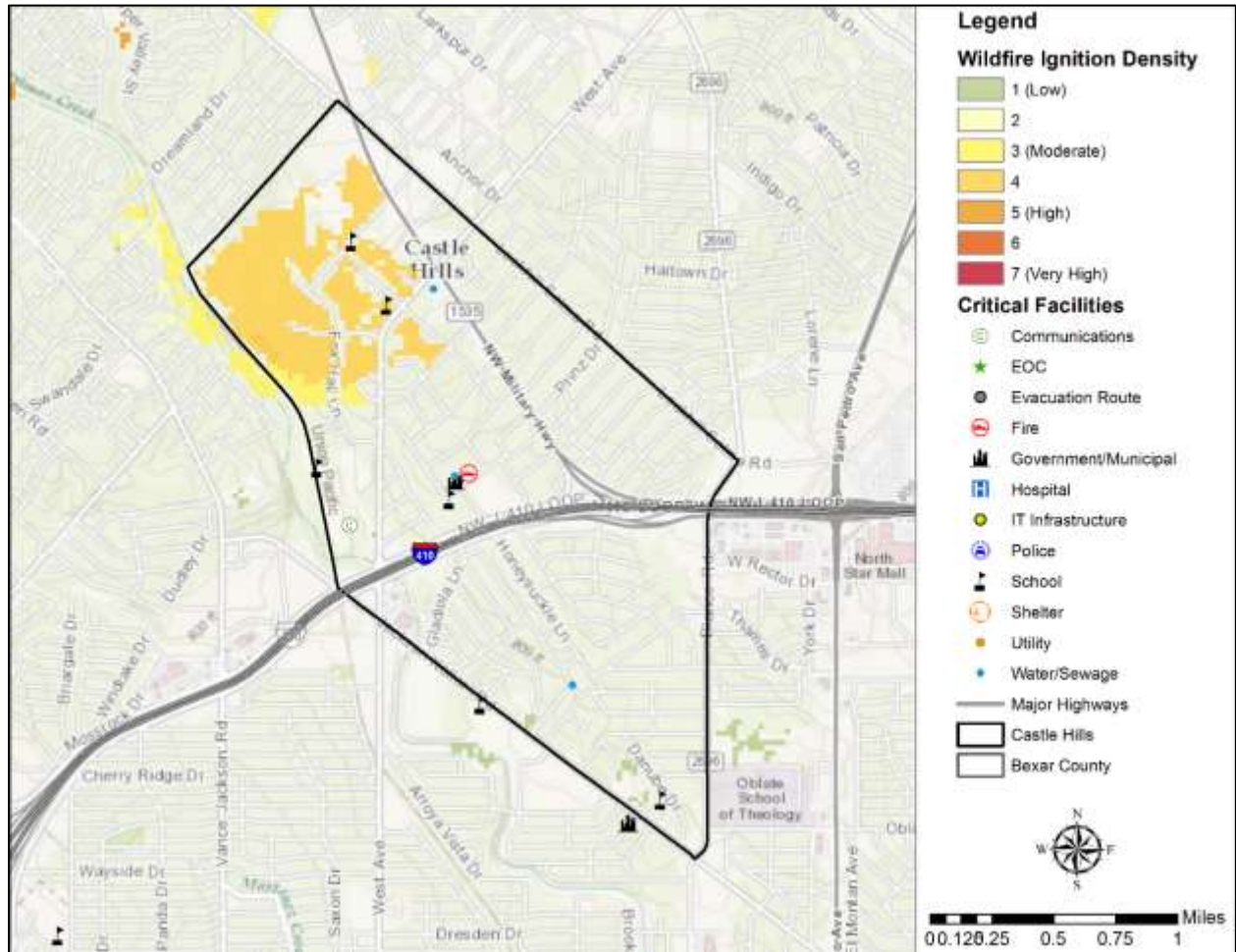
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Figure 11-55. Wildfire Ignition Density – Balcones Heights



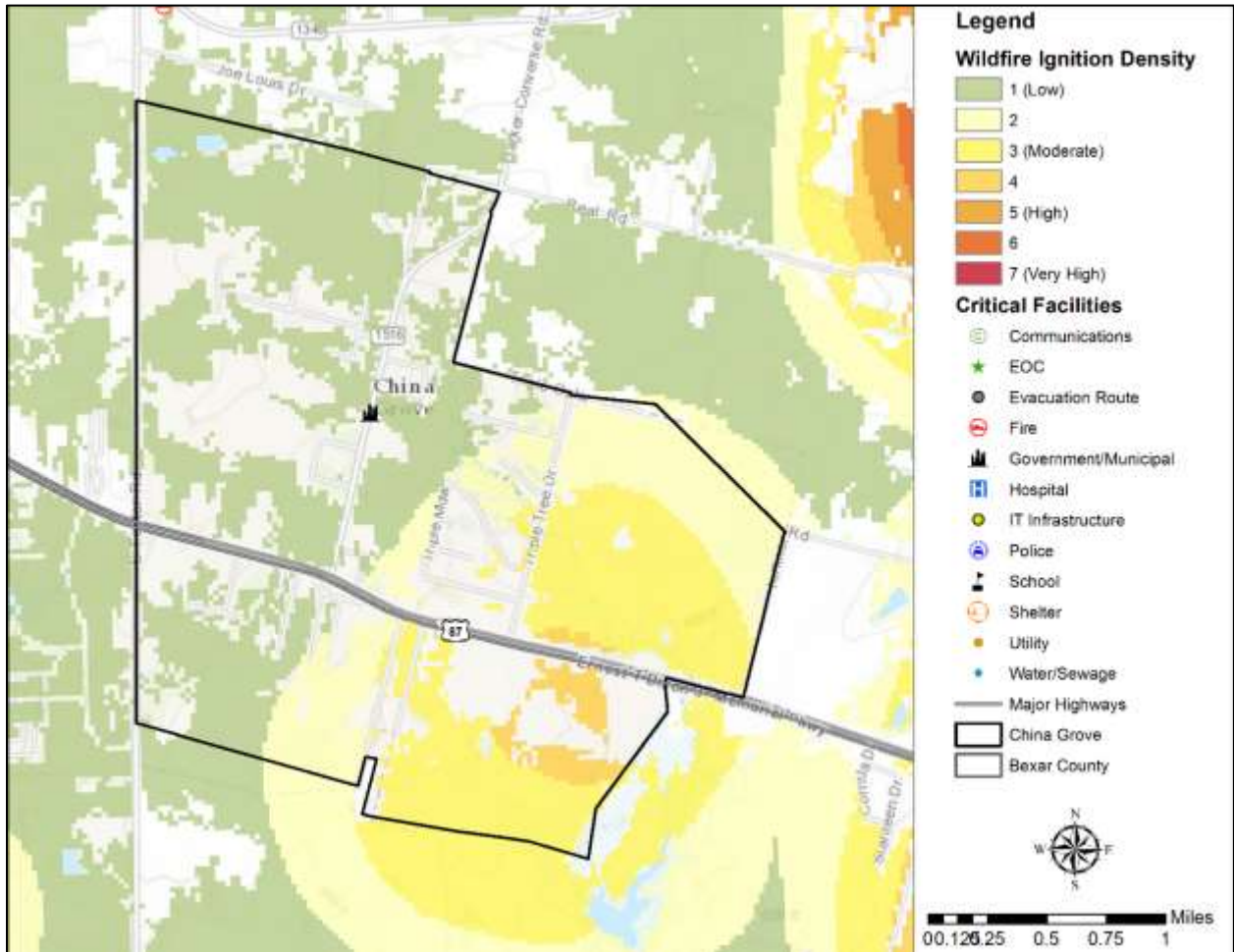
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Figure 11-56. Wildfire Ignition Density – Castle Hills



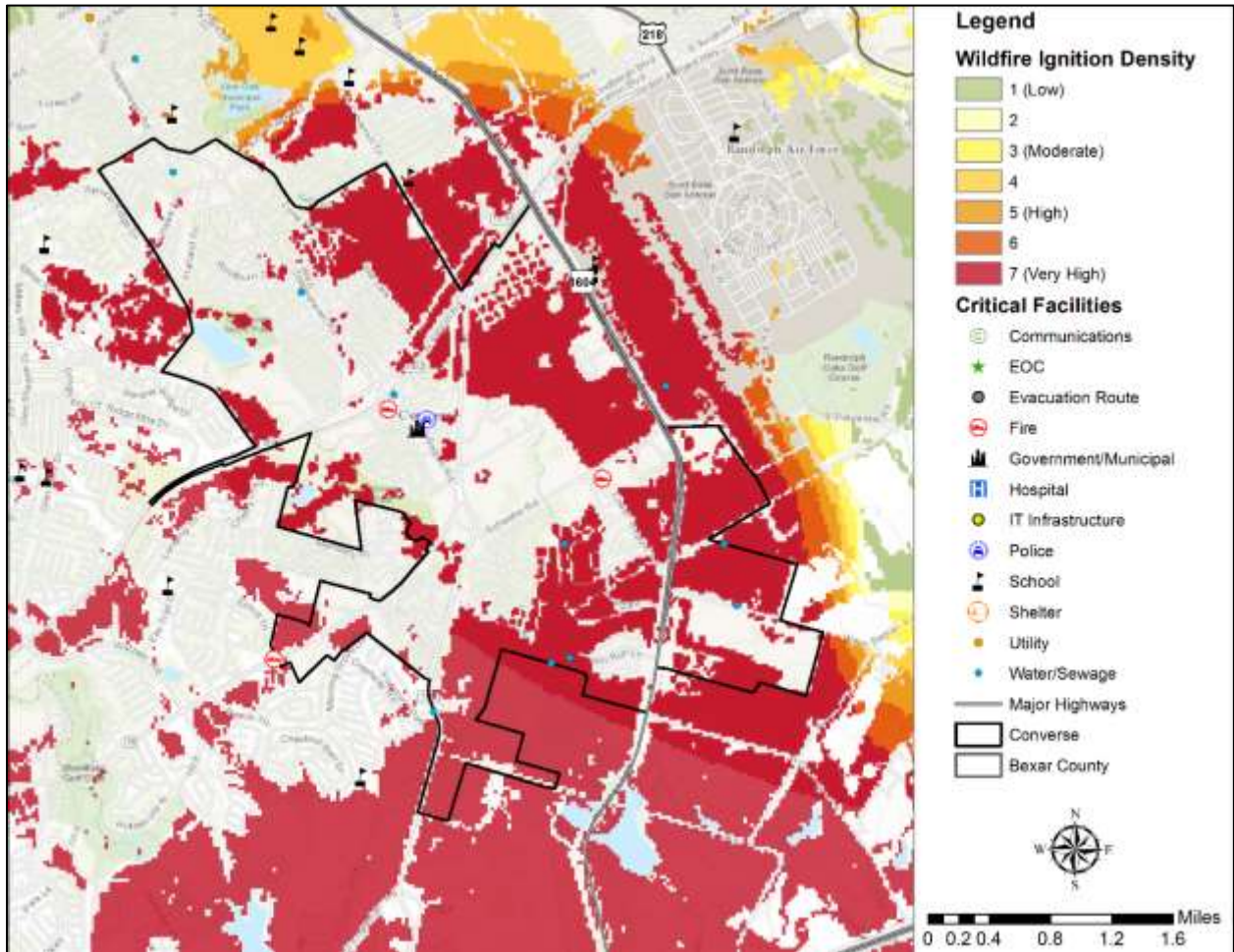
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Figure 11-57. Wildfire Ignition Density – China Grove



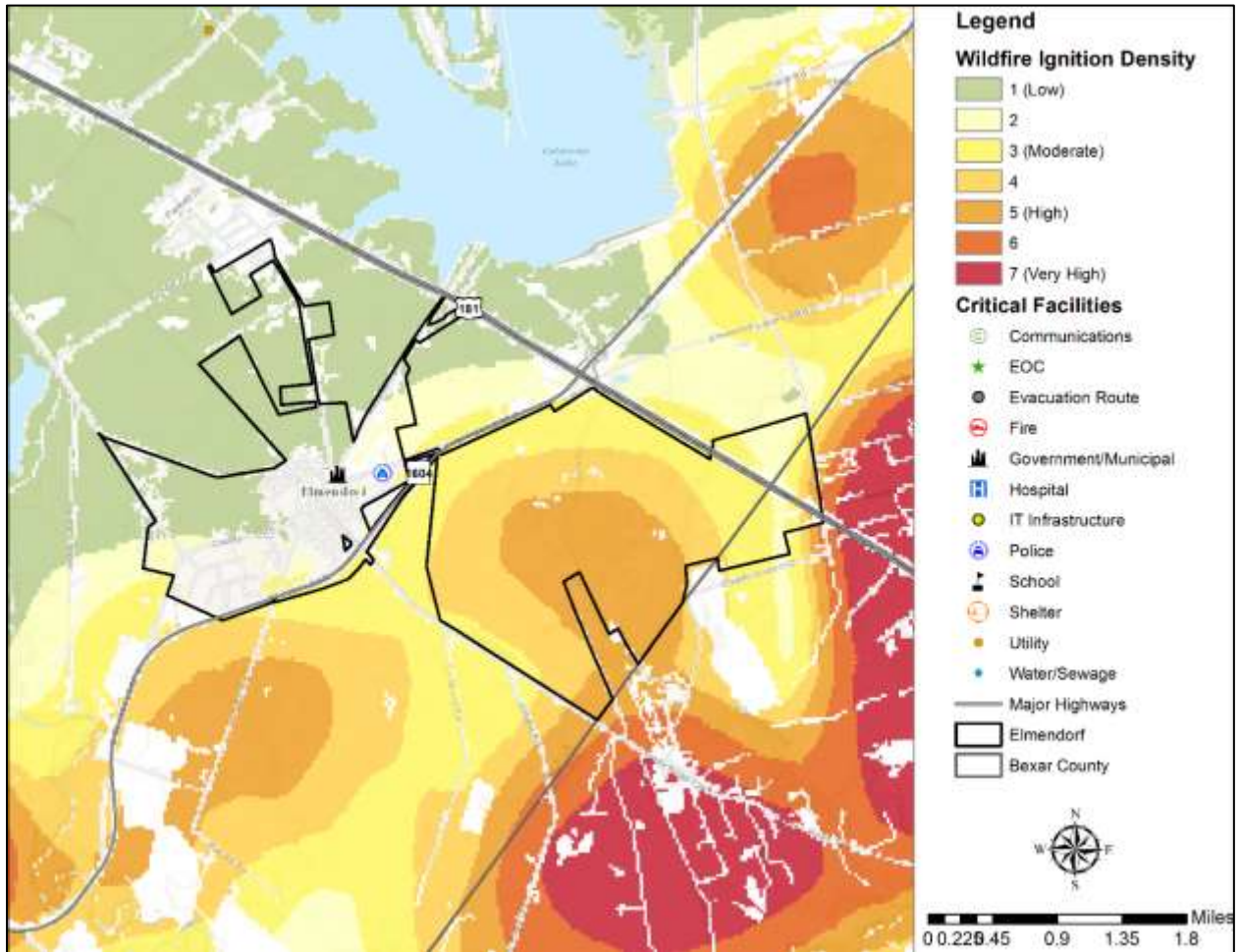
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Figure 11-58. Wildfire Ignition Density – Converse



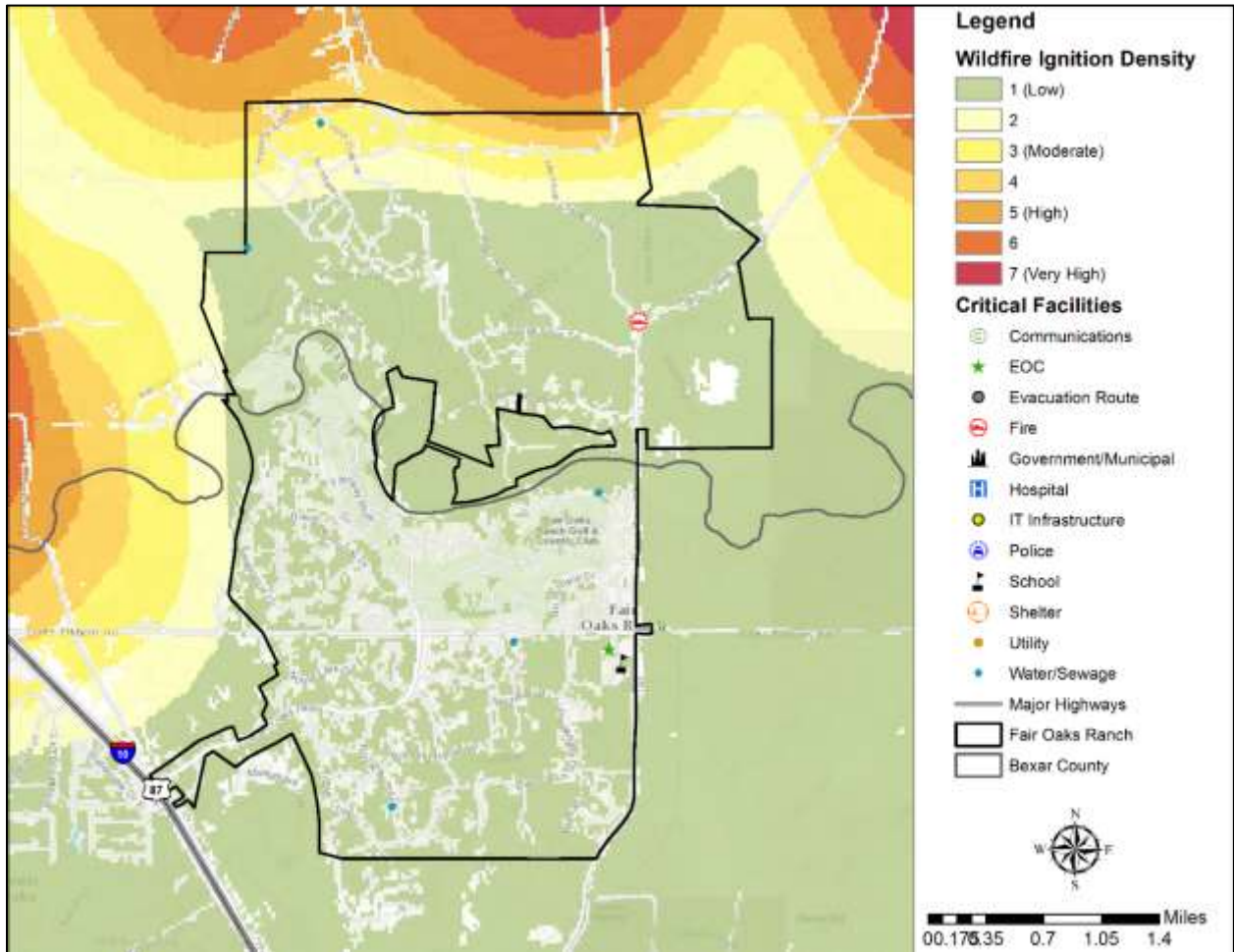
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Figure 11-59. Wildfire Ignition Density – Elmendorf



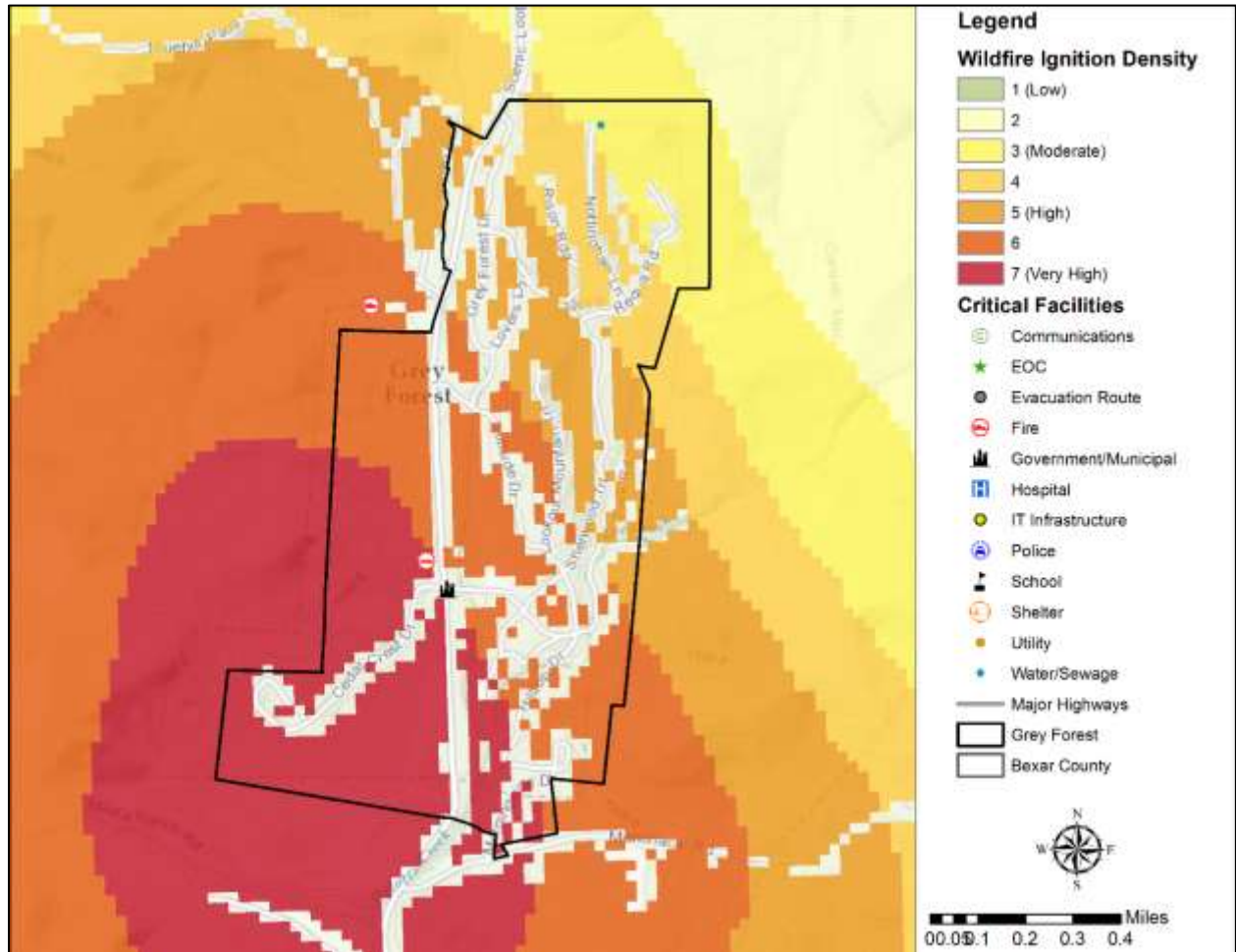
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Figure 11-60. Wildfire Ignition Density – Fair Oaks Ranch



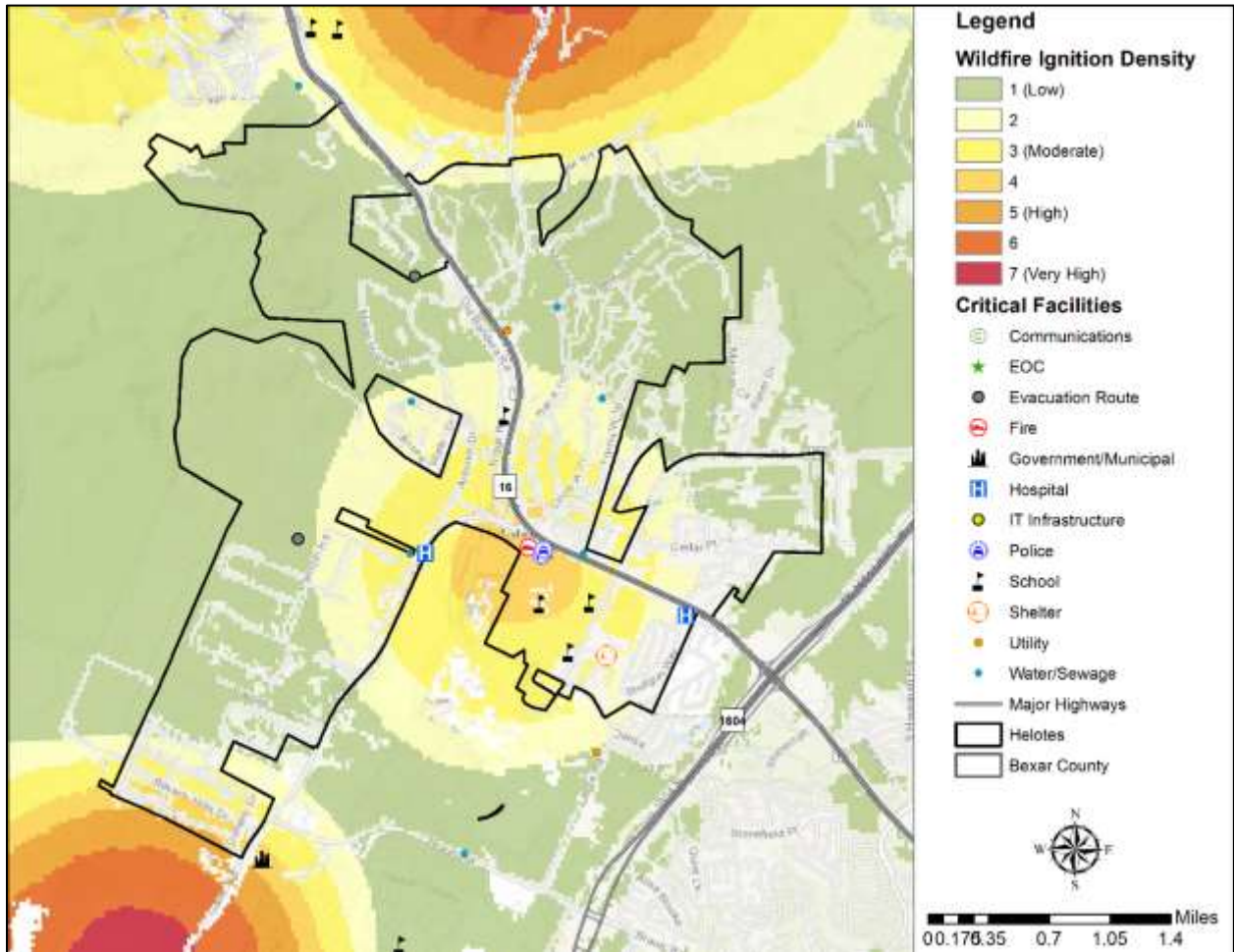
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Figure 11-61. Wildfire Ignition Density – Grey Forest



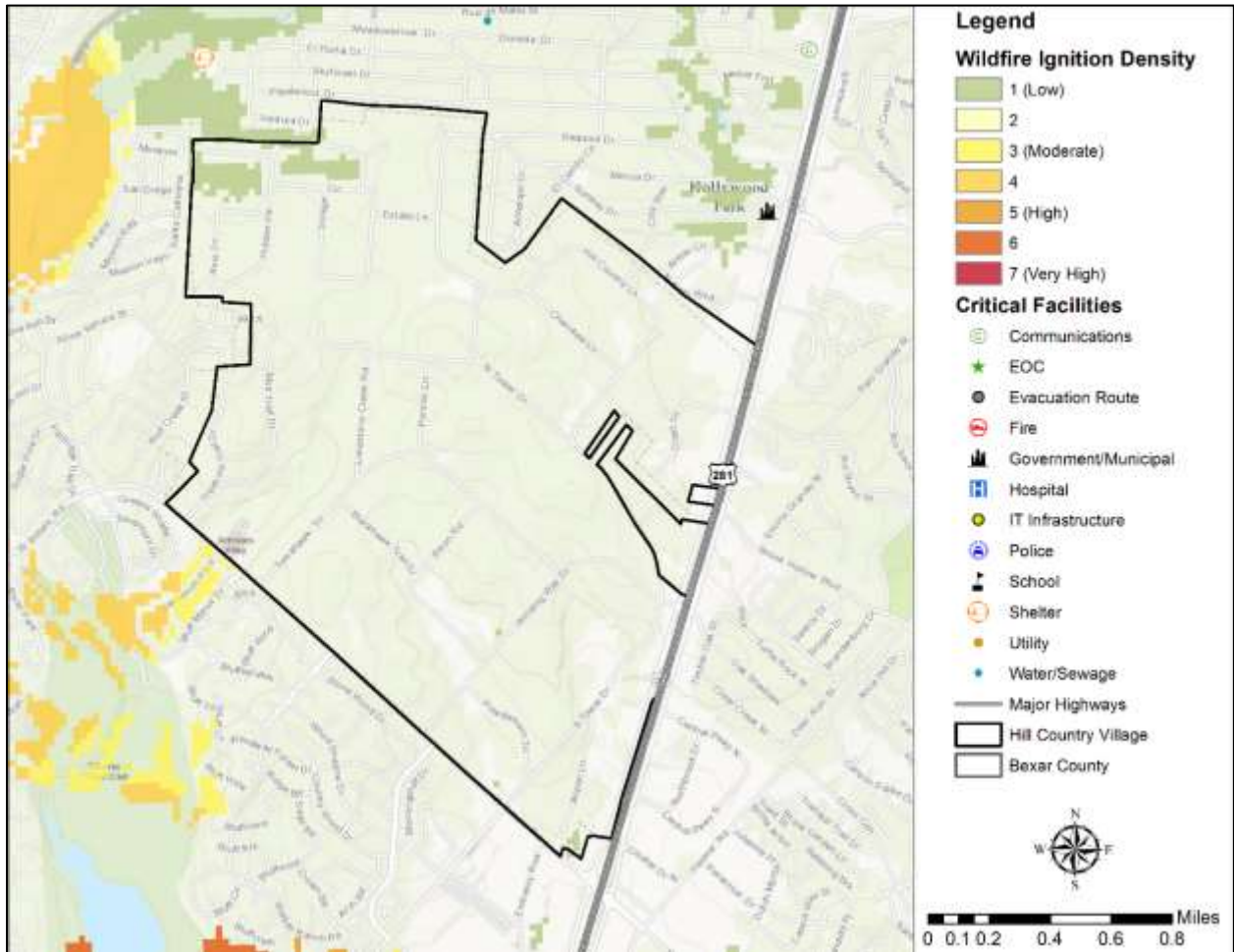
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Figure 11-62. Wildfire Ignition Density – Helotes



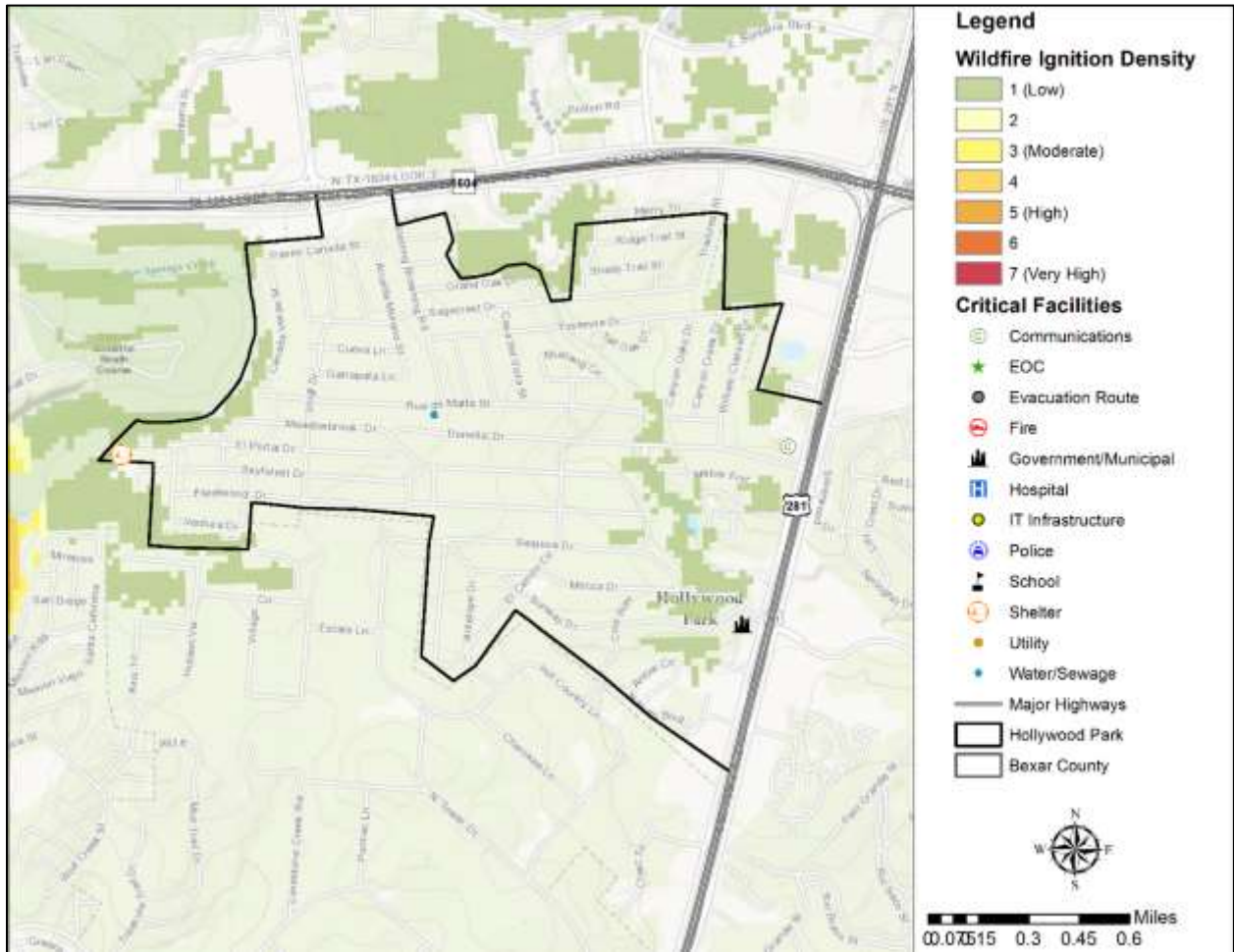
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Figure 11-63. Wildfire Ignition Density – Hill Country Village



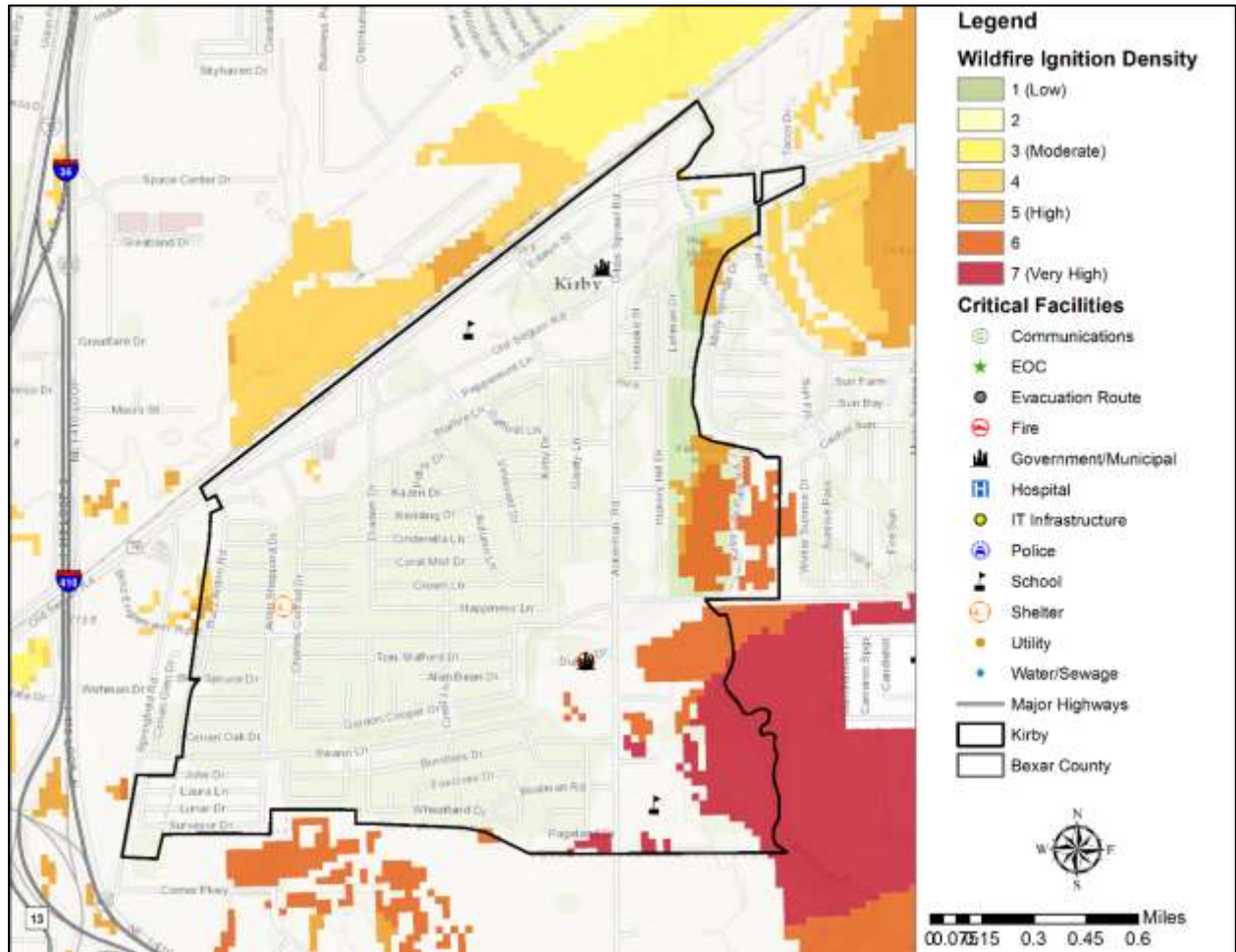
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Figure 11-64. Wildfire Ignition Density – Hollywood Park



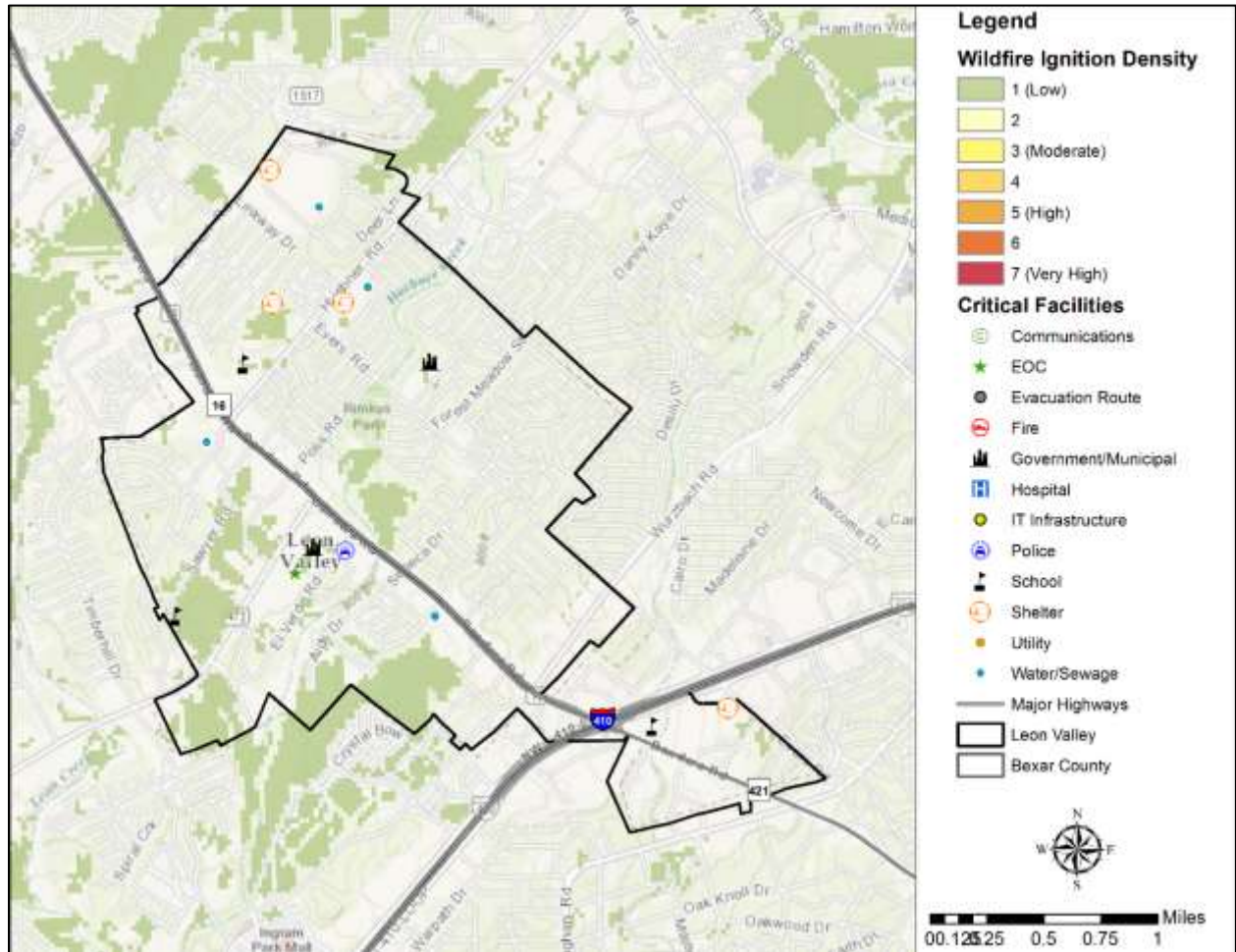
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Figure 11-65. Wildfire Ignition Density – Kirby



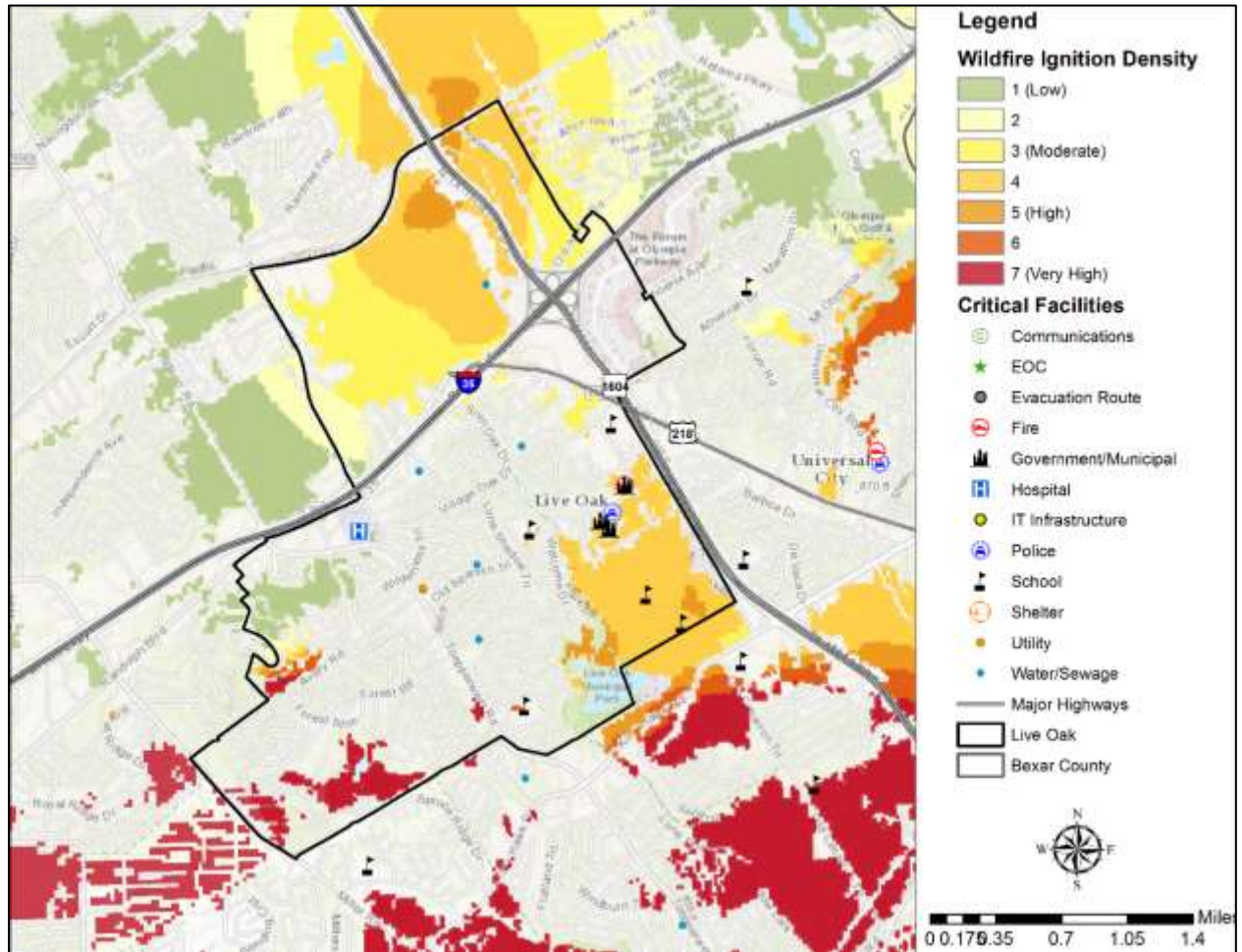
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Figure 11-66. Wildfire Ignition Density – Leon Valley



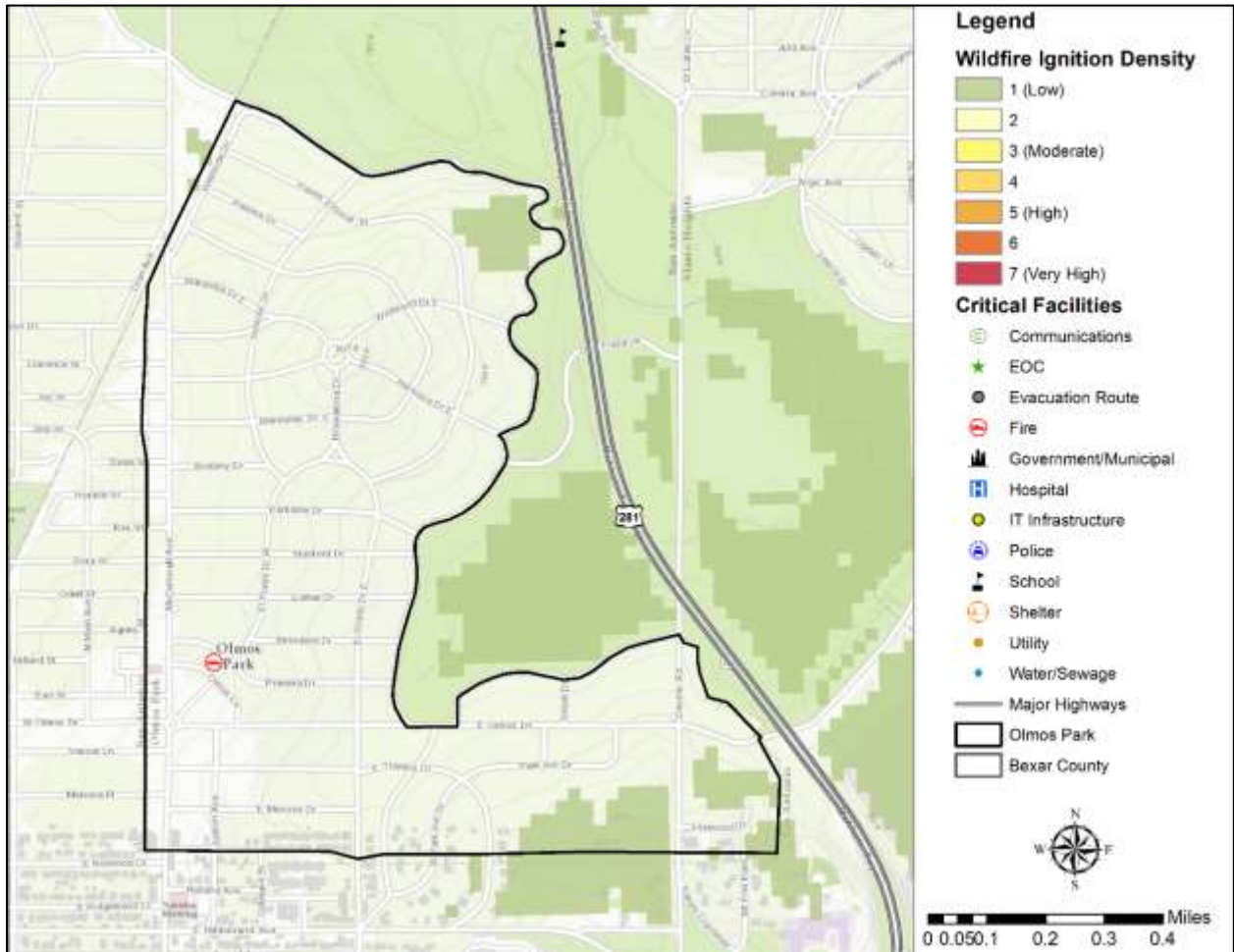
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Figure 11-67. Wildfire Ignition Density – Live Oak



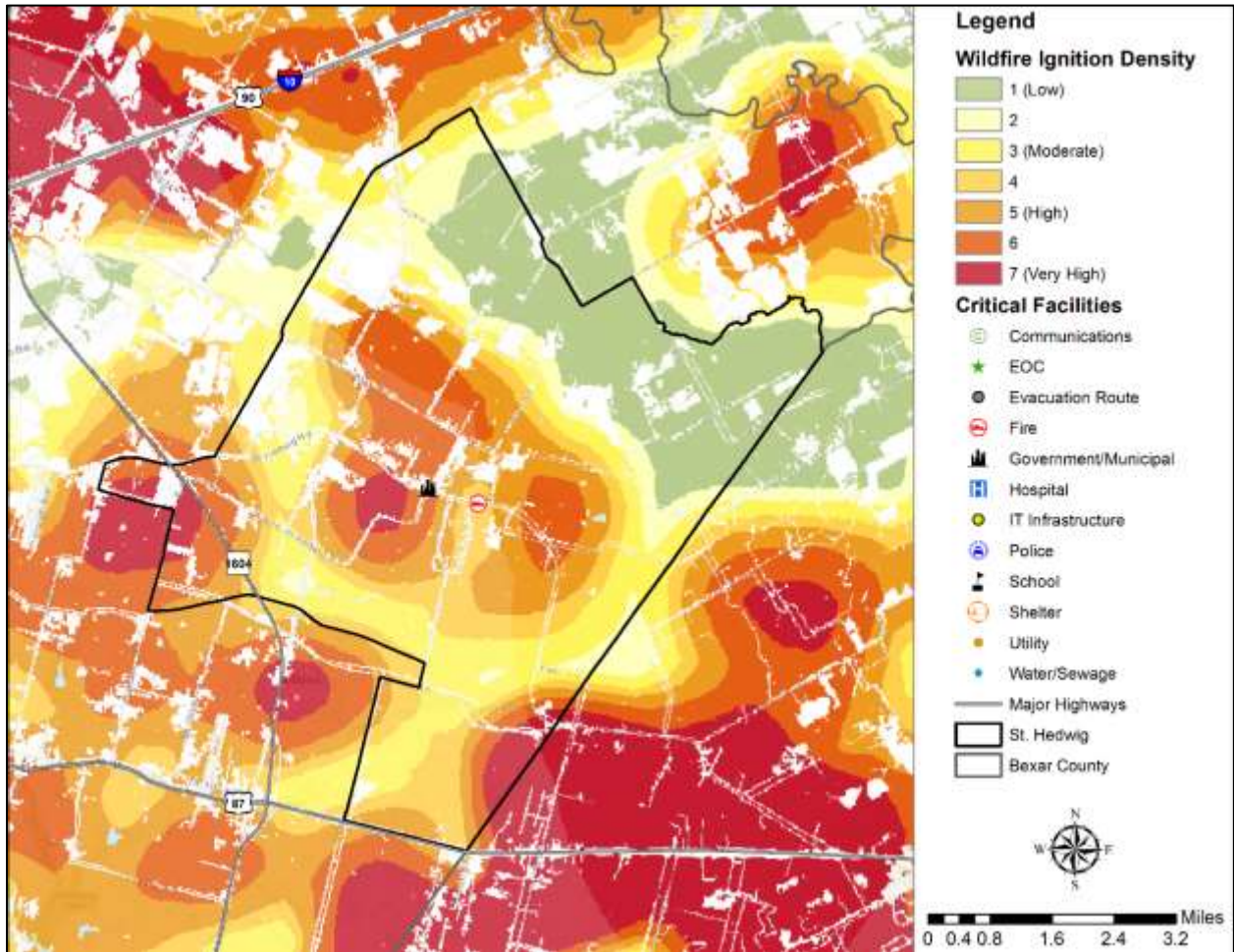
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Figure 11-68. Wildfire Ignition Density – Olmos Park



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Figure 11-69. Wildfire Ignition Density – Saint Hedwig



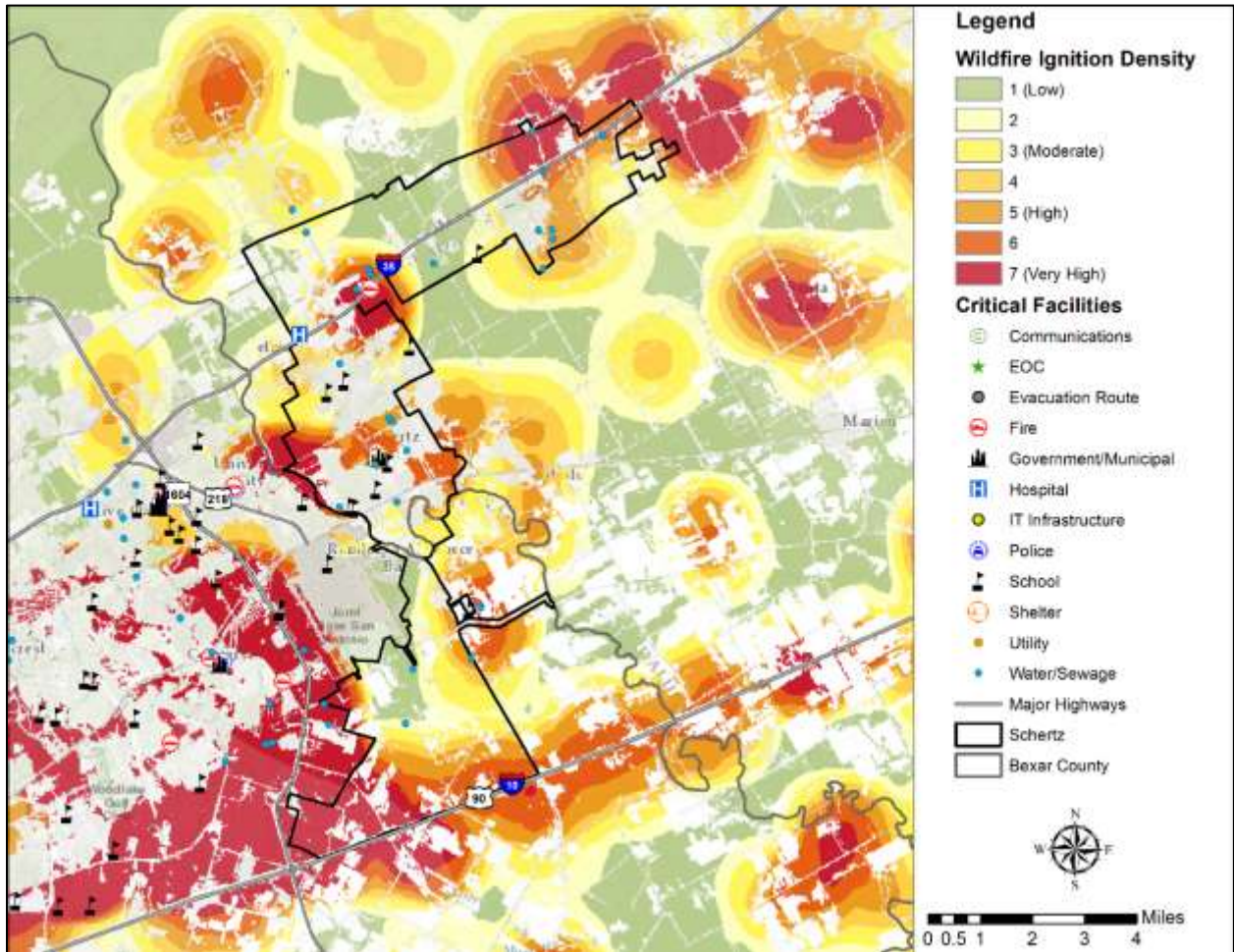
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Figure 11-70. Wildfire Ignition Density – Sandy Oaks



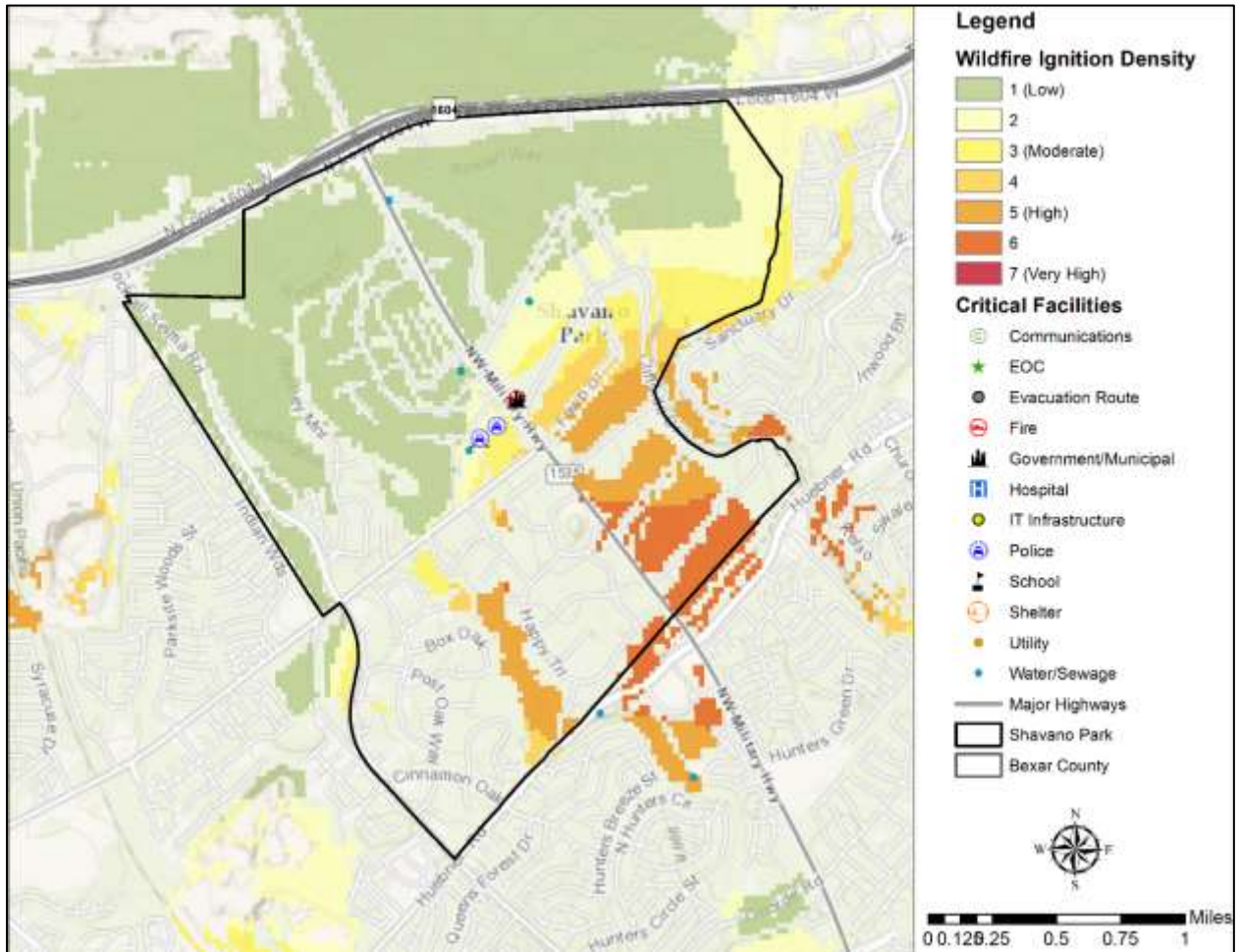
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Figure 11-71. Wildfire Ignition Density – Schertz



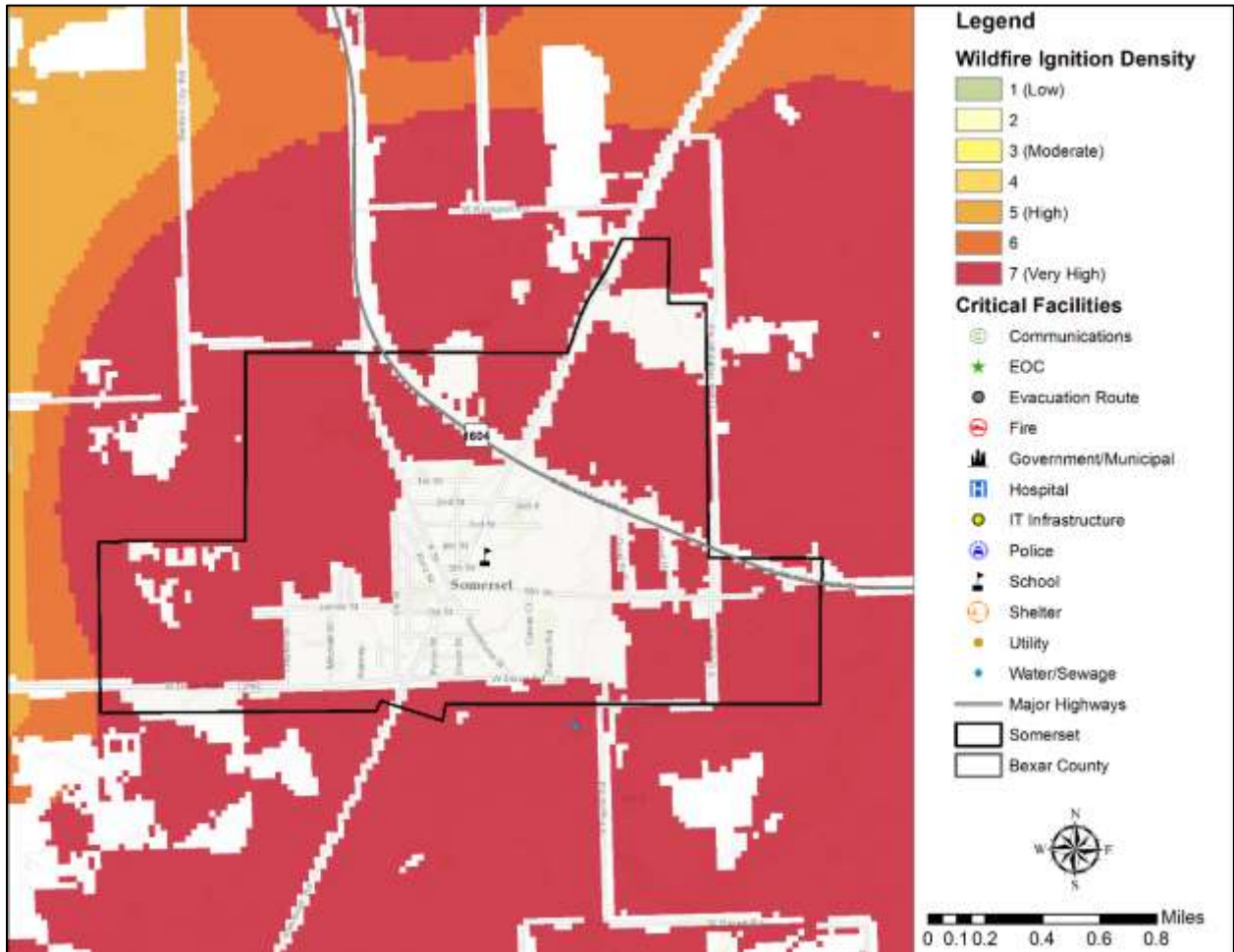
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Figure 11-72. Wildfire Ignition Density – Shavano Park



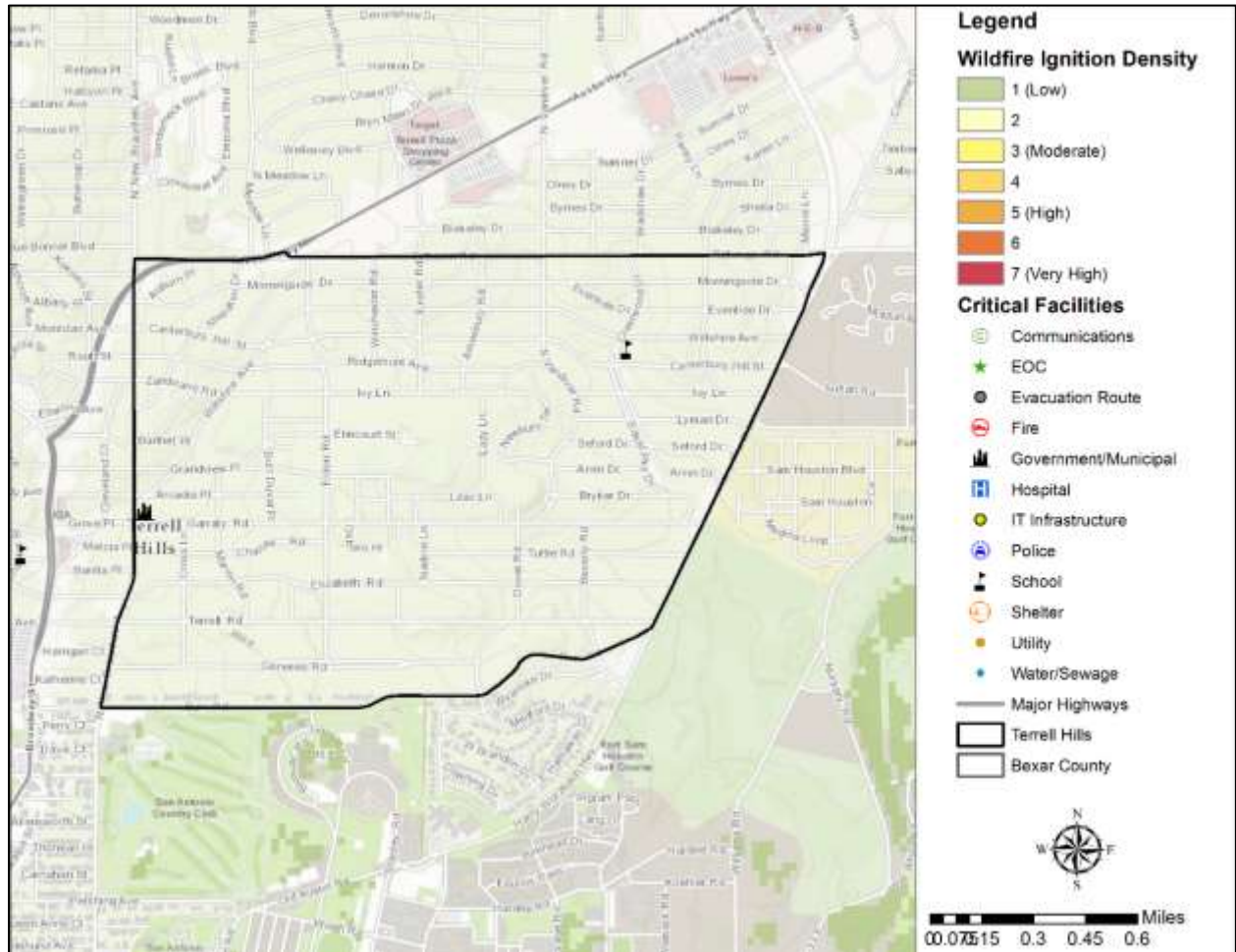
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Figure 11-73. Wildfire Ignition Density – Somerset



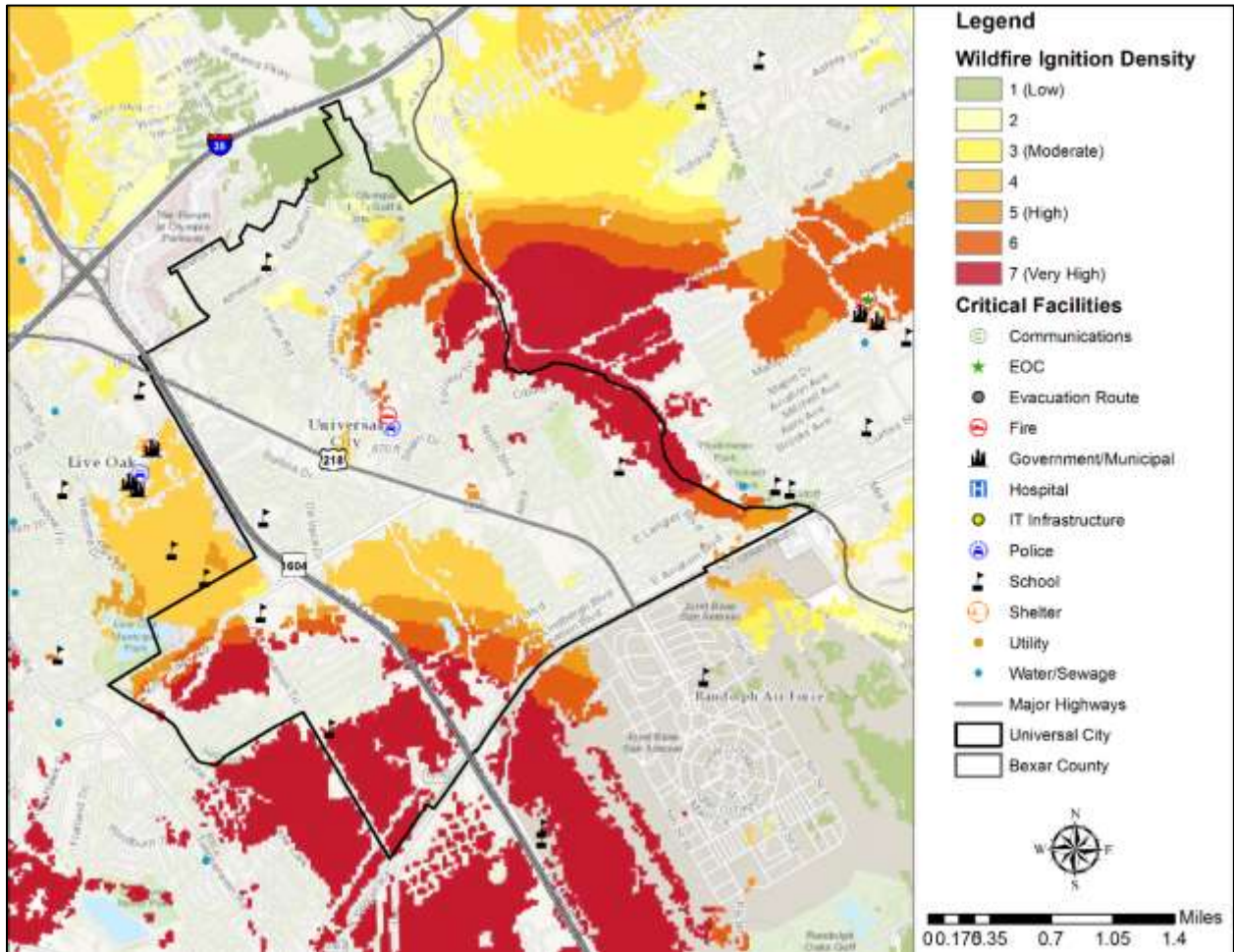
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Figure 11-74. Wildfire Ignition Density – Terrell Hills



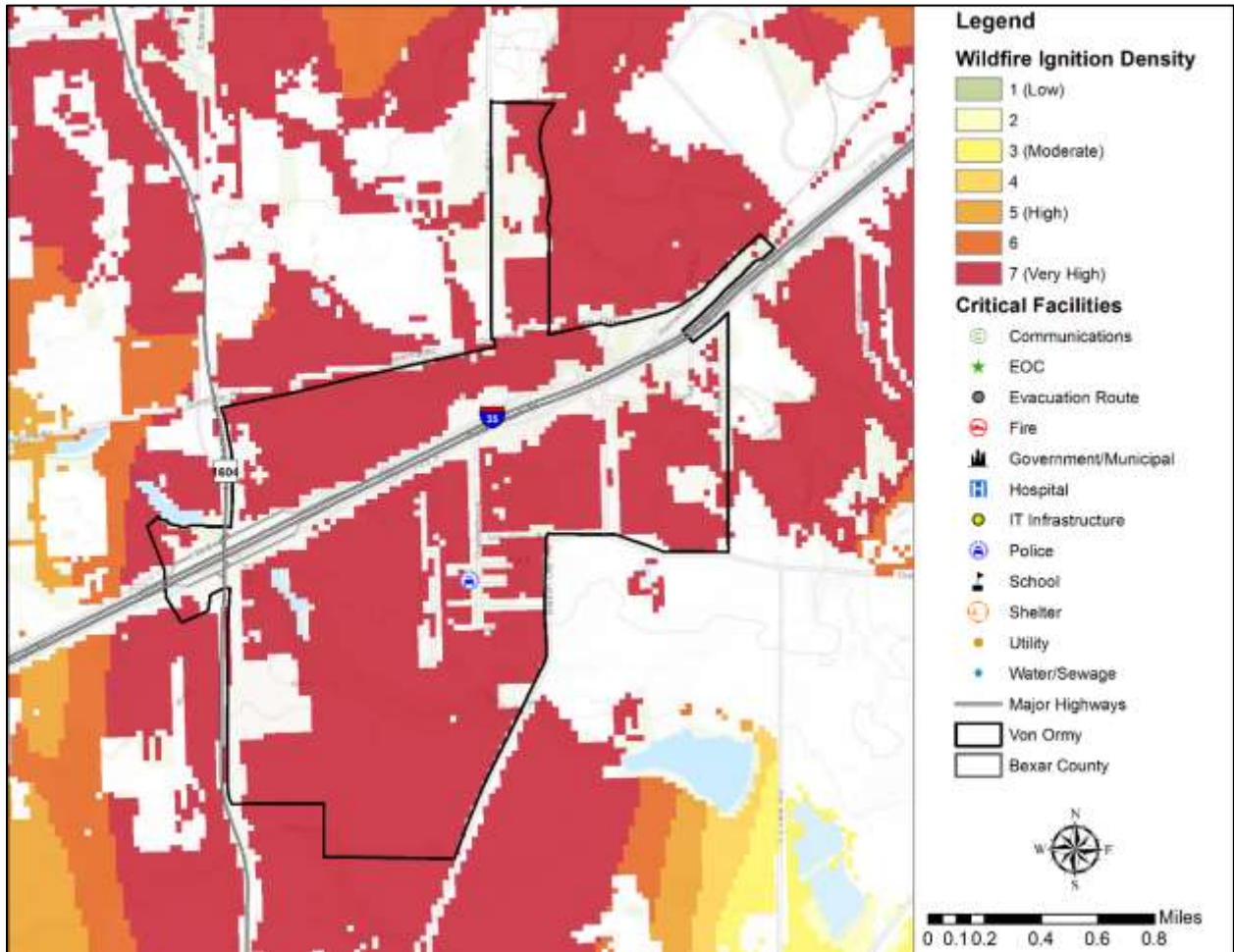
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Figure 11-75. Wildfire Ignition Density – Universal City



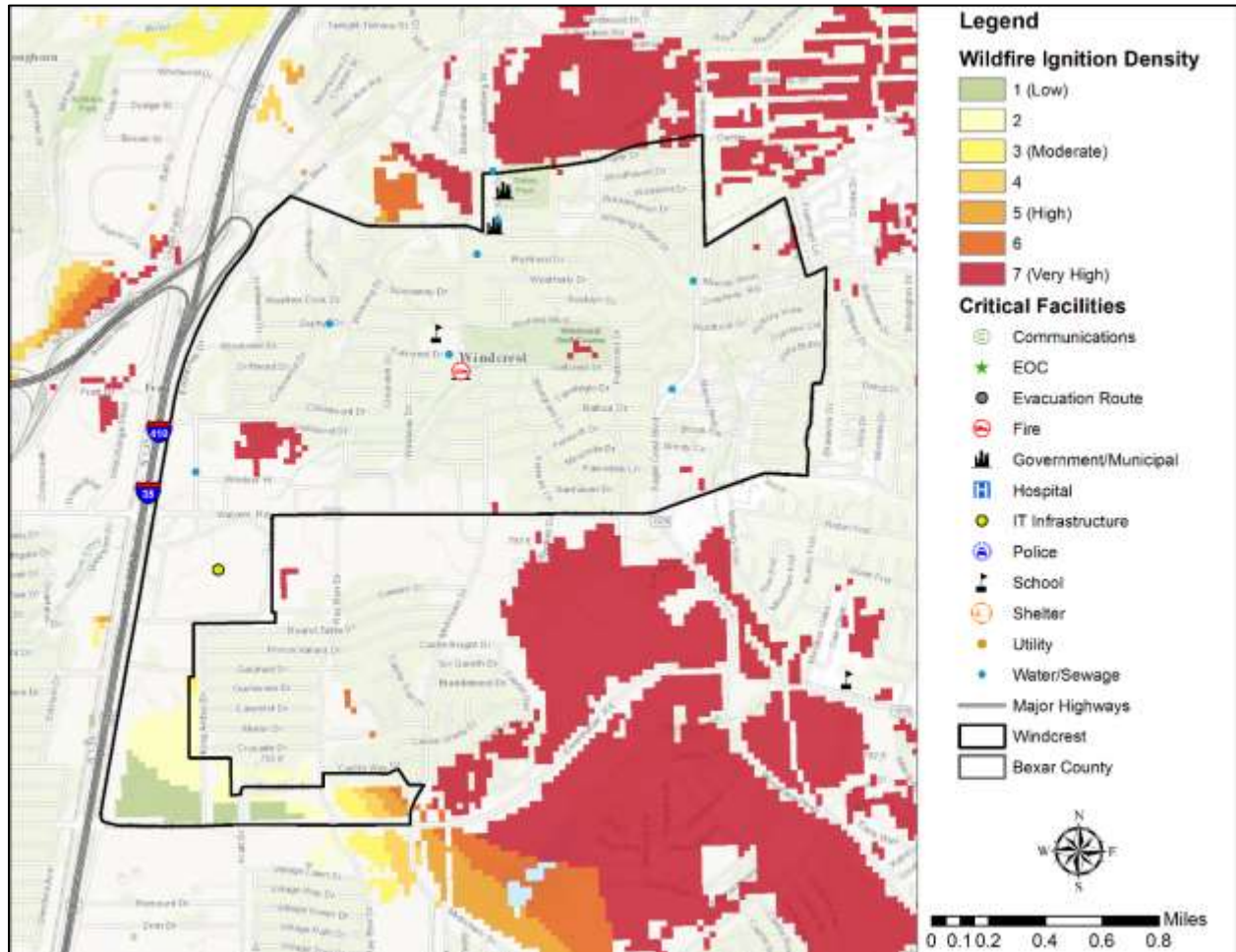
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Figure 11-76. Wildfire Ignition Density – Von Ormy



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Figure 11-77. Wildfire Ignition Density – Windcrest



Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too microscopic for the respiratory system to filter can cause immediate and possibly long term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

Climatic conditions such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact from major wildfire events can be substantial. Such events can cause multiple deaths, shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of resulting injuries and fatalities. For the Bexar County planning area, the impact from a wildfire event can be considered limited, meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is destroyed or sustains major damage.

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Assessment of Impacts

A wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to the direct damages. Potential impacts for the planning area include:

- Persons in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation.
- First responders are at greater risk of physical injury since they are in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty.
- Critical City and/or County departments may not be able to function and provide necessary services depending on the location of the fire, and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure.
- Some high density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly.
- Air pollution from smoke may exacerbate respiratory problems of vulnerable residents.
- Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows.
- Wildfires can cause erosion, degrading stream water quality.
- Wildlife may be displaced or destroyed.
- Historical or cultural resources may be damaged or destroyed.
- Tourism can be significantly disrupted, further delaying economic recovery for the area.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community.
- Recreational activities and tourism can be unappealing for years following a large wildfire, devastating directly related businesses.
- Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.

The economic and financial impacts of a wildfire event on local government will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event

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planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

Section 12: Tornado

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 Assessment of Impacts 13

Hazard Description



Tornadoes are among the most violent storms on the planet. A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth. The most violent tornadoes are capable of tremendous destruction, with wind speeds of 250 miles per hour (mph) or more. In extreme cases, winds may approach 300 mph. Damage paths can be in excess of 1 mile wide and 50 miles long.

The most powerful tornadoes are produced by “Supercell Thunderstorms.” Supercell Thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado.

Table 12-1. Tornado Variations

WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
<ul style="list-style-type: none"> • 69% of all tornadoes • Less than 5% of tornado deaths • Lifetime 1-10+ minutes • Winds less than 110 mph 	<ul style="list-style-type: none"> • 29% of all tornadoes • Nearly 30% of all tornado deaths • May last 20 minutes or longer • Winds 110 – 205 mph 	<ul style="list-style-type: none"> • 2% of all tornadoes • 70% of all tornado deaths • Lifetime can exceed 1 hour • Winds greater than 205 mph

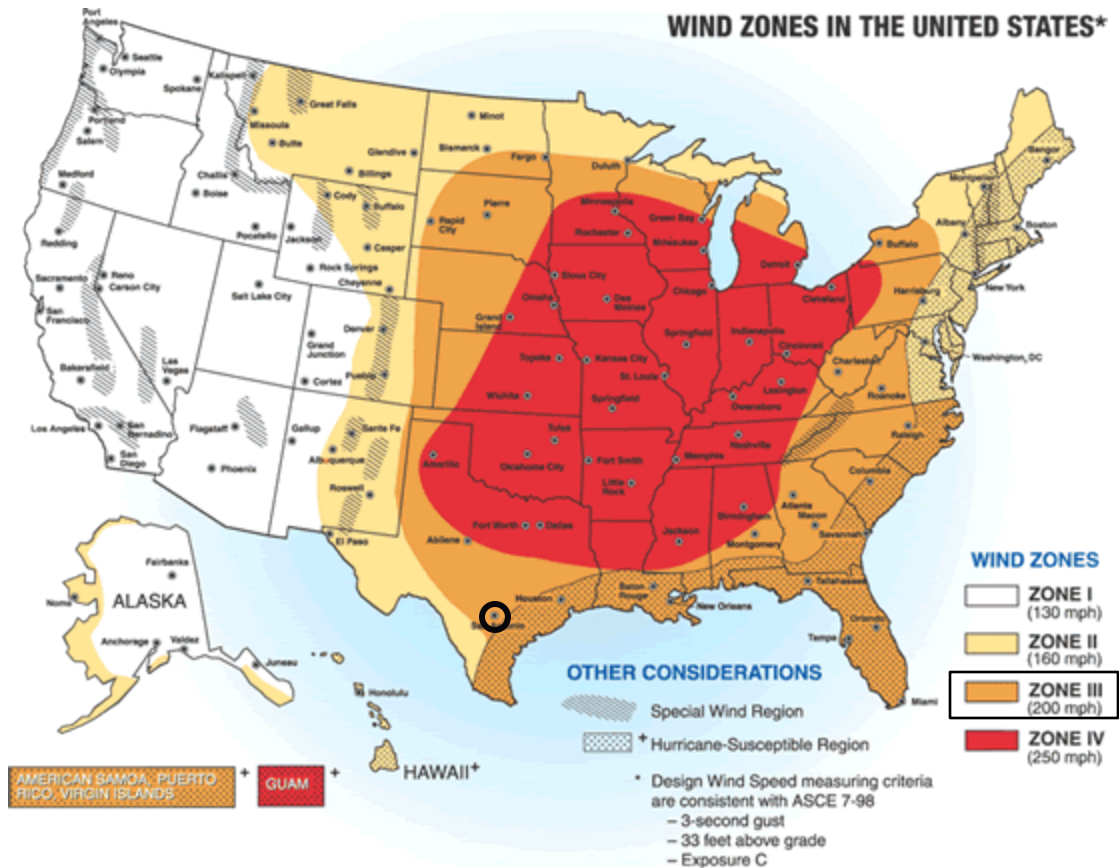
Location

As with thunderstorms, tornadoes do not have any specific geographic boundary and can occur throughout the Bexar County planning area, including all participating jurisdictions. It is assumed that the Bexar County

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planning area is equally exposed to tornado activity. Bexar County is located in Wind Zone III (Figure 12-1), where tornado winds can be as high as 200 mph.

Figure 12-1. FEMA Wind Zones in the United States¹



Extent

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes (particularly mobile homes).

Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (Table 12-2). Since February 2007, the Fujita Scale has been replaced by the Enhanced Fujita Scale (Table 12-3), which retains the same basic design and 6 strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures.

¹ The black circle indicates the Bexar County planning area.

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Table 12-2. The Fujita Tornado Scale²

F-SCALE NUMBER	INTENSITY	WIND SPEED (MPH)	TYPE OF DAMAGE DONE	PERCENT OF APPRAISED STRUCTURE VALUE LOST DUE TO DAMAGE
F0	Gale Tornado	40 – 72	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	None Estimated
F1	Moderate Tornado	73 – 112	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	0% – 20%
F2	Significant Tornado	113 – 157	Considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	50% – 100%
F3	Severe Tornado	158 – 206	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	100%
F4	Devastating Tornado	207 – 260	Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	100%
F5	Incredible Tornado	261 – 318	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles flying through the air in excess of 330 yards; trees debarked; steel reinforced concrete badly damaged.	100%

² Source: <http://www.tornadoproject.com/fscale/fscale.htm>

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Table 12-3. Enhanced Fujita Scale for Tornadoes

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	
EF1	Weak	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	
EF2	Strong	111–135	Considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	
EF4	Devastating	166–200	Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	
EF5	Incredible	200+	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles flying through the air in excess of 330 yards; trees debarked; steel reinforced concrete badly damaged.	

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events prior to 2007 will follow the original Fujita Scale. The largest magnitude reported within the planning area is F4 on the Fujita Scale, a “Devastating Tornado.” Based on the planning areas location in Wind Zone III, the planning area could experience anywhere from an EF0 to an EF5 depending on the wind speed.

The events in Bexar County have been between F0 and F4 (Table 12-4). Therefore, the range of intensity that the Bexar County planning area, including all participating jurisdictions, would be expected to mitigate is a tornado event with a low to severe risk, an EF0 to EF5.

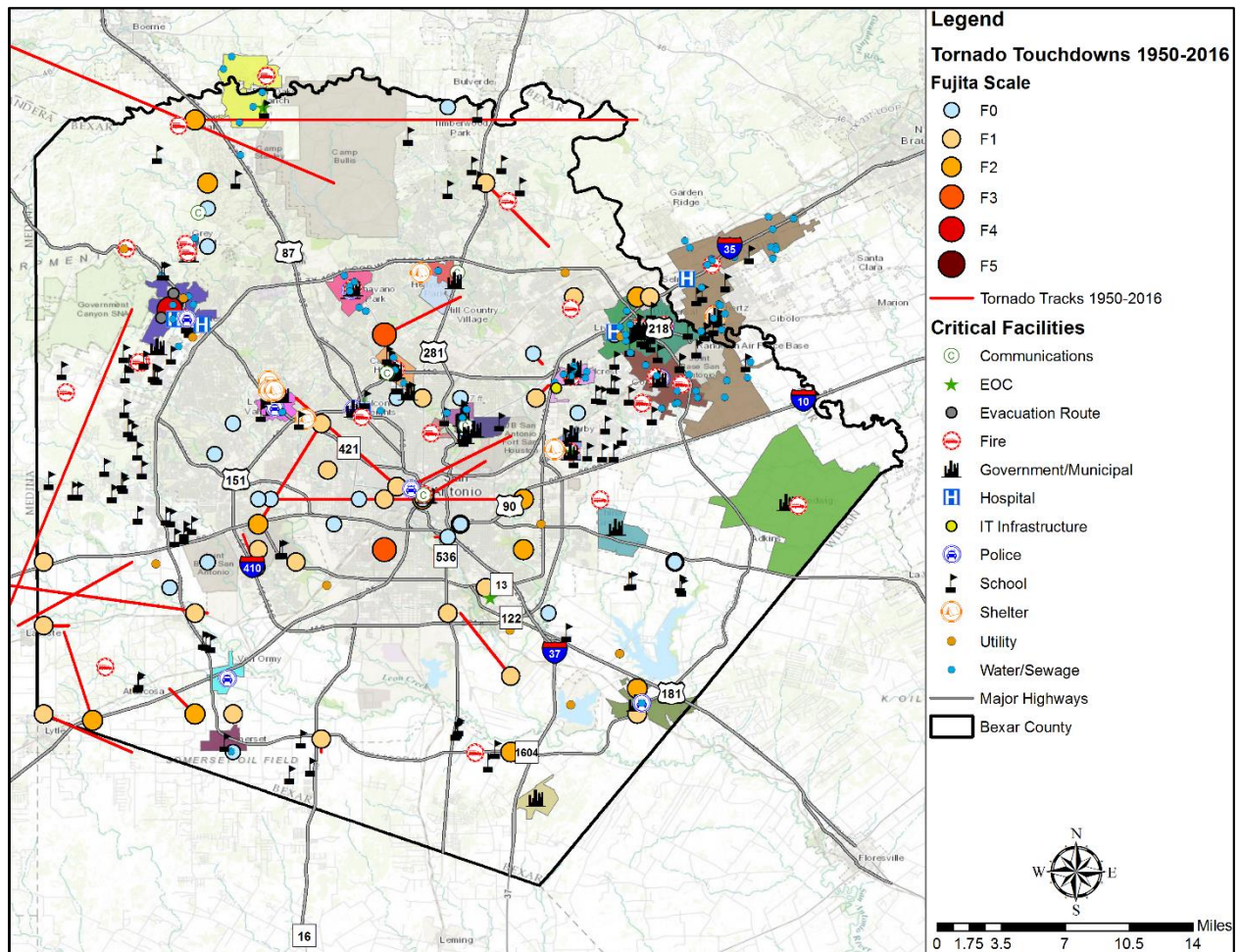
Historical Occurrences

The National Center for Environmental Information (NCEI) is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA) and is the largest archive available for climate data. Only NCEI reported incidents were factored into this risk assessment. It is likely that a number of occurrences

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have gone unreported over the past 66 years. Figure 12-2 identifies the locations of previous occurrences in the Bexar County planning area from 1950 to 2016. A total of 68 events have been recorded by the Storm Prediction Center (NOAA) and the NCEI databases for the Bexar County planning area, including all participating jurisdictions. The most significant event reported occurred in Helotes, just west of Bandera Road on April 28, 1953. The F4 tornado was 1,760 yards wide and stayed on the ground for approximately 5 miles. The devastating tornado resulted in 2 deaths and 15 injuries (damage estimates were not available).

Figure 12-2. Spatial Historical Tornado Events, 1950-2016³



³ Source: NOAA Records

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Table 12-4. Historical Tornado Events, 1950-2016⁴

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Helotes	4/28/1953	9:00 PM	F4	2	15	\$0	\$0
Bexar County	7/12/1954	5:50 PM	F2	0	0	\$22,327	\$0
Bexar County	5/10/1959	4:00 PM	F2	0	0	\$20,639	\$0
Bexar County	7/20/1960	12:00 PM	F1	0	0	\$20,290	\$0
Bexar County	11/22/1961	7:30 AM	F3	0	0	\$20,087	\$0
Bexar County	10/26/1964	10:00 PM	F1	0	0	\$193,739	\$0
Bexar County	6/21/1965	6:30 PM	F1	0	0	\$190,663	\$0
Bexar County	9/24/1967	7:13 PM	F1	0	0	\$17,982	\$0
Bexar County	9/9/1968	4:00 PM	F1	0	2	\$17,258	\$0
Bexar County	5/3/1969	5:00 AM	F2	0	0	\$1,636,485	\$0
Bexar County	5/16/1969	7:30 AM	F2	0	3	\$1,636,485	\$0
Bexar County	4/18/1970	6:30 PM	F2	0	0	\$154,791	\$0
Bexar County	5/14/1970	5:40 PM	F1	0	1	\$154,791	\$0
Bexar County	9/13/1970	3:00 PM	F2	0	0	\$15,479	\$0
Bexar County	3/15/1972	5:30 PM	F1	0	0	\$143,682	\$0
Bexar County	9/26/1972	4:00 PM	F1	0	0	\$14,368	\$0
Bexar County	11/1/1977	12:15 PM	F1	0	0	\$991,073	\$0
Bexar County	4/20/1979	11:10 PM	F1	0	0	\$82,726	\$0
Bexar County	8/10/1980	8:57 AM	F2	0	2	\$728,871	\$0
Bexar County	8/10/1980	9:50 AM	F1	0	0	\$72,887	\$0
Bexar County	10/7/1981	1:00 AM	F1	0	0	\$660,715	\$0
Bexar County	2/12/1984	3:10 AM	F0	0	0	\$57,805	\$0
Bexar County	2/12/1984	3:15 AM	F0	0	0	\$578	\$0
Bexar County	2/12/1984	3:20 AM	F0	0	0	\$578	\$0
Bexar County	2/12/1984	3:25 AM	F0	0	0	\$5,781	\$0

⁴ Values are in 2016 dollars.

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Somerset	4/7/1984	4:00 PM	F0	0	0	\$5,781	\$0
Bexar County	9/17/1988	4:45 AM	F1	1	1	\$5,076,839	\$0
Bexar County	9/17/1988	5:49 AM	F2	0	3	\$72,887,136	\$0
Bexar County	9/17/1988	6:30 PM	F1	0	3	\$72,887,136	\$0
Bexar County	3/29/1992	2:50 PM	F0	0	0	\$42,808	\$0
Bexar County	3/27/1994	1:05 AM	F0	0	0	\$811	\$811
Somerset	2/25/1998	9:23 PM	F1	0	0	\$36,846	\$4,422
Bexar County	5/19/2000	6:41 PM	F0	0	0	\$27,902	\$0
Bexar County	5/19/2000	7:50 PM	F0	0	0	\$55,804	\$0
Bexar County	10/23/2000	2:35 PM	F0	0	0	\$69,755	\$0
Somerset	3/19/2002	7:20 PM	F2	0	30	\$2,670,773	\$0
Somerset	3/19/2002	7:25 PM	F1	0	0	\$1,335,386	\$0
Von Ormy	3/19/2002	7:19 PM	F1	0	0	\$667,693	\$0
Bexar County	7/15/2007	1:30 AM	EF1	0	0	\$57,932	\$0
Bexar County	7/24/2008	8:20 AM	EF0	0	0	\$892,643	\$0
Bexar County	10/9/2011	12:10 AM	EF1	0	0	\$1,068,005	\$0
Converse	5/25/2013	4:25 AM	EFO	0	0	\$103,125	\$0
PLANNING AREA TOTAL				3	60	\$164,746,455	\$5,233

Table 12-5. Summary of Historical Tornado Events, 1996-2016⁵

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (MAX EXTENT)	FATALITIES	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Bexar County	51	F3	1	19	\$159,926,851	\$811
Alamo Heights	0	N/A	0	0	\$0	\$0
Balcones Heights	1	EF1	0	0	\$0	\$0
Castle Hills	0	N/A	0	0	\$0	\$0
China Grove	0	N/A	0	0	\$0	\$0

⁵ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (MAX EXTENT)	FATALITIES	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Converse	1	EF0	0	0	\$103,125	\$0
Elmendorf	0	N/A	0	0	\$0	\$0
Fair Oaks Ranch	0	N/A	0	0	\$0	\$0
Grey Forest	1	F0	0	0	\$0	\$0
Helotes	3	F4	2	15	\$0	\$0
Hill Country Village	0	N/A	0	0	\$0	\$0
Hollywood Park	0	N/A	0	0	\$0	\$0
Kirby	1	EF0	0	0	\$0	\$0
Leon Valley	1	F0	0	0	\$0	\$0
Live Oak	0	N/A	0	0	\$0	\$0
Olmos Park	0	N/A	0	0	\$0	\$0
St. Hedwig	0	N/A	0	0	\$0	\$0
Sandy Oaks	0	N/A	0	0	\$0	\$0
Schertz	0	N/A	0	0	\$0	\$0
Shavano Park	0	N/A	0	0	\$0	\$0
Somerset	4	F2	0	30	\$4,048,786	\$4,422
Terrell Hills	0	N/A	0	0	\$0	\$0
Universal City	0	N/A	0	0	\$0	\$0
Von Ormy	2	F1	0	0	\$667,693	\$0
Windcrest	0	N/A	0	0	\$0	\$0
TOTAL LOSSES	65	(Max Extent)	3	64	\$164,751,688	

Significant Past Events

April 28, 1953 – Helotes

A strong tornado that developed in Bexar County made landfall in Helotes, just west of Bandera Road on April 28th, 1953. The F4 tornado was 1,760 yards wide and stayed on the ground for approximately 5 miles according to news outlets. The official report had the tornado on the ground for approximately one mile. The devastating tornado resulted in 2 deaths and 15 injuries. Damage estimates are not available but news reports indicate total devastation along the path of the tornado.

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September 17, 1988 – Bexar County

An F1 tornado touched down in central Bexar County on September 17th, 1988. The tornado was 50 yards wide and stayed on the ground for approximately 6 miles. Three injuries and no fatalities were reported as a result of the tornado. Damage estimates for the event exceeded 25 million dollars.

March 19, 2002 – Somerset

A series of tornadoes struck the area on March 19th, 2002. Tornado number five, the strongest of the six, was rated as a minimal F2 tornado on the Fujita Scale. The tornado formed about 3.5 miles southwest of the intersection of Loop 1604 and I-35. It struck near 7:20 PM along Silver Street and Bravo Street and moved toward the north for 1.5 miles. It apparently weakened periodically, producing a hit-and-miss damage path. It completely destroyed four mobile homes and damaged several others. Thirty injuries were reported as a direct result of the tornado. Damage estimates for the event exceeded two million dollars.

Probability of Future Events

Tornadic storms can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. According to historical records, Bexar County experiences a tornado touchdown approximately once every year. This frequency supports a highly likely probability of future events for the Bexar County planning area, including all participating jurisdictions.

Vulnerability and Impact

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities, and populations in Bexar County are considered to be exposed to this hazard and could potentially be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Consequently, the vulnerability of humans and property is difficult to evaluate since tornadoes form at different strengths, in random locations, and create relatively narrow paths of destruction. Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Manufactured Homes;
- Homes on crawlspaces (more susceptible to lift); and
- Buildings with large spans, such as shopping malls, gymnasiums, and factories.

Tornadoes can possibly cause a significant threat to people as they could be struck by flying debris, falling trees/branches, utility lines, and poles. First responders could also not be able to respond to calls due to blocked roads. Tornadoes commonly cause power outages, which could cause health and safety risks to patients in hospitals or other vulnerable populations that rely on power for medical necessities.

The Bexar County planning area features multiple mobile or manufactured home parks throughout the planning area and many participating jurisdictions. These parks are typically more vulnerable to thunderstorm wind events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including 16 jurisdictions. These homes would also be more vulnerable. The

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U.S. Census data indicates a total of 19,128 manufactured homes located in the Bexar County planning area, including most participating jurisdictions (Table 12-6). (Nine of the participating jurisdictions do not feature manufactured homes.) In addition, 44.8% (approximately 302,761 structures) of the single family residential (SFR) structures in the Bexar County planning area were built before 1980⁶. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant thunderstorm wind events.

Table 12-6. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Alamo Heights	0	2,854
Balcones Heights	22	1,234
Castle Hills	0	1,705
China Grove	18	132
Converse	74	1,902
Elmendorf	242	152
Fair Oaks Ranch	0	292
Grey Forest	9	181
Helotes	31	579
Hill Country Village	4	161
Hollywood Park	0	934
Kirby	191	2,117
Leon Valley	0	2,764
Live Oak	0	2,204
Olmos Park	0	809
St. Hedwig	152	214
Sandy Oaks ⁷	Unknown	Unknown
Schertz	915	2,730
Shavano Park	0	485

⁶ Source: U.S. Census Bureau data estimates for 2015.

⁷ The City of Sandy Oaks was incorporated in 2014. Census data is not available for this community.

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JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Somerset	111	267
Terrell Hills	0	1,468
Universal City	76	3,401
Von Ormy	178	151
Windcrest	26	1,868
Bexar County⁸	19,128	302,761

The following critical facilities would be vulnerable to tornado events in each participating jurisdiction:

Table 12-7. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	3 Government Facilities, EOC, Sheriff's Office, Police Station, 4 Power Stations, 3 Public Works Facilities, Fire Marshall Office, 11 Fire Stations, 71 Schools
Alamo Heights	Hospital, 2 Government Facilities, 6 Schools, AT&T Facility (communications HUB), College
Balcones Heights	Hospital, Police Station, Government Facility, Fire Station, School
Castle Hills	Police Station (includes administration and communications), Fire Station, 2 Government Facilities, 6 Schools, 3 Water Facilities, AT&T Facility (switching station)
China Grove	Government Facility, Fire Station
Converse	Government Facility, Police Department, 2 Fire Stations, 4 Water Facilities, 2 Pump Stations, 4 Lift Stations
Elmendorf	Police Station (includes City Hall and Water Department), Church, Public Service Facility (Electrical)
Fair Oaks Ranch	Police Station (includes EOC), Fire Station, School, 5 Water Facilities, Sewer Treatment Facility
Grey Forest	Police Department (includes City Hall), Fire Department, Water facility
Helotes	Police Department (includes City Hall, Fire Department, and dispatch center), Evacuation Center, 7 Schools, School Transportation Center, 2 Medical Facilities, 3 Fire Stations, 2 Evacuation Routes, 3 Lift Stations, 5 Water Facilities, Utility Offices and 2 Distribution Centers, Emergency Equipment Provider, Government Facility, Radio Tower
Hill Country Village	None
Hollywood Park	AT&T Facility (communications HUB), 2 Government Facilities, Water Storage Facility

⁸ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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JURISDICTION	CRITICAL FACILITIES
Kirby	Police Station, Fire Station, Public Works, Government Facility, 2 Schools, Community Center
Leon Valley	Fire Station, Government Facility, Police Station, Public Works, 6 Water Facilities, 4 Shelters, 3 Schools, Dispatch/Communications Center
Live Oak	Police Station, Fire Station, Public Works, 5 Water Facilities, Government Facility, Hospital, 3 Schools, 2 School Support Facilities, 2 Colleges, Power Sub-Station
Olmos Park	Fire Department
St. Hedwig	2 Government Facilities, Fire Department, School
Sandy Oaks	Government Facility
Schertz	Police Station (includes EMS, Fire Department, EOC, Community Center, City Hall, Civic Center, and Administration), Fire Station, 9 Schools, Hospital, 7 Water Facilities, 18 Sewer Facilities (including lift stations and treatment plants)
Shavano Park	Government Facility, Police Station, Communication/Dispatch Facility, Fire Station, Public Works, 8 Water Facilities
Somerset	Sewer Treatment Facility, 4 Schools
Terrell Hills	2 Government Facilities, Fire Department, School
Universal City	Police Station, Fire Station, 5 Schools
Von Army	Police Station
Windcrest	Police Station (includes City Hall, Communications/Dispatch Center, and Fire Department), 8 Water Facilities, 3 Government Facilities, School

The average loss estimate of crops and property is \$164,751,688 (in 2016 dollars), having an approximate annual loss estimate of \$2,496,238. Based on historic loss and damages, the impact of tornadoes on the Bexar County planning area, including all participating jurisdictions, can be considered “Major,” with more than 25 percent of property expected to be destroyed or with major damage, injuries and/or illness that result in permanent disability, and critical facilities shut down for at least 2 weeks.

Table 12-8. Potential Annualized Losses by Jurisdiction, 1950-2016

JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Bexar County	\$159,927,662	\$2,423,146
Alamo Heights	\$0	\$0
Balcones Heights	\$0	\$0
Castle Hills	\$0	\$0
China Grove	\$0	\$0
Converse	\$103,125	\$1,563

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JURISDICTION	PROPERTY & CROP LOSS	AVERAGE ANNUALIZED LOSSES
Elmendorf	\$0	\$0
Fair Oaks Ranch	\$0	\$0
Grey Forest	\$0	\$0
Helotes	\$0	\$0
Hill Country Village	\$0	\$0
Hollywood Park	\$0	\$0
Kirby	\$0	\$0
Leon Valley	\$0	\$0
Live Oak	\$0	\$0
Olmos Park	\$0	\$0
St. Hedwig	\$0	\$0
Sandy Oaks	\$0	\$0
Schertz	\$0	\$0
Shavano Park	\$0	\$0
Somerset	\$4,053,208	\$61,412
Terrell Hills	\$0	\$0
Universal City	\$0	\$0
Von Ormy	\$667,693	\$10,117
Windcrest	\$0	\$0
Planning Area	\$164,751,686	\$2,496,238

Assessment of Impacts

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Providing and preserving public health and safety is often difficult. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees, causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes may suffer substantial damage as they would be more vulnerable than typical site built structures.

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- Sub-standard construction may suffer substantial damage as they are not built to code and would be more vulnerable to tornado events than code compliant structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts. Therefore, they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- County or City departments may be damaged or destroyed, delaying response and recovery efforts for the entire community.
- Private sector entities that the County or City and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the tornado may be negatively impacted while roads and utilities are being restored, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.

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The economic and financial impacts of a tornado event on the community will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

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Hazard Description

According to the National Oceanic and Atmospheric Administration (NOAA), a hurricane is an intense tropical weather system of strong thunderstorms with well-defined surface circulation and maximum sustained winds of 74 miles per hour (mph) or higher. In the Northern Hemisphere, winds near the Earth’s surface circulate counterclockwise.

Hurricanes often begin as tropical depressions that intensify into tropical storms when maximum sustained winds increase to between 35 – 64 knots (39 – 73 mph). At these wind speeds, the storm becomes more organized and circular in shape and begins to resemble a hurricane. Tropical storms resulting in high winds and heavy rainfall can be equally problematic without ever becoming a hurricane and can be dangerous to people and property, resulting in high winds and heavy rainfall, as Tropical Storm Frances did for southeast Texas in September 1998. Once sustained winds reach or exceed 74 mph, the storm becomes a hurricane. The intensity of a land falling hurricane is expressed in categories relating wind speeds to potential damage. Tropical storm-force winds are strong enough to be dangerous to those caught in them.

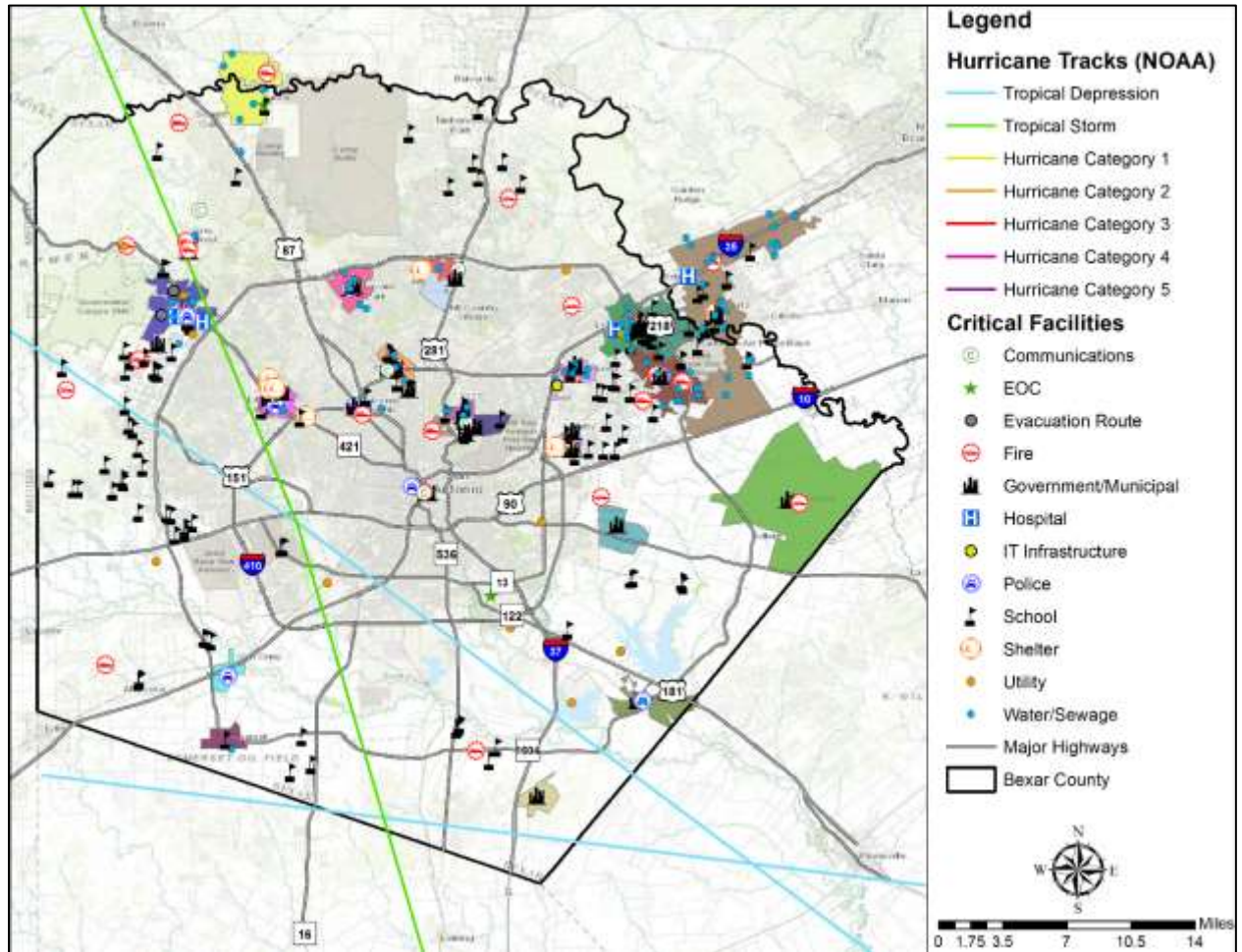


Location

The Bexar County planning area, including all participating jurisdictions, is located inland from the coast and is outside of the hurricane wind speed hazard areas. Thus, the Bexar County planning area is in a low risk area for hurricane wind speeds of 90 mph or less. However, Bexar County, including all participating jurisdictions, is susceptible to the indirect threats of a hurricane, including high winds and flooding. Additionally, Bexar County has hosted coastal area residents who evacuate during hurricane events. The Bexar County planning area, including all participating jurisdictions, is in a low risk area for tropical storm wind speeds up to 74 mph as shown in Figures 13-1 to 13-4.

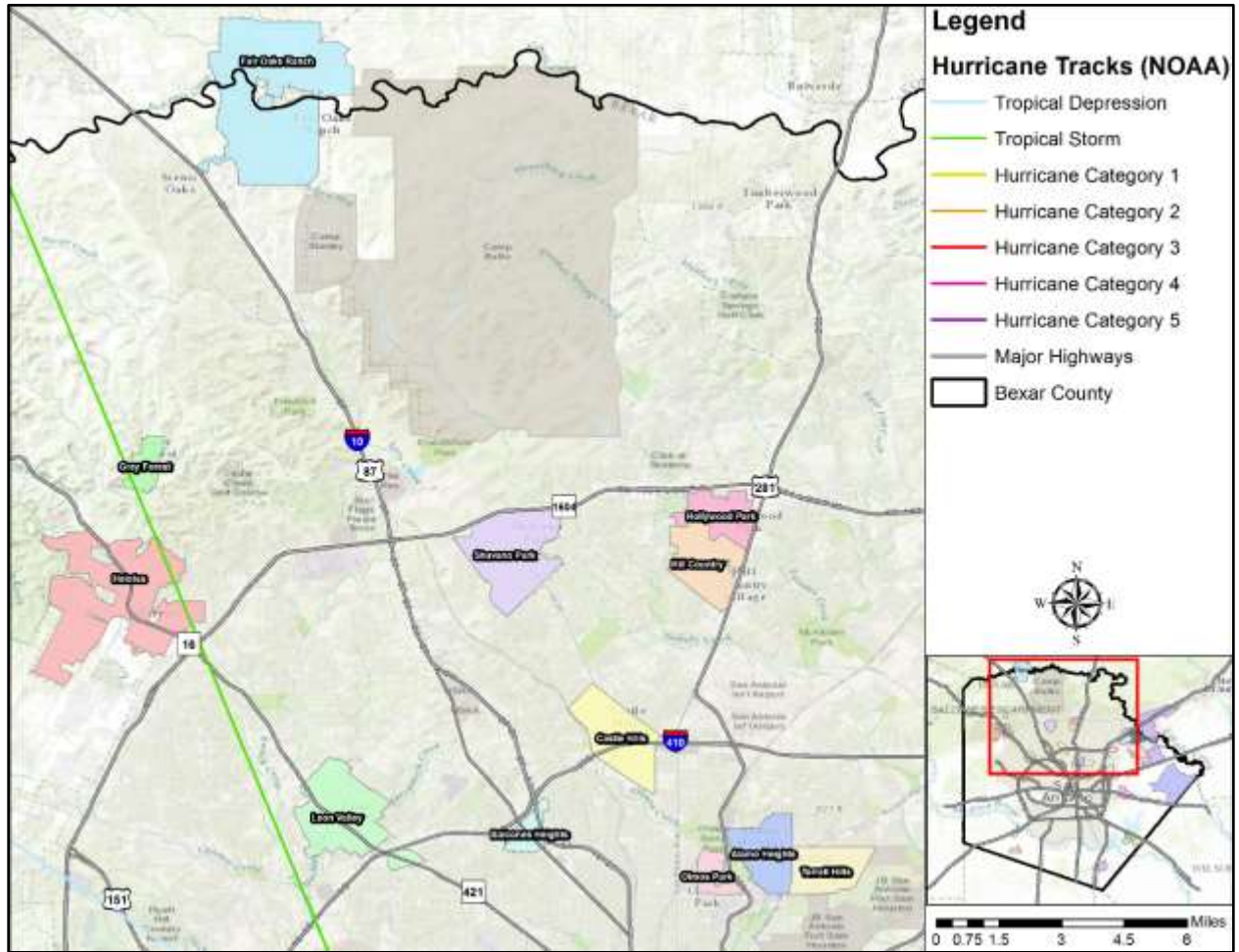
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Figure 13-1. Location of Bexar County Historic Hurricane Tracks, Overview



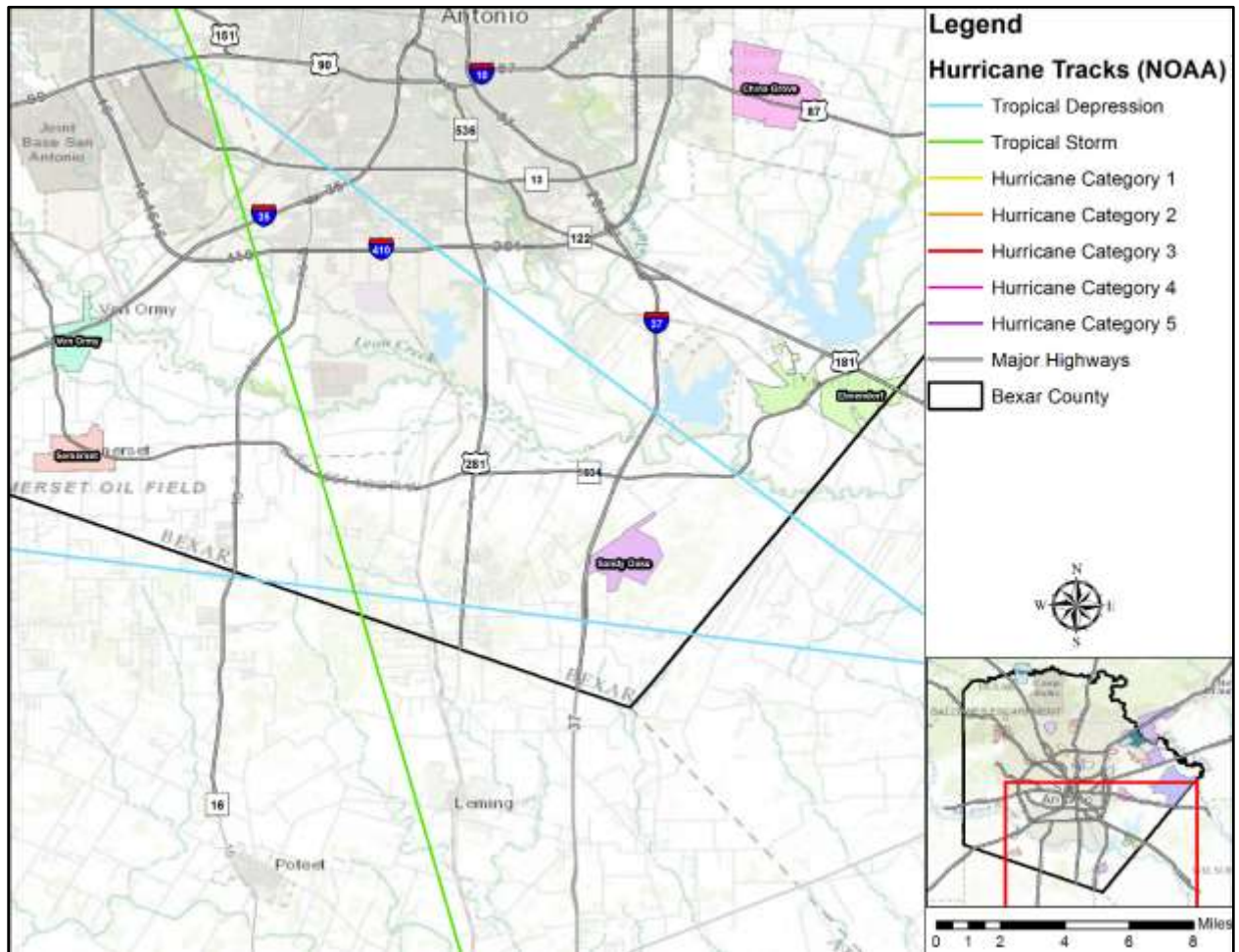
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Figure 13-2. Location of Bexar County Historic Hurricane Tracks, North



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Figure 13-4. Location of Bexar County Historic Hurricane Tracks, South



Extent

As a hurricane develops, the barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 mph, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center (NHC) in Miami, Florida. When sustained winds reach or exceed 74 mph, the storm is deemed a hurricane.

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale (Table 13-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. However, a lower category storm can inflict greater damage than higher category storms depending on where they strike, the amount of storm surge, other weather they interact with, and how slow they move.

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Table 13-1. Extent Scale for Hurricanes¹

CATEGORY	MAXIMUM SUSTAINED WIND SPEED (Mph)	MINIMUM SURFACE PRESSURE (Millibars)	STORM SURGE (Feet)
1	74–95	Greater than 980	3–5
2	96–110	979–965	6–8
3	111–130	964–945	9–12
4	131–155	944–920	13–18
5	155+	Less than 920	19+

Based on the historical storm tracks for hurricanes and tropical storms, as well as the location of the Bexar County planning area, the average extent to be mitigated is a Category 1 storm.

Historical Occurrences

Previous occurrences include storms that had a direct path through the Bexar County study area. Table 13-2 below lists the storms that have impacted the Bexar County planning area from 1950 through 2016.

Table 13-2. Historic Hurricane/Tropical Storm Events, 1950-2016²

YEAR	STORM NAME	CATEGORY	PROPERTY DAMAGE	CROP DAMAGE
1960	6/22/1960	Tropical Storm	\$0	\$0
2007	Erin	Tropical Storm	\$17,581,145	\$0
2010	Hermine	Tropical Storm	\$0	\$0
TOTALS			\$17,581,145	\$0

Significant Past Events

Tropical Storm Erin, August 16-17, 2007 – Bexar County

Tropical Storm Erin moved inland near Port Aransas on the morning of August 16th and continued toward the northwest, in the general direction of San Antonio. By noon, the remnants of Erin were located near Pleasanton in Atascosa County with winds near 30 mph, and moving toward the northwest near 14 mph. What was left of Erin was estimated to be in the Rocksprings area by midnight that night and just south of Ozona on the morning of August 17th. The track of highest rain totals associated with Erin over South Central Texas began in Karnes County and streamed northwestward across Wilson, Bexar, Kendall, Bandera, Medina, Gillespie, and Kerr Counties.

¹ Source: National Hurricane Center

² Damages reported in 2016 dollar values.

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Extremely heavy rainfall associated with the remains of Tropical Storm Erin spread across Bexar County on the 16th and into the 17th of August, with a general 4 to 5 inch rain over the county. Totals of up to 8 inches were reported at several locations in the south and west parts of San Antonio as well as between Helotes and Leon Springs. By 2 PM, most roads in the northwest part of Bexar County were closed. By 3:30 PM that afternoon, more than 39 high water rescues were reportedly underway in Bexar County. Water was almost waist-deep at Southcross Boulevard in San Antonio. Floodwaters were so deep and running so swiftly at the San Antonio High School West Campus that a masonry wall collapsed and filled the school with almost five feet of muddy water. Hallways were flooded, and desks, computers, and boxes were tossed and thrown together. A young man was driving to work in the mid-afternoon of August 16th when his vehicle struck a guardrail on Southwest Military Drive and was knocked into Six Mile Creek near South Flores Street. The young man called his family to say he had an accident, then exited the vehicle but drowned as he attempted to move to higher ground. Near midnight a young woman was driving with three friends and a baby near North Star Mall when she accidentally drove her sport utility vehicle into deeper water where it was slammed against a bridge and then was swept into a drainage ditch. The three other adults in the vehicle were able to get the baby out of the vehicle through the window and escape. When the three looked back for the driver, she was gone. Her body was found later by emergency responders when the water receded.

Hurricane Hermine, September 3-9, 2010 – Bexar County

Tropical storm Hermine made landfall near the Texas/Mexico border on the night of September 6th. The storm moved northward through South Texas into South Central Texas. Strong winds and flooding rain began in South Central Texas on September 7th. On September 8th the winds subsided, but the flooding rain continued as the remnants of Hermine moved northward into Oklahoma. South Central Texas was hit very hard with widespread rains of 8-12 inches across much of the I-35 corridor from Austin down to San Antonio.

Heavy rain produced flash flooding of Cibolo Creek along the Bexar and Comal County border, resulting in one death. A man was killed when his vehicle was swept off FM1863 at the low water crossing approximately one quarter mile east of Beck Road. After successfully driving through another flooded crossing a few moments earlier, he entered the flood waters and was swept away. More than 50 roads were closed throughout the planning area due to flooding and multiple high water rescues were required. Over 100,000 customers lost power in the county.

Probability of Future Events

Based on historical occurrences of significant hurricane wind events, the probability of future events is occasional, with a frequency of occurrence of one event probable in the next five years.

Vulnerability and Impact

Hurricanes and Tropical storms can cause major damage to large areas; hence all existing buildings, facilities, and populations are equally exposed and vulnerable to this hazard and could potentially be impacted. The Bexar County planning area features multiple mobile or manufactured home parks throughout the planning area and many participating jurisdictions. These parks are typically more vulnerable to thunderstorm wind events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including 16 jurisdictions. These homes would also be more vulnerable. The U.S. Census data indicates a total of 19,128 manufactured homes located in the Bexar County planning area, including most participating jurisdictions (Table 13-3). (Nine of the participating jurisdictions do not feature manufactured

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homes.) In addition, 44.8% (approximately 302,761 structures) of the single family residential (SFR) structures in the Bexar County planning area were built before 1980.³ These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant thunderstorm wind events.

Table 13-3. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Alamo Heights	0	2,854
Balcones Heights	22	1,234
Castle Hills	0	1,705
China Grove	18	132
Converse	74	1,902
Elmendorf	242	152
Fair Oaks Ranch	0	292
Grey Forest	9	181
Helotes	31	579
Hill Country Village	4	161
Hollywood Park	0	934
Kirby	191	2,117
Leon Valley	0	2,764
Live Oak	0	2,204
Olmos Park	0	809
St. Hedwig	152	214
Sandy Oaks ⁴	Unknown	Unknown
Schertz	915	2,730
Shavano Park	0	485
Somerset	111	267
Terrell Hills	0	1,468

³ Source: U.S. Census Bureau data estimates for 2015

⁴ The City of Sandy Oaks was incorporated in 2014. Census data is not available for this community.

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JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Universal City	76	3,401
Von Ormy	178	151
Windcrest	26	1,868
Bexar County⁵	19,128	302,761

The following critical facilities would be vulnerable to hurricane events in each participating jurisdiction, respectively.

Table 13-4. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Bexar County	3 Government Facilities, EOC, Sheriff's Office, Police Station, 4 Power Stations, 3 Public Works Facilities, Fire Marshall Office, 11 Fire Stations, 71 Schools
Alamo Heights	Hospital, 2 Government Facilities, 6 Schools, AT&T Facility (communications HUB), College
Balcones Heights	Hospital, Police Station, Government Facility, Fire Station, School
Castle Hills	Police Station (includes administration and communications), Fire Station, 2 Government Facilities, 6 Schools, 3 Water Facilities, AT&T Facility (switching station)
China Grove	Government Facility, Fire Station
Converse	Government Facility, Police Department, 2 Fire Stations, 4 Water Facilities, 2 Pump Stations, 4 Lift Stations
Elmendorf	Police Station (includes City Hall and Water Department), Church, Public Service Facility (Electrical)
Fair Oaks Ranch	Police Station (includes EOC), Fire Station, School, 5 Water Facilities, Sewer Treatment Facility
Grey Forest	Police Department (includes City Hall), Fire Department, Water facility
Helotes	Police Department (includes City Hall, Fire Department, and dispatch center), Evacuation Center, 7 Schools, School Transportation Center, 2 Medical Facilities, 3 Fire Stations, 2 Evacuation Routes, 3 Lift Stations, 5 Water Facilities, Utility Offices and 2 Distribution Centers, Emergency Equipment Provider, Government Facility, Radio Tower
Hill Country Village	None
Hollywood Park	AT&T Facility (communications HUB), 2 Government Facilities, Water Storage Facility
Kirby	Police Station, Fire Station, Public Works, Government Facility, 2 Schools, Community Center

⁵ County totals include all participating jurisdictions, unincorporated areas, and the City of San Antonio.

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JURISDICTION	CRITICAL FACILITIES
Leon Valley	Fire Station, Government Facility, Police Station, Public Works, 6 Water Facilities, 4 Shelters, 3 Schools, Dispatch/Communications Center
Live Oak	Police Station, Fire Station, Public Works, 5 Water Facilities, Government Facility, Hospital, 3 Schools, 2 School Support Facilities, 2 Colleges, Power Sub-Station
Olmos Park	Fire Department
St. Hedwig	2 Government Facilities, Fire Department, School
Sandy Oaks	Government Facility
Schertz	Police Station (includes EMS, Fire Department, EOC, Community Center, City Hall, Civic Center, and Administration), Fire Station, 9 Schools, Hospital, 7 Water Facilities, 18 Sewer Facilities (including lift stations and treatment plants)
Shavano Park	Government Facility, Police Station, Communication/Dispatch Facility, Fire Station, Public Works, 8 Water Facilities
Somerset	Sewer Treatment Facility, 4 Schools
Terrell Hills	2 Government Facilities, Fire Department, School
Universal City	Police Station, Fire Station, 5 Schools
Von Ormy	Police Station
Windcrest	Police Station (includes City Hall, Communications/Dispatch Center, and Fire Department), 8 Water Facilities, 3 Government Facilities, School

Table 13-5 shows impact or loss estimation for storms impacting the county. Damages are reported on a countywide basis and are not available for each participating jurisdiction. Annual loss estimates were based on the 66 year reporting period for such damages (Table 13-2). The average annual loss estimate for Bexar County, which includes all participating jurisdictions, is approximately \$266,381.

Table 13-5. Summary of Hurricane Events and Potential Annualized Losses, 1950-2016⁶

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
Bexar County	3	\$17,581,145	\$266,381

While the potential severity of impact from a hurricane for the Bexar County planning area is considered minor, the historical fatalities support a substantial severity of impact; meaning multiple deaths, complete shutdown of critical facilities and services for 30 days or more, and more than 50 percent of property would be destroyed or have major damage.

⁶ Values are in 2016 dollars.

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Assessment of Impacts

Hurricane events have the potential to pose a significant risk to people, and can create dangerous and difficult situations for public health and safety officials. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees, causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Driving conditions in all jurisdictions may be dangerous during a hurricane or tropical storm event, especially over elevated bridges, heightening the risk of injury and accidents during events.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Hurricane events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages often result in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Extreme hurricane events may rupture gas lines and down trees and power lines, increasing the risk of structure fires during and after a storm event.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- City or county departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the county, cities and its residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by the hurricane may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to hurricane damage.
- Large scale hurricanes can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.

The economic and financial impacts of a hurricane on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The

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level of preparedness and pre-event planning done by the county, communities, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any hurricane event.

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Hazard Description

Dams are water storage, control, or diversion structures that impound water upstream in reservoirs. Dam failure can take several forms, including a collapse of or breach in the structure. While most dams have storage volumes small enough that failures have few or no repercussions, dams storing large amounts can cause significant flooding downstream. Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which cause most failures;
- Inadequate spillway capacity, resulting in excess overtopping of the embankment;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, or maintain gates, valves, and other operational components;
- Improper design or use of improper construction materials;
- Failure of upstream dams in the same drainage basin;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion;
- Destructive acts of terrorism; and,
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments, leading to structural failure.

Benefits provided by dams include water supplies for drinking, irrigation and industrial uses, flood control, hydroelectric power, recreation, and navigation. At the same time, dams also represent a risk to public safety. Dams require ongoing maintenance, monitoring, safety inspections, and sometimes even rehabilitation to continue safe service.

In the event of a dam failure, the energy of the water stored behind the dam is capable of causing rapid and unexpected flooding downstream, resulting in loss of life and substantial property damage. A devastating effect on water supply and power generation could be expected as well. The terrorist attacks of September 11, 2001 generated increased focus on protecting the country’s infrastructure, including ensuring the safety of dams.

One major issue with the safety of dams is their age. The average age of America’s 84,000 dams is 52 years. More than 2,000 dams near population centers are in need of repair, according to statistics released in 2009

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by the Association of State Dam Safety Officials.¹ In addition to the continual aging of dams, there have not been significant increases in the number of safety inspectors, resulting in haphazard maintenance and inspection.

The Association of State Dam Safety Officials estimate that \$18.2 billion will be needed to repair all high-hazard dams, but the total for all state dam-safety budgets is less than \$35 million.² The current maintenance budget does not match the scale of America's long-term modifications of its watersheds. Worse still, more people are moving into risky areas. As the American population grows, dams that once could have failed without major repercussions are now upstream of cities and development.



Location

The State of Texas has 7,126 dams, all regulated by the Texas Commission on Environmental Quality (TCEQ). Of these, 1,046 are considered “high-hazard,” 725 are considered “significant-hazard,” and 5,355 are considered “low-hazard”.³ For dams in Bexar County, location, volume, elevation, condition, and classification information were factored into the risk ranking in Figure 14-1, which illustrates general locations for each dam in the area. Currently, there are 67 dams located in the Bexar County planning area: 35 are classified as “high-hazard”, 2 as “significant-hazard”, and 30 as “low-hazard” dams, as determined by the National Inventory of Dams (NID). Low and significant dams in the planning area have no history of failure. In the event of a breach, no loss of life or impact to critical facilities is expected, therefore, these 32 dams will not be profiled. The 35 high hazard dams in the planning area are fully profiled.

¹ Source: Association of State Dam Safety Officials, Journal of Dam Safety.

² Source: <http://www.damsafety.org/news/?p=c0fdade4-ab98-4679-be22-e3d7f14e124f>

³ Source: <http://www.infrastructurereportcard.org/wp-content/uploads/2013/02/2012-Texas-Report-Card-FINAL.pdf>

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Figure 14-1. Dam Locations in Bexar County

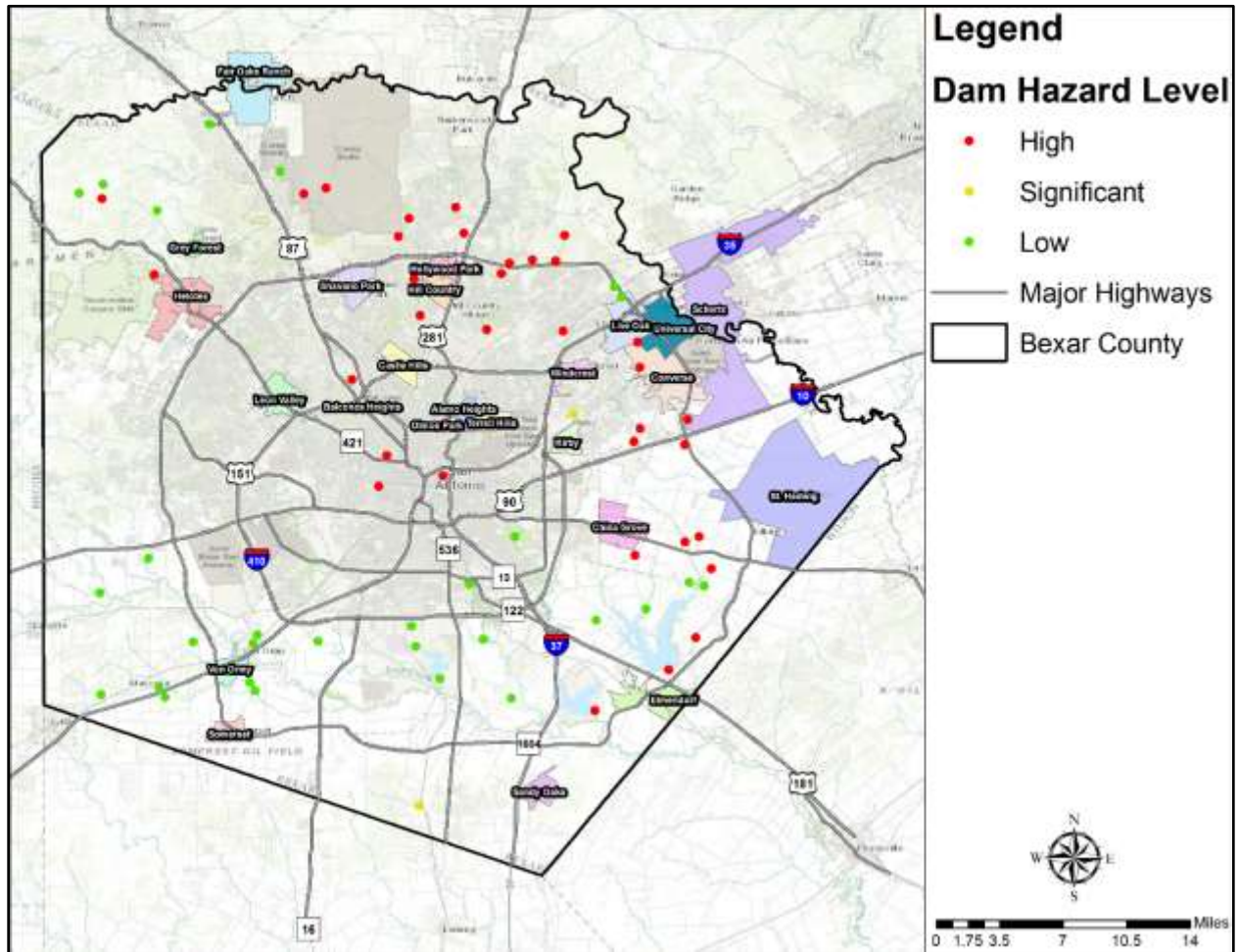


Table 14-1. Bexar County Dam Survey

JURISDICTION	DAM NAME	HEIGHT (ft.)	STORAGE (Acre ft.)	CONDITION ⁴	IMPACT
Bexar County	WOODLAWN LAKE DAM	20	460	Fair	High
Bexar County	MARTINEZ CREEK WS SCS SITE 2 DAM	27	1,085	Satisfactory	High
Bexar County	CALAVERAS CREEK WS SCS SITE 7 DAM	34	1,403	Satisfactory	Low
Bexar County	VICTOR BRAUNIG DAM	80	32,324	Fair	High
Bexar County	MARTINEZ CREEK WS SCS SITE 4 DAM	44	1,632	Satisfactory	Significant
Bexar County	MARTINEZ CREEK WS SCS SITE 1 DAM	38	3,509	Satisfactory	Significant

⁴ Condition provided if available.

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JURISDICTION	DAM NAME	HEIGHT (ft.)	STORAGE (Acre ft.)	CONDITION ⁴	IMPACT
Bexar County	MARTINEZ CREEK WS SCS SITE 5 DAM	45	1,922	Satisfactory	Significant
Bexar County	ELMENDORF LAKE DAM	10	105	Satisfactory	High
Bexar County	MARTINEZ CREEK WS SCS SITE 6A DAM	44	1,922	Satisfactory	Low
Bexar County	CALAVERAS CREEK WS SCS SITE 6 DAM	43	3,768	Satisfactory	Low
Bexar County	CALAVERAS CREEK WS SCS SITE 10 DAM	47	2,825	Satisfactory	Low
Bexar County	CALAVERAS CREEK WS SCS SITE 3 DAM	41	3,298	Satisfactory	Low
Bexar County	CALAVERAS CREEK DAM	86	97,441	Satisfactory	High
Bexar County	CALAVERAS CREEK WS SCS SITE 8 DAM	27	1,413	Satisfactory	Low
Bexar County	SALADO CREEK WS SCS SITE 2 DAM	57	4,317	Satisfactory	Low
Bexar County	SALADO CREEK WS SCS SITE 4 DAM	57	3,957	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 5 DAM	58	5,807	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 13A DAM	69	3,053	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 7 DAM	52	6,864	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 13B DAM	49	1,898	Satisfactory	High
Bexar County	EL DORADO LAKE DAM	5	78	Not Rated	Low
Helotes	WILDLAKE DAM	40	462	Not Rated	Low
Bexar County	SALADO CREEK WS SCS SITE 9 DAM	55	2,612	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 6 DAM	65	2,830	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 12 DAM	98	7,837	Satisfactory	High
Bexar County	OLMOS DAM	58	21,970	Not Rated	High
Bexar County	SALADO CREEK WS SCS SITE 10 DAM	82	4,063	Satisfactory	High
Bexar County	SALADO CREEK WS SCS SITE 1 DAM	83	8,675	Satisfactory	Low
Bexar County	DENMAN PARK DAM	20	19.1	Not Rated	No Impact
Bexar County	SALADO CREEK WS NRCS SITE 15R DAM	53	8,741	Satisfactory	High

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JURISDICTION	DAM NAME	HEIGHT (ft.)	STORAGE (Acre ft.)	CONDITION ⁴	IMPACT
Bexar County	BROOKLYN STREET LOCK AND DAM	20	27.6	Not Rated	Low
Bexar County	SALADO CREEK WS SCS SITE 8 DAM	61	7,100	Satisfactory	High
Bexar County	MARTINEZ CREEK WS SCS SITE 3 DAM	30	1,622	Satisfactory	Low
Bexar County	WHITE LAKE DAM	42.3	420	Fair	Low
Bexar County	SALADO CREEK WS SCS SITE 11 DAM	80	6,318	Satisfactory	High

Extent

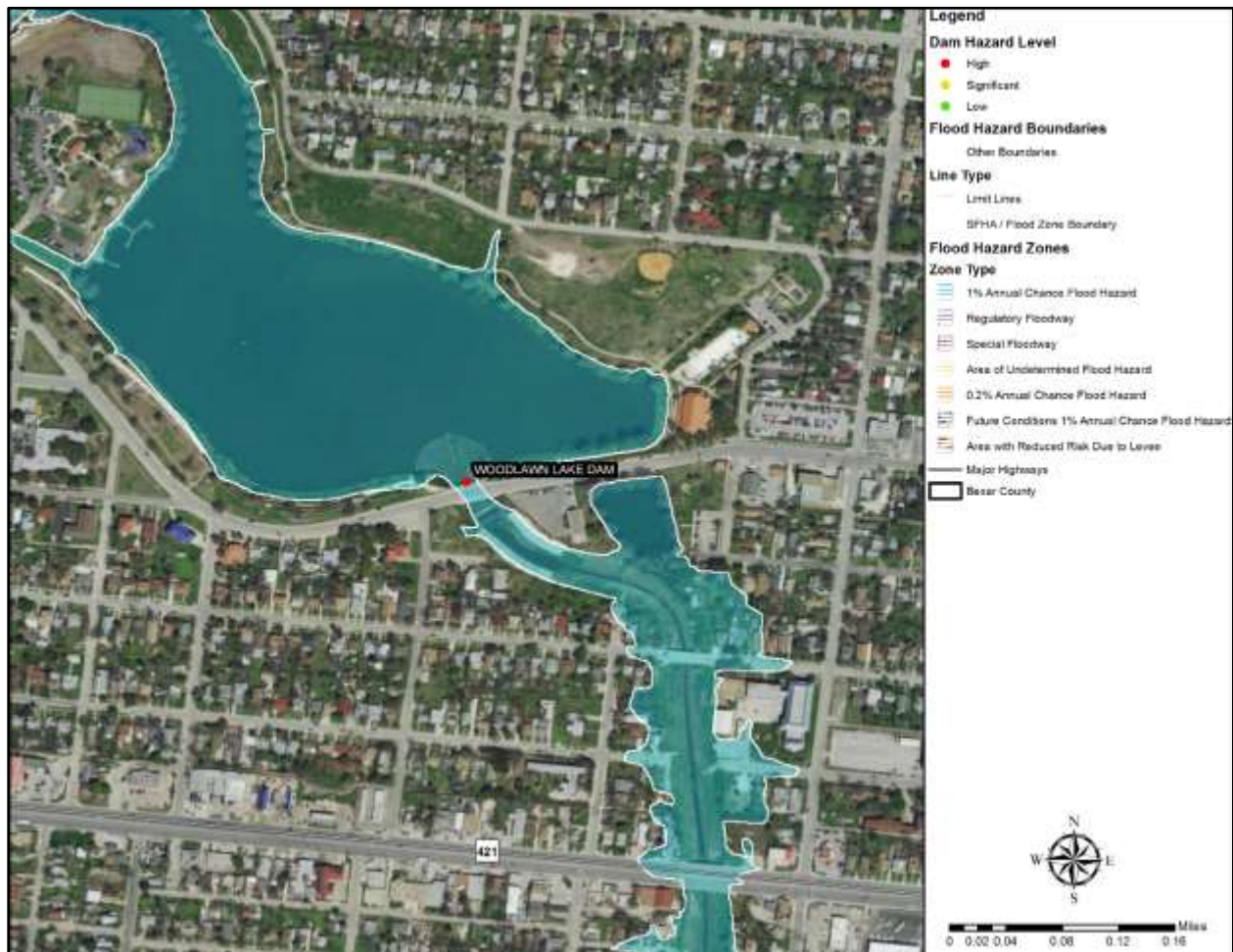
The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam's failure; not the probability of failure. For dams with a maximum storage capacity of less than 10,000 acre-feet, the area within one mile of the dam is considered to be at risk to potential dam failure hazards. Dams with a maximum storage capacity between 10,000 and 100,000 acre-feet, the area within 3 miles of the dam is considered to be at risk to potential dam failure hazards.

Figures 14-2 through 14-36 are inundation maps that show the flood risk areas for each high hazard dam. An estimated depth for dam breach is indicated in the paragraph below Figures 14-2 through 14-36.⁵

⁵ Dam breach depth is an estimate based on best available data, not statistical data.

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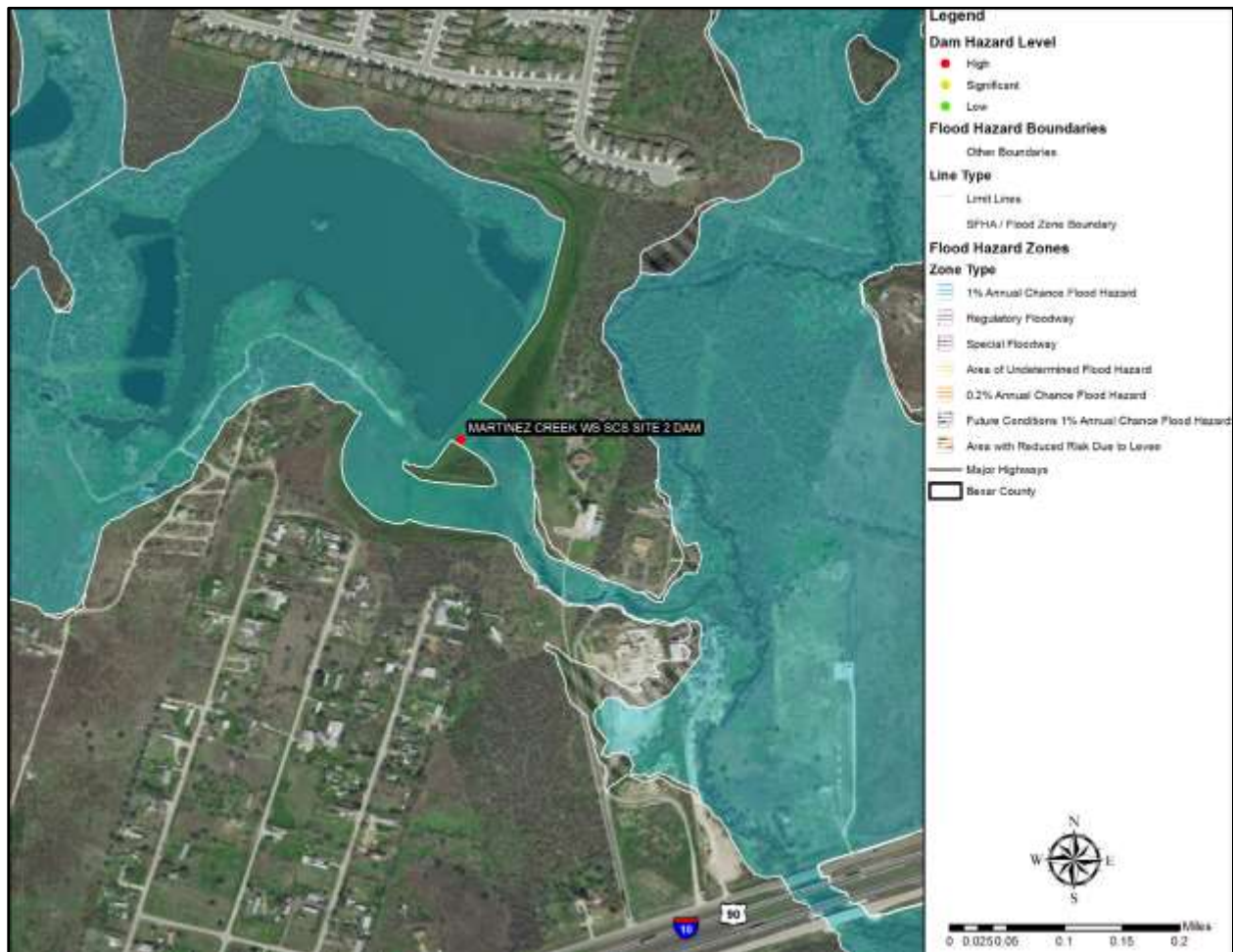
Figure 14-2. Woodlawn Lake Dam Flood Risk Area



Woodlawn Lake is on the Alazan Creek in the City of San Antonio and is used for recreation purposes. Woodlawn Lake Dam is earthen construction, owned by the City of San Antonio and was constructed in 1961. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 3,417 people, 1,191 housing units, 9 commercial facilities, 1 government facility, 1 nuclear reactor, materials, and waste facility, and 1 manufacturing facility vulnerable. In the event of a breach, it is estimated the average breach width would be 93 feet with a maximum breach flow of 11,152 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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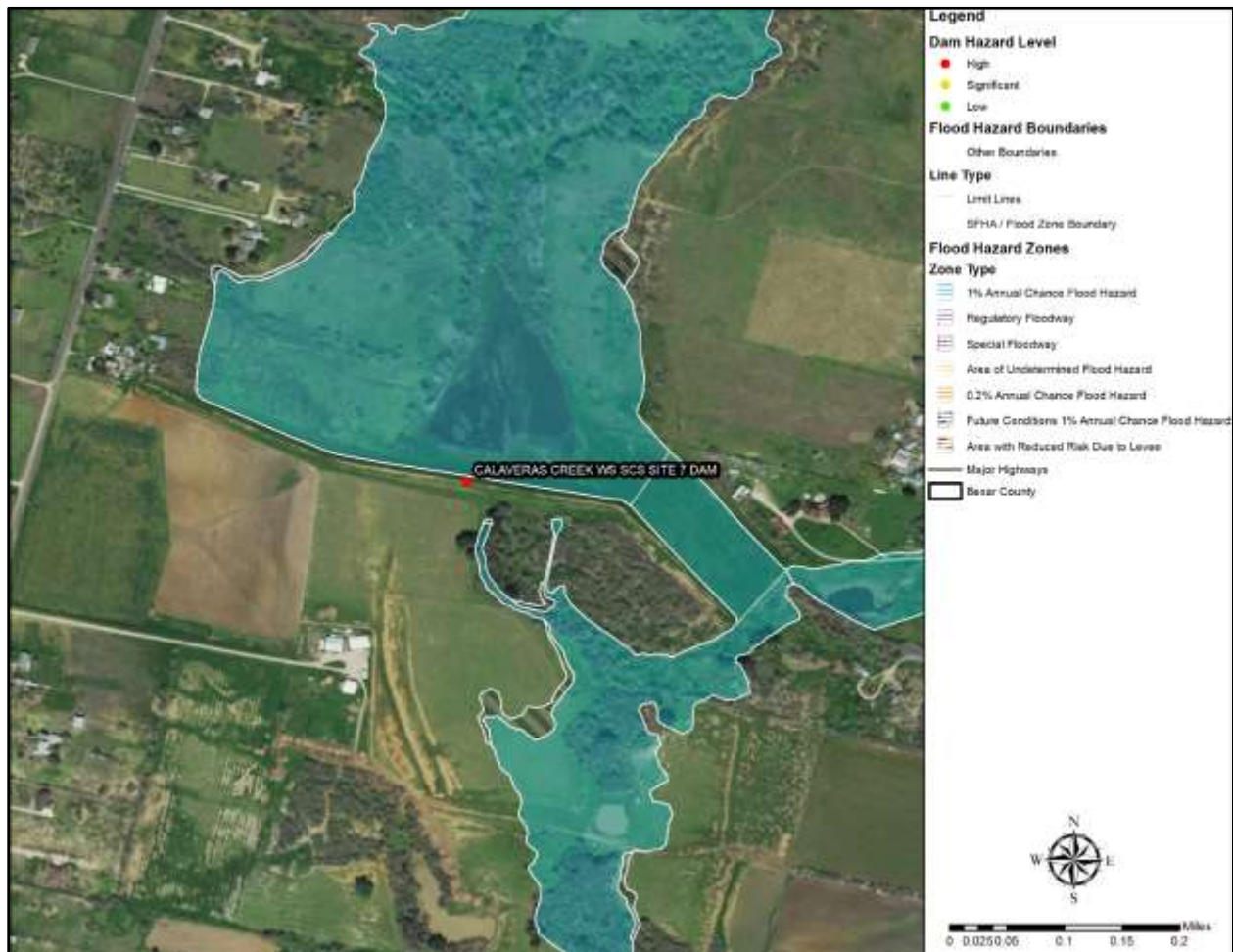
Figure 14-3. Martinez Creek WS SCS Site 2 Dam Flood Risk Area



Martinez Creek Watershed SCS Site 2 Dam is on a tributary of Martinez Creek in San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1964. The extent classification is considered high and the area located near the dam is a rural area. In the event of dam failure, there would be 1 person, 1 housing unit, 1 transportation facility, and 1 dam vulnerable. In the event of a breach, it is estimated the average breach width would be 124.3 feet with a maximum breach flow of 10,580 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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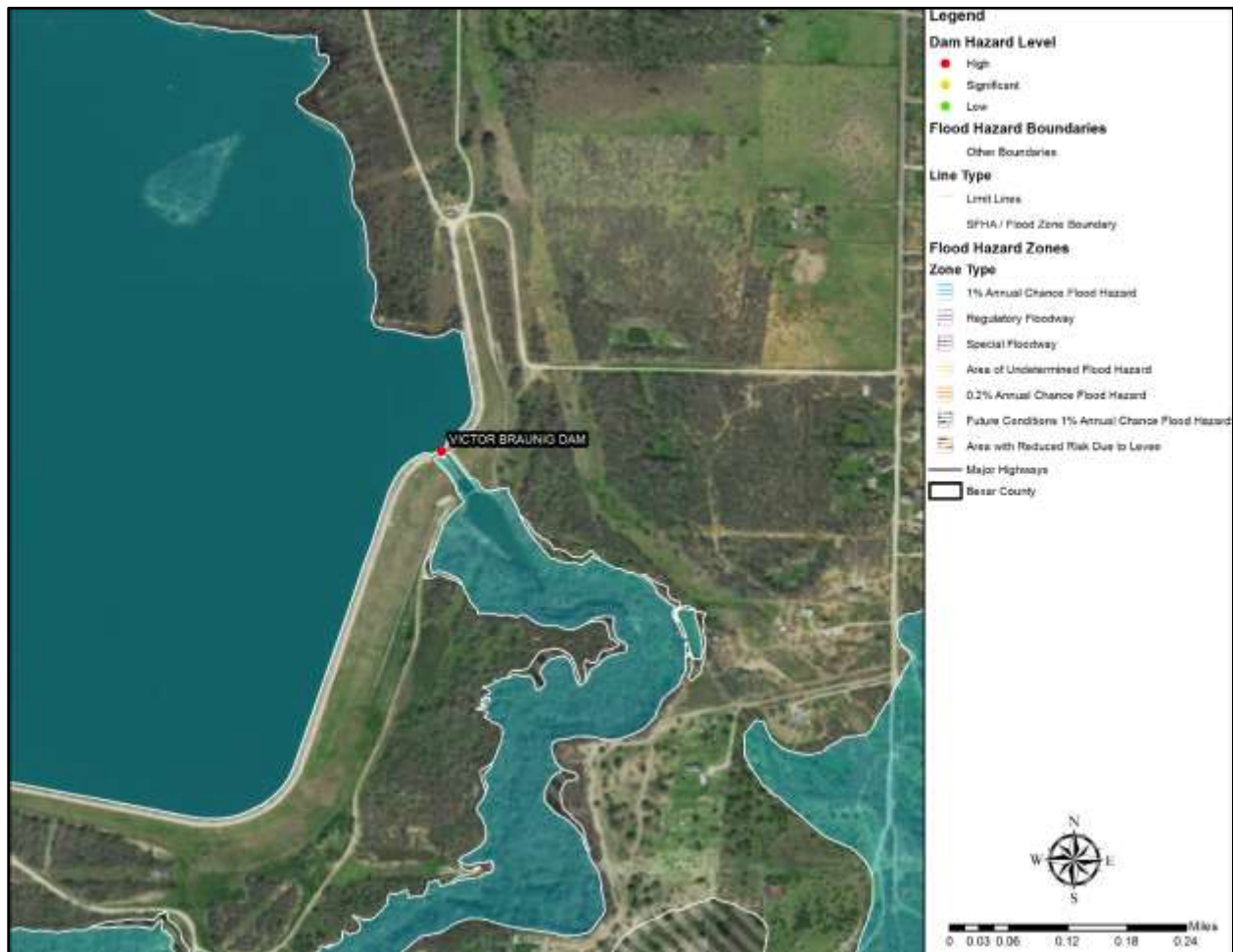
Figure 14-4. Calaveras Creek WS SCS Site 7 Dam Flood Risk Area



Calaveras Creek Watershed SCS Site 7 Dam is on a tributary of Chupaderas Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1956. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be farm land and outbuildings vulnerable. In the event of a breach, it is estimated the average breach width would be 140.4 feet with a maximum breach flow of 5,079 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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Figure 14-5. Victor Braunig Dam Flood Risk Area



Victor Braunig Dam is on the Arroyo Seco River in the City of San Antonio and is used for recreation purposes. The dam is owned by the City of San Antonio and was constructed in 1963 by earthen construction. The extent classification is considered high and the area located near the dam is a semi-densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 1,352 people, 565 housing units, and 1 dam vulnerable. In the event of a breach, it is estimated the average breach width would be 381 feet with a maximum breach flow of 547,901 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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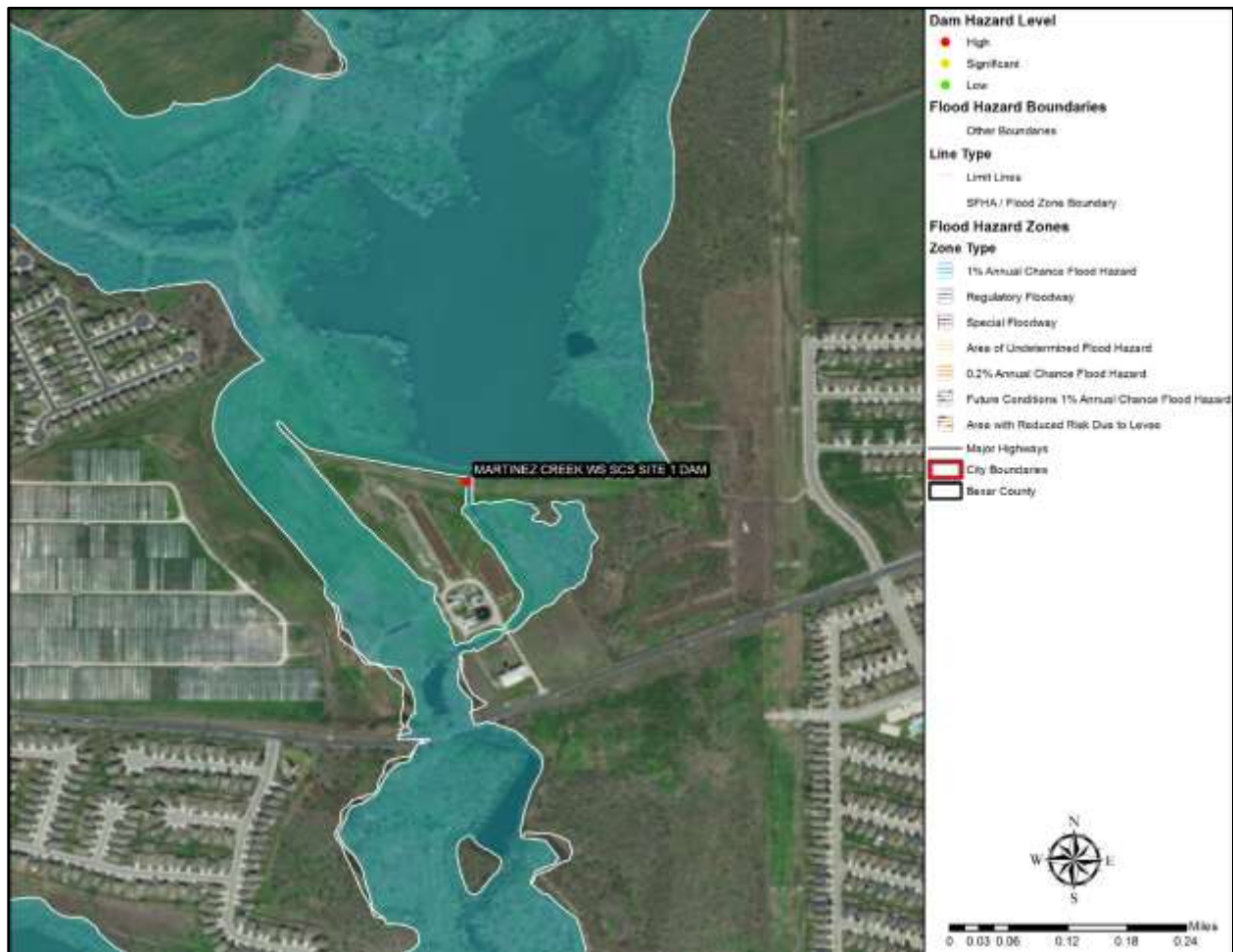
Figure 14-6. Martinez Creek WS SCS Site 4 Dam Flood Risk Area



Martinez Creek Watershed SCS Site 4 Dam is on a tributary of Salitrillo Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1964. The extent classification is considered significant and the area located near the dam is a densely populated area. While the storage capacity of the dam is considered low, the extent classification is considered significant due to the substantial residential development in the immediate area that could be vulnerable. In the event of dam failure, there would be multiple residential structures and seven commercial structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 155.5 feet with a maximum breach flow of 9,988 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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Figure 14-7. Martinez Creek WS SCS Site 1 Dam Flood Risk Area



Martinez Creek Watershed SCS Site 1 Dam is on Martinez Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1964. The extent classification is significant and the area located near the dam is a densely populated area. While the storage capacity of the dam is considered low, the extent classification is considered significant due to the substantial residential and commercial development in the immediate area that could be vulnerable. In the event of dam failure, there would be a wastewater treatment Plant, multiple residential structures and 15 commercial structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 181.5 feet with a maximum breach flow of 14,531 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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Figure 14-8. Martinez Creek WS SCS Site 5 Dam Flood Risk Area



Martinez Creek Watershed SCS Site 5 Dam is located on Salitrillo Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1964. The extent classification is considered significant and the area located near the dam is a densely populated area. While the storage capacity of the dam is considered low, the extent classification is considered significant due to the substantial residential and commercial development in the immediate area that could be vulnerable. In the event of dam failure, there would be an elementary school, a park, multiple residential structures and 34 commercial structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 162.9 feet with a maximum breach flow of 18,924 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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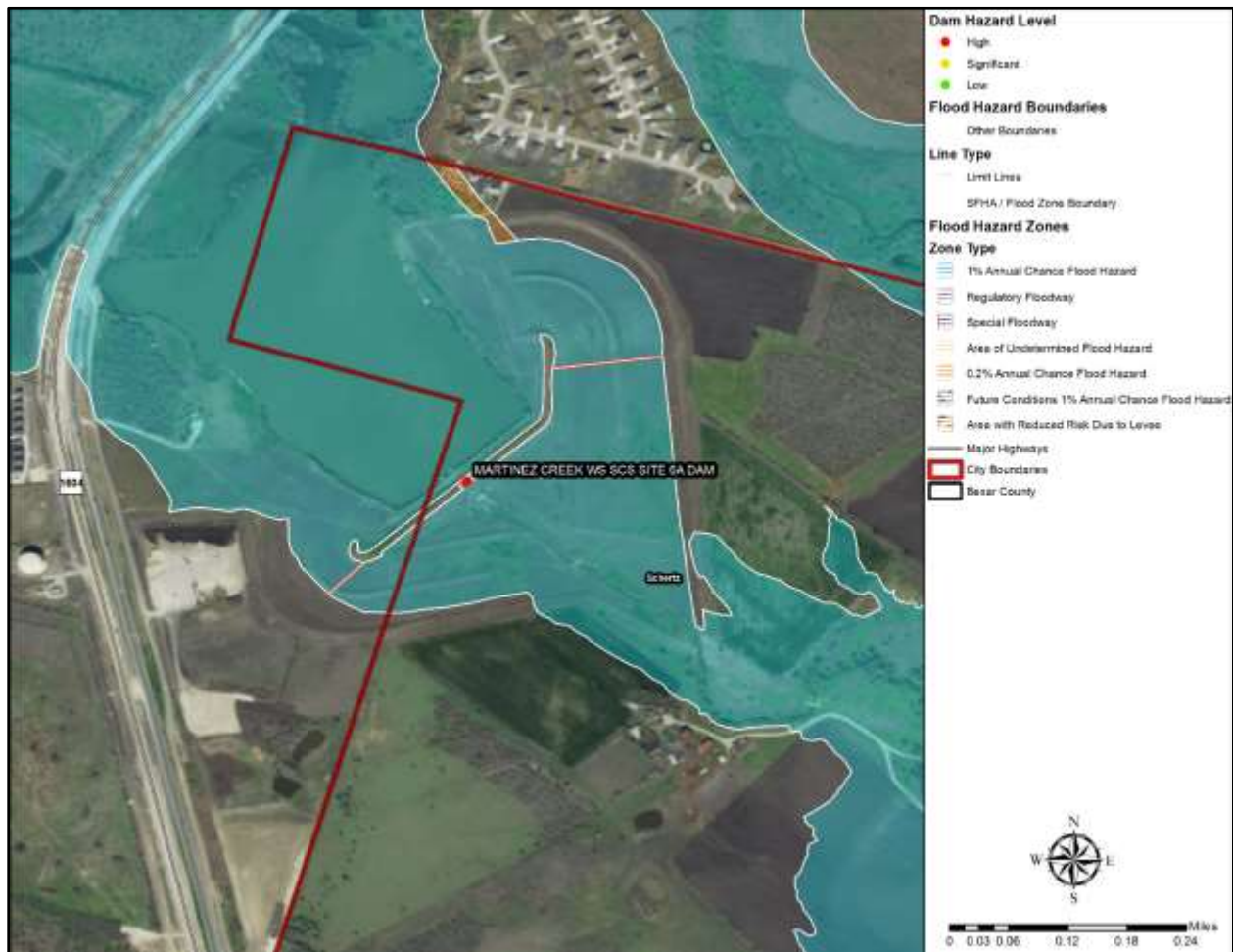
Figure 14-9. Elmdorf Lake Dam Flood Risk Area



Elmdorf Lake Dam is formed by Elmdorf Lake on Apache Creek in San Antonio and is used for recreational purposes. It is owned by the City of San Antonio and was constructed in 1967. It is a concrete structure and the foundation rock and soil. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 4,065 people, 1,346 housing units, 2 chemical and hazardous materials facilities, 1 emergency services facility, 7 commercial facilities, 1 government facility, and 2 dams vulnerable. In the event of a breach, it is estimated the average breach width would be 54.1 feet with a maximum breach flow of 2,539 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 10 feet.

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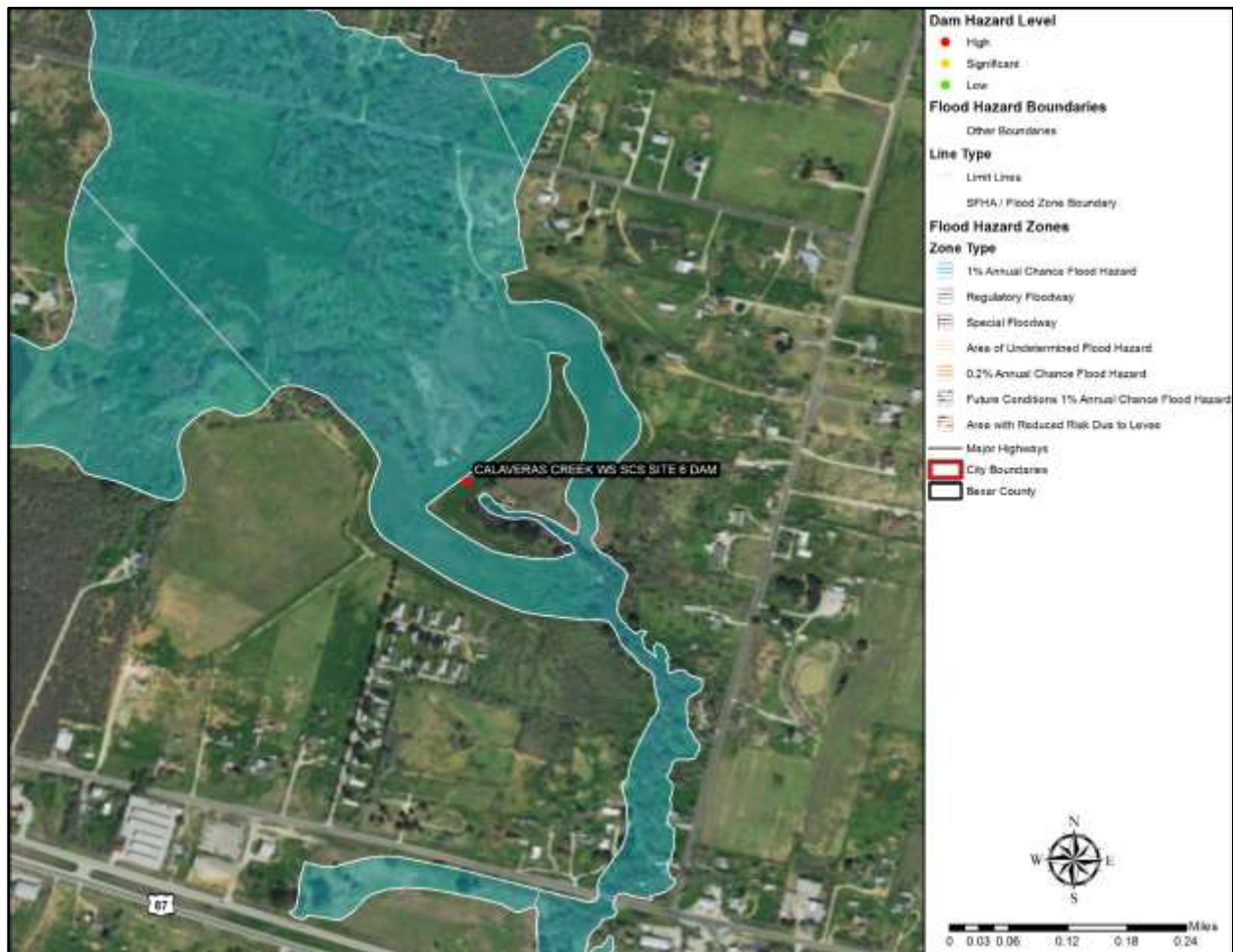
Figure 14-10. Martinez Creek WS SCS Site 6A Dam Flood Risk Area



Martinez Creek Watershed SCS Site 6A Dam is on Salitrillo Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1966. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be farm land, approximately two dozen residential structures, and a solar panel farm vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 162.0 feet with a maximum breach flow of 48,597 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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Figure 14-11. Calaveras Creek WS SCS Site 6 Dam Flood Risk Area



Calaveras Creek Watershed SCS Site 6 Dam is on Chupaderas Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1957. The extent classification is considered low and the area located near the dam is a semi-densely populated area. In the event of dam failure, there would be a church, approximately 50 residential structures and 11 commercial structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 190.60 feet with a maximum breach flow of 13,132 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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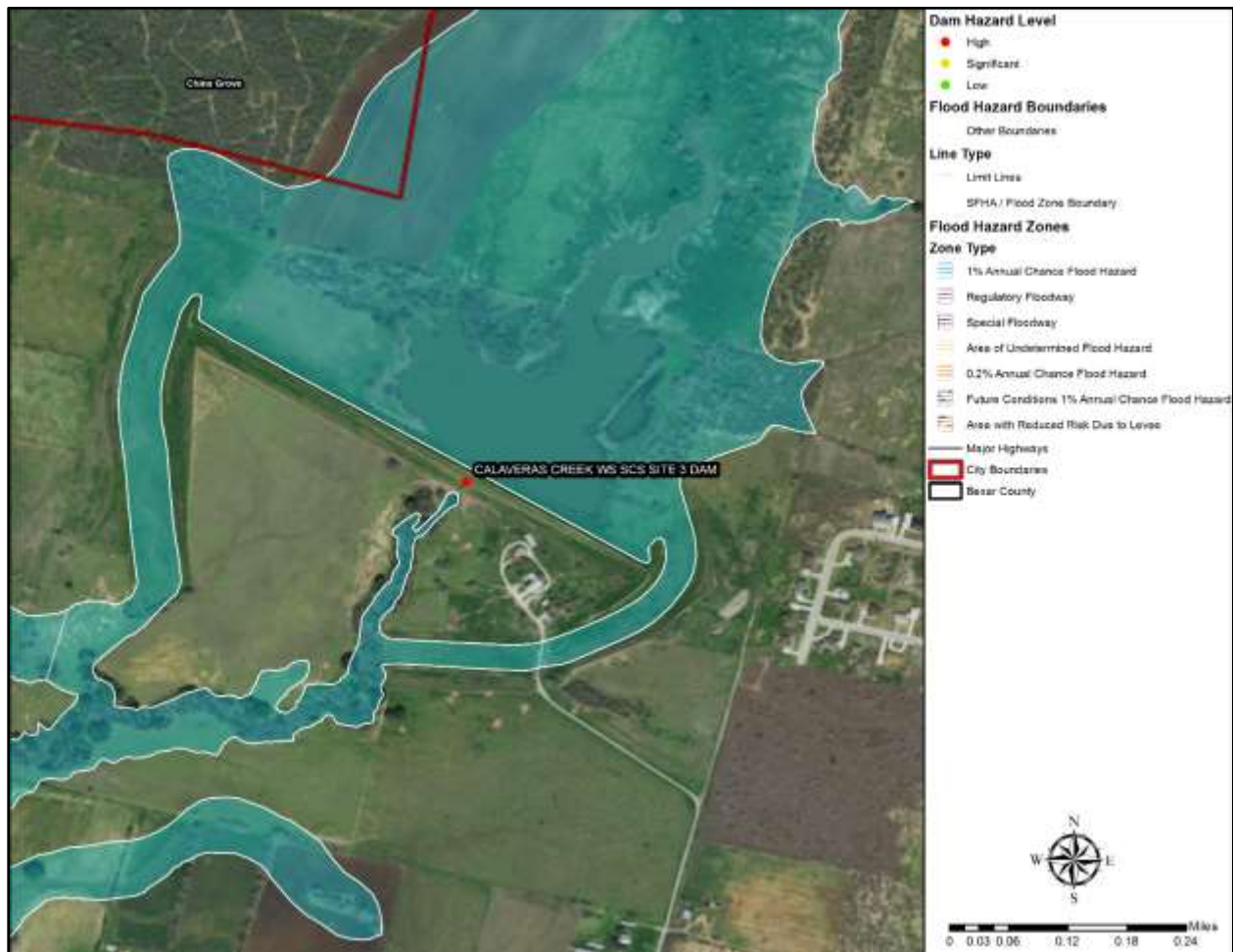
Figure 14-12. Calaveras Creek WS SCS Site 10 Dam Flood Risk Area



Calaveras Creek Watershed SCS Site 10 Dam is on Parita Creek in Bexar County and is used for irrigation purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1958. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be minimal structures vulnerable with the primary impact on farm land and out buildings. In the event of a breach, it is estimated the average breach width would be 181.3 feet with a maximum breach flow of 20,497 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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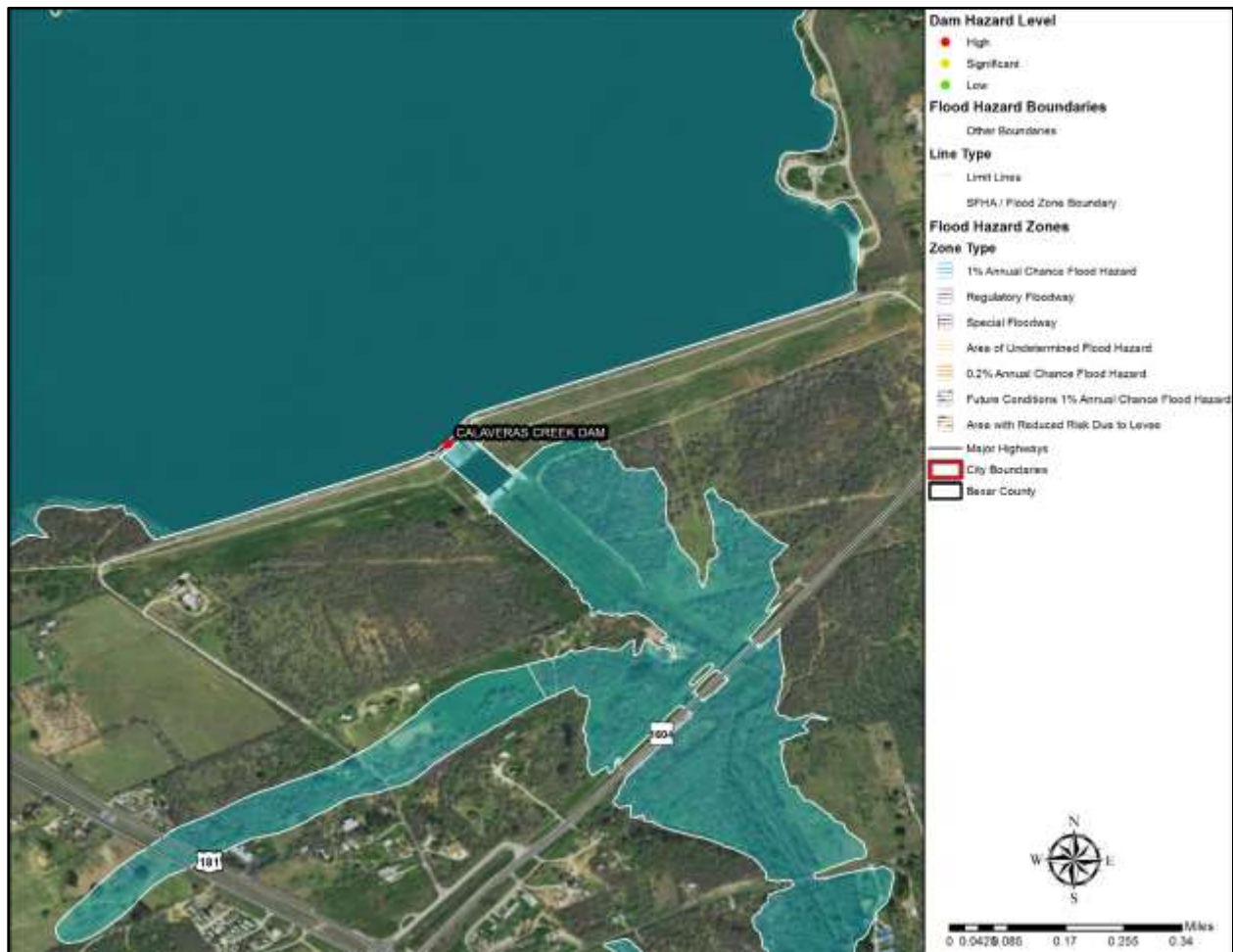
Figure 14-13. Calaveras Creek WS SCS Site 3 Dam Flood Risk Area



Calaveras Creek Watershed SCS Site 3 Dam is on Calaveras Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1954. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be approximately two dozen residential structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 182.2 feet with a maximum breach flow of 24,571 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

Section 14: Dam Failure

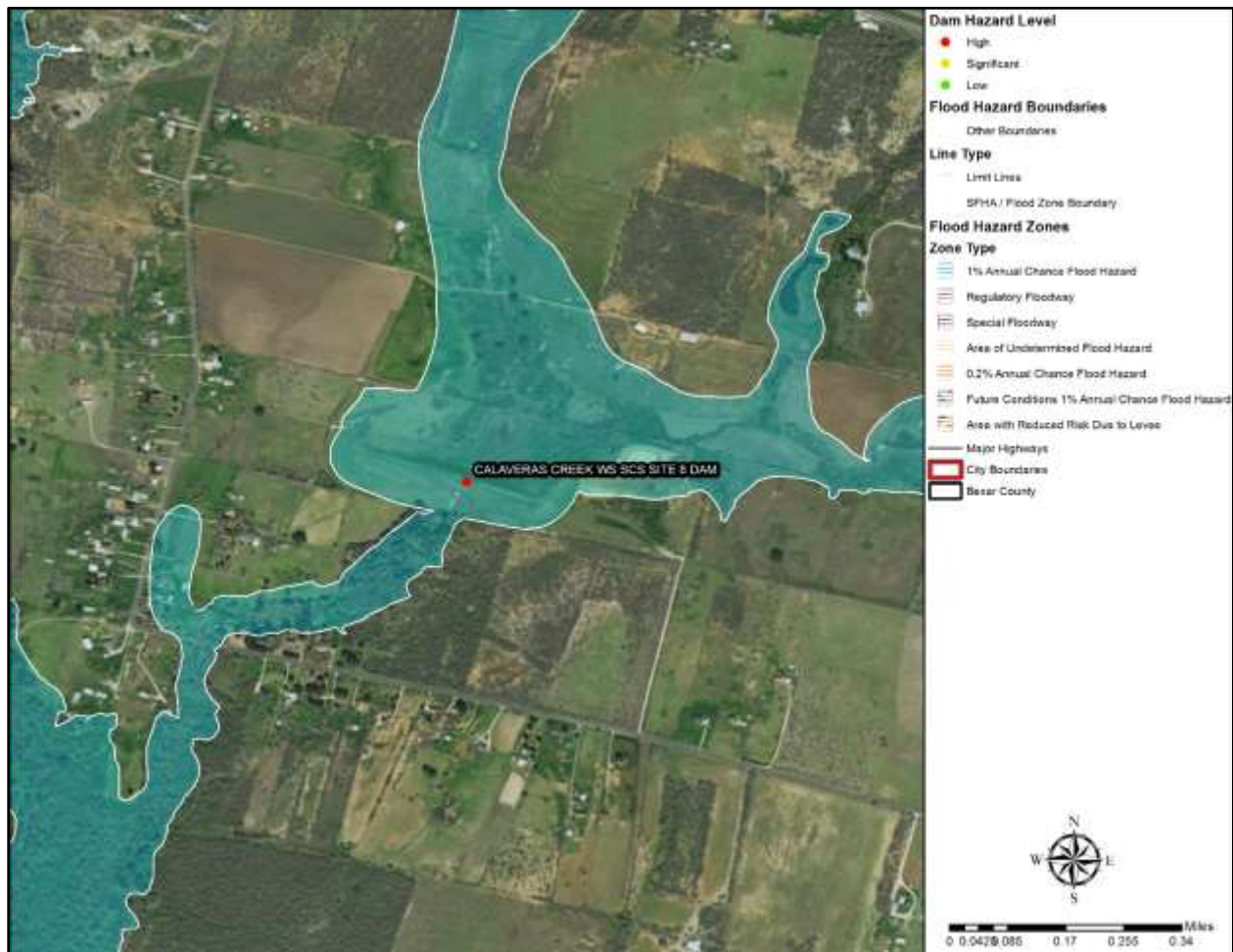
Figure 14-14. Calaveras Creek Dam Flood Risk Area



Calaveras Creek Dam is on Calaveras Creek in Bexar County and is used for flood control and recreational purposes. The earthen dam is owned by the City of San Antonio and was constructed in 1969. The extent classification is considered high and the area located near the dam is a densely populated area. In the event of dam failure, there would be several hundred homes, an elementary school, several parks, a power station, and dozens of businesses vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 511.1 feet with a maximum breach flow of 863,520 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

Section 14: Dam Failure

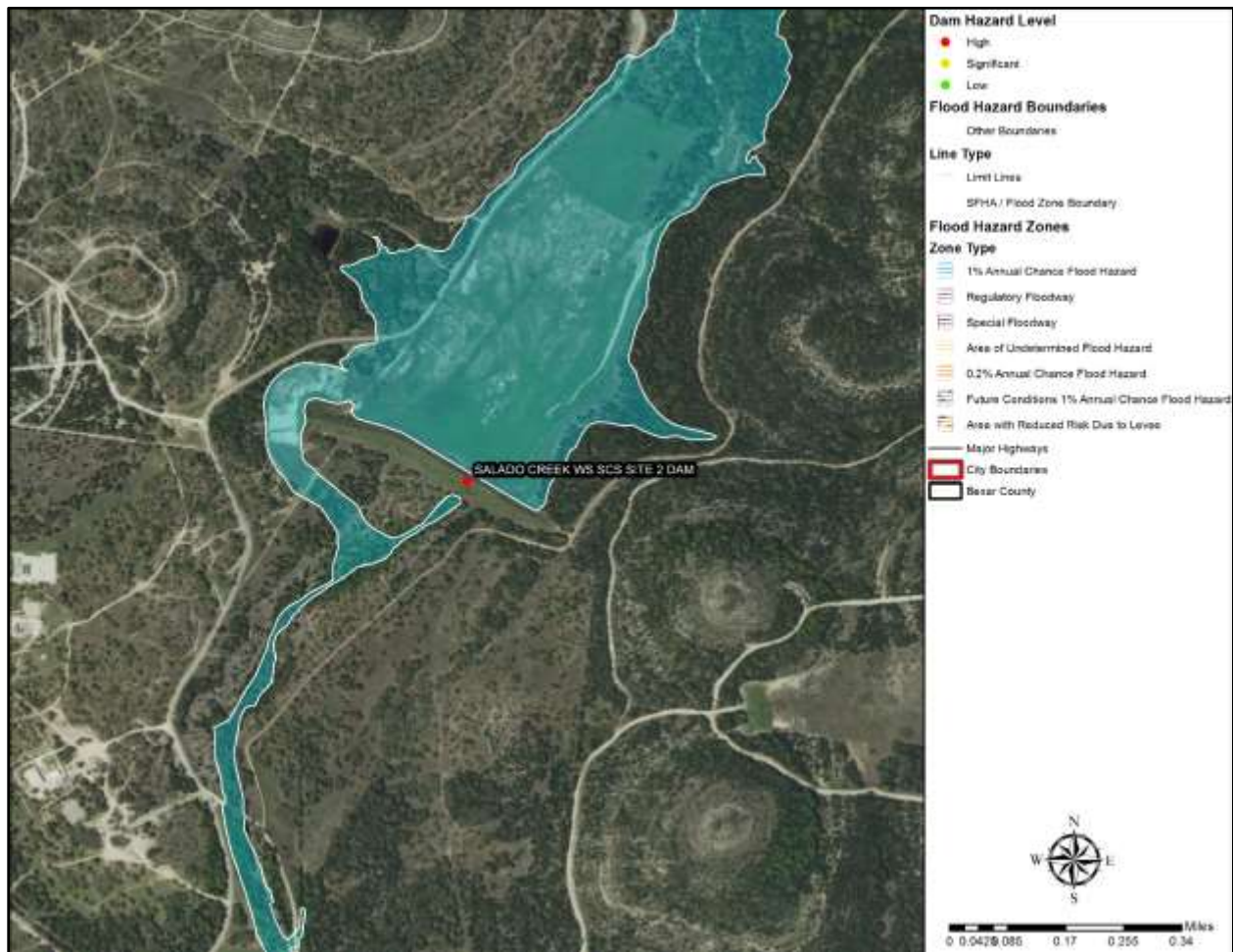
Figure 14-15. Calaveras Creek WS SCS Site 8 Dam Flood Risk Area



Calaveras Creek Watershed SCS Site 8 Dam is on a tributary of Chupaderas Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1954. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be approximately two dozen residential structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 132.8 feet with a maximum breach flow of 12,733 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

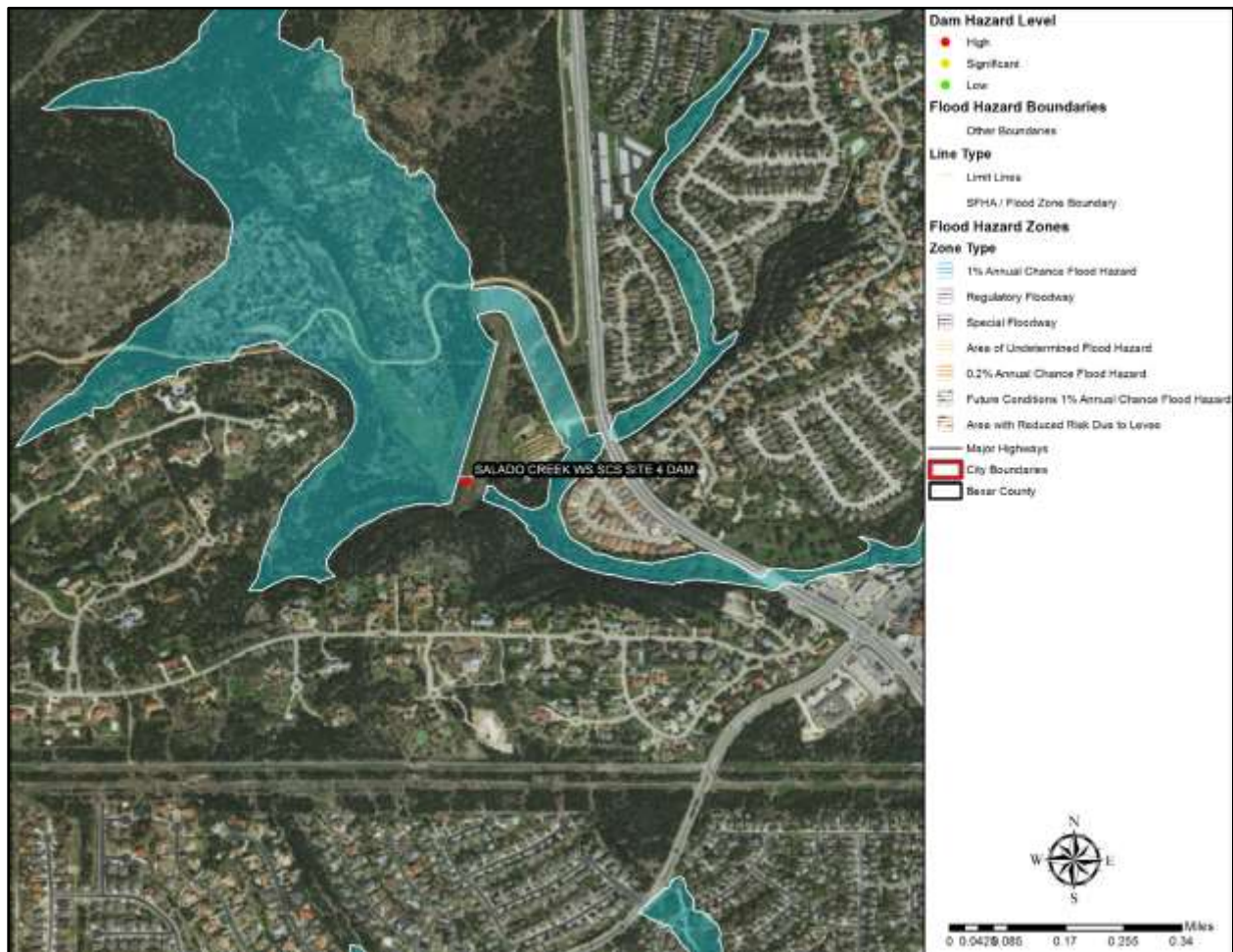
Figure 14-16. Salado Creek WS SCS Site 2 Dam Flood Risk Area



Salado Creek Watershed SCS Site 2 Dam is on Lewis Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1971. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be minimal structures vulnerable with the primary impact on farm land and out buildings. In the event of a breach, it is estimated the average breach width would be 211.6 feet with a maximum breach flow of 14,723 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

Section 14: Dam Failure

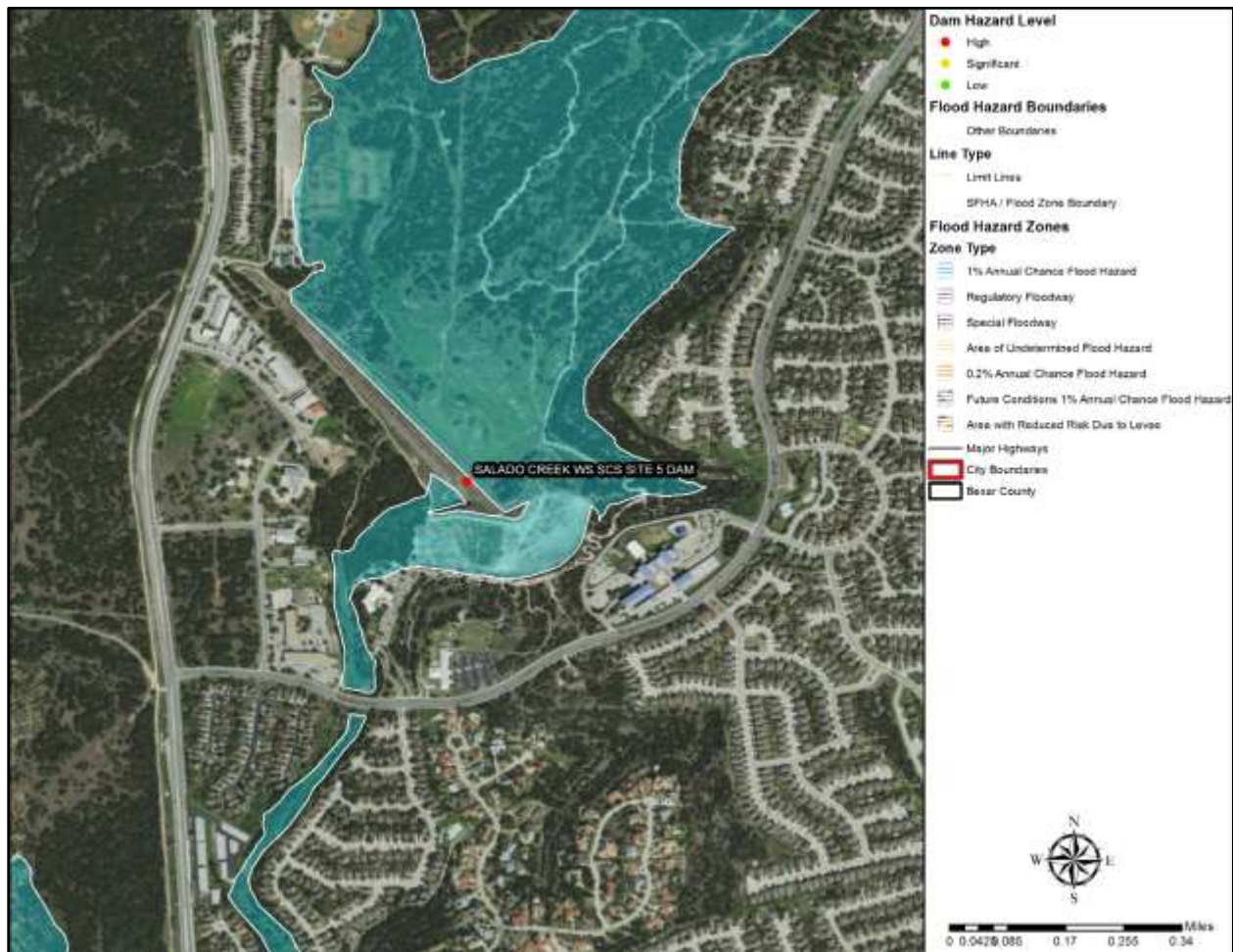
Figure 14-17. Salado Creek WS SCS Site 4 Dam Flood Risk Area



Salado Creek Watershed SCS Site 4 Dam is on the Panther Springs Creek in the City of San Antonio and is used for flood control purposes. The dam is owned by the San Antonio River Authority and was constructed in 1972 by earthen construction. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 30,755 people, 14,730 housing units, 7 banking and finance facilities, 32 chemical and hazardous materials facilities, 4 energy facilities, 4 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 27 healthcare and public health facilities, 1 transportation facility, 9 water facilities, 67 commercial facilities, 10 government facilities, 1 dam, and 8 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 207 feet with a maximum breach flow of 4,155 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

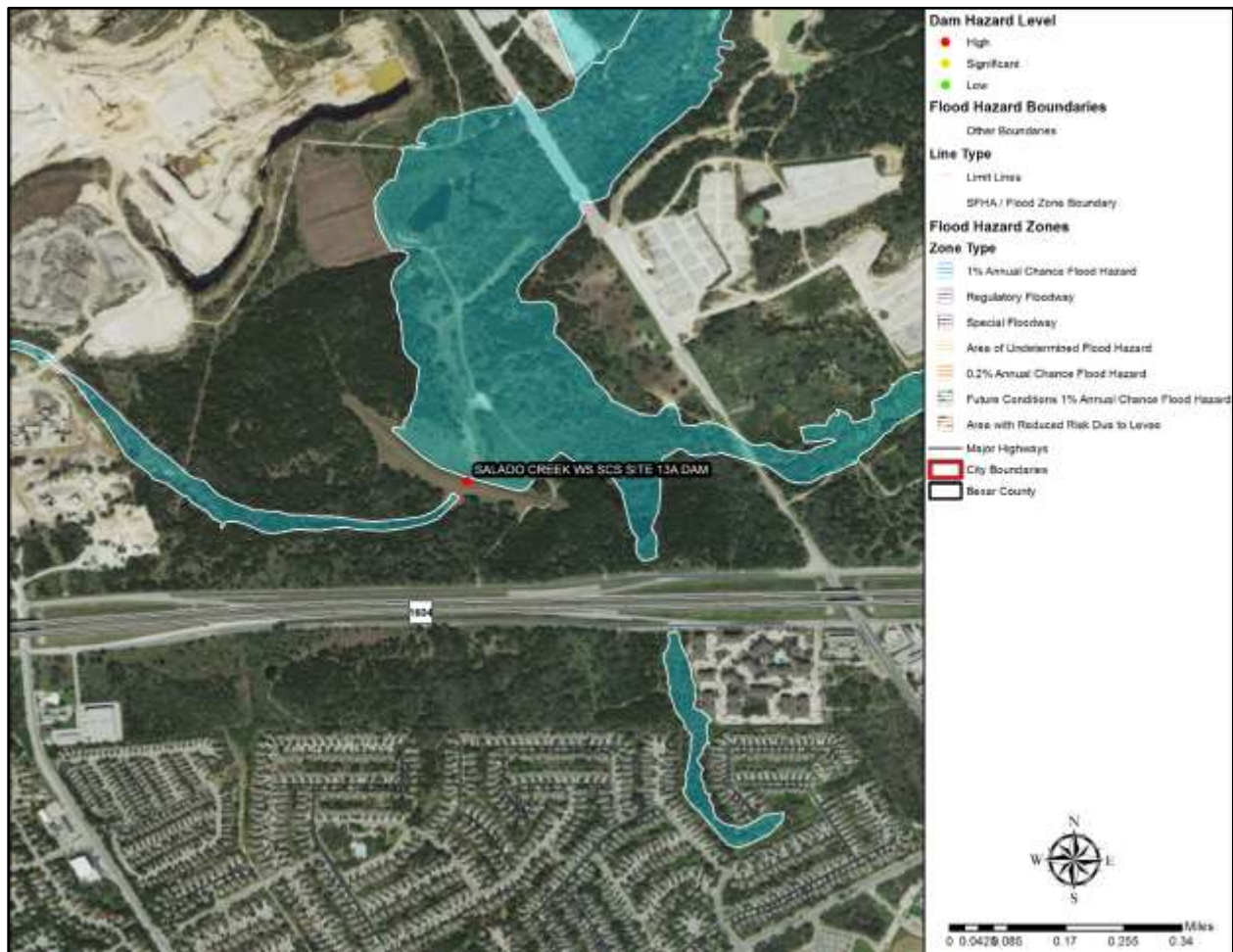
Figure 14-18. Salado Creek WS SCS Site 5 Dam Flood Risk Area



Salado Creek Watershed SCS Site 5 Dam is on the Panther Springs Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1976. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 34,238 people, 16,465 housing units, 1 agriculture and food facility, 7 banking and finance facilities, 37 chemical and hazardous materials facilities, 5 energy facilities, 6 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 28 healthcare and public health facilities, 2 transportation facilities, 5 water facilities, 79 commercial facilities, 12 government facilities, 4 dams, and 8 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 228.9 feet with a maximum breach flow of 6,909 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

Figure 14-19. Salado Creek WS SCS Site 13A Dam Flood Risk Area



Salado Creek Watershed SCS Site 13A Dam is on the Elm Waterhole Creek in the City of San Antonio and is used for flood control purposes. The dam is owned by the San Antonio River Authority and was constructed in 1976 by earthen construction. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 26,189 people, 11,677 housing units, 5 banking and finance facilities, 22 chemical and hazardous materials facilities, 2 energy facilities, 5 emergency services facilities, 6 communication facilities, 24 healthcare and public health facilities, 1 transportation facility, 5 water facilities, 45 commercial facilities, 9 government facilities, 2 dams, 8 nuclear reactors, materials, and waste facilities, and 2 manufacturing facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 203.5 feet with a maximum breach flow of 22,849 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

Figure 14-20. Salado Creek WS SCS Site 7 Dam Flood Risk Area



Salado Creek Watershed SCS Site 7 Dam is on the Panther Springs Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1987. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 12,454 people, 6,118 housing units, 4 banking and finance facilities, 8 chemical and hazardous materials facilities, 2 energy facilities, 2 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 13 healthcare and public health facilities, 1 transportation facility, 1 water facility, 28 commercial facilities, 6 government facilities, 2 dams, and 6 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 232.2 feet with a maximum breach flow of 2,045 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

Figure 14-21. Salado Creek WS SCS Site 13 B Dam Flood Risk Area



Salado Creek Watershed SCS Site 13B Dam is on a tributary of Elm Waterhole Creek in the City of San Antonio and is used for flood control purposes. The dam is owned by the San Antonio River Authority and was constructed in 1976 by earthen construction. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 34,891 people, 15,201 housing units, 1 agriculture and food facility, 6 banking and finance facilities, 29 chemical and hazardous materials facilities, 5 energy facilities, 4 emergency services facilities, 6 communication facilities, 2 postal and shipping facilities, 32 healthcare and public health facilities, 1 transportation facility, 11 water facilities, 67 commercial facilities, 11 government facilities, 3 dams, and 7 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 165.9 feet with a maximum breach flow of 2,045 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

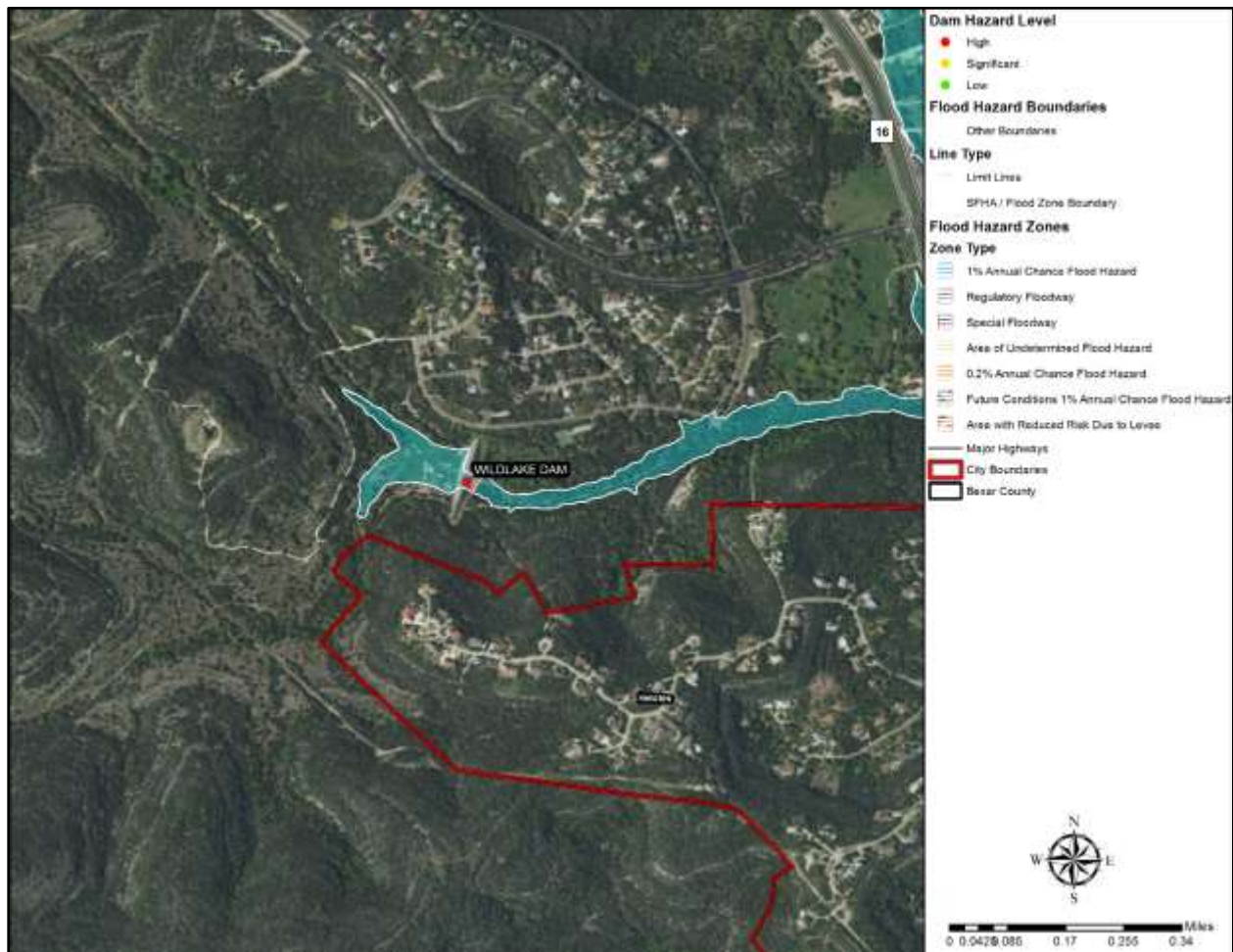
Figure 14-22. El Dorado Lake Dam Flood Risk Area



El Dorado Lake Dam is located on a tributary of Beitel Creek in the City of San Antonio and is used for recreational purposes. The earthen dam is owned by the El Dorado Homes Association and was constructed in 1935 and substantially modified in 1999. While the dam is located in a densely populated area the limited storage capacity and low dam height indicates a low extent classification. In the event of dam failure, there would be several residential structures that could be minimally vulnerable. In the event of a breach, it is estimated the average breach width would be 42.2 feet with a maximum breach flow of 230 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 5 feet.

Section 14: Dam Failure

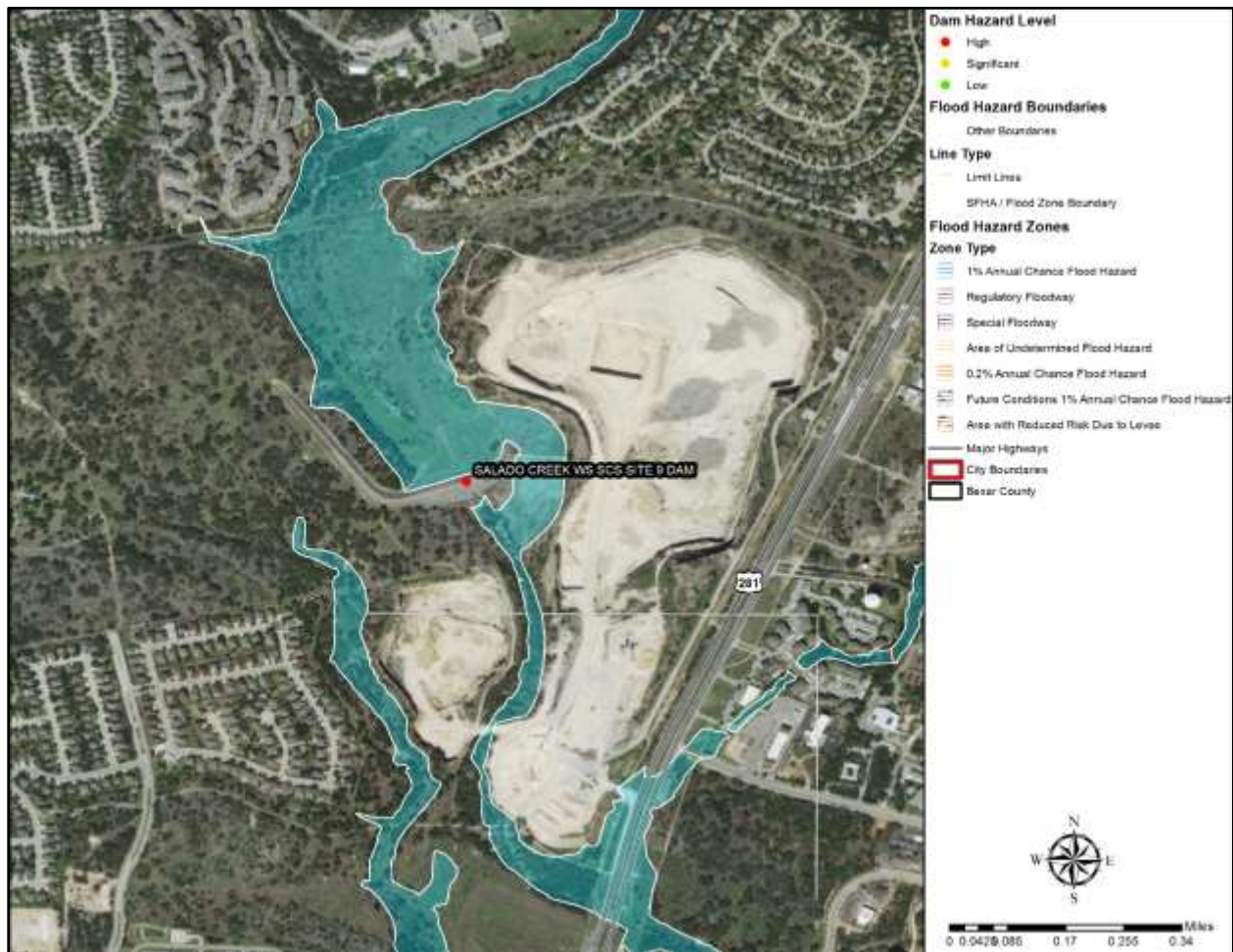
Figure 14-23. Wildlake Dam Flood Risk Area



Wildlake Dam is on Ranch Creek in the City of Helotes and is used for flood control purposes. The earthen dam is owned by the San Antonio Municipal Utility District and was constructed in 1982. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be several residential structures vulnerable. In the event of a breach, it is estimated the average breach width would be 110.8 feet with a maximum breach flow of 20,762 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

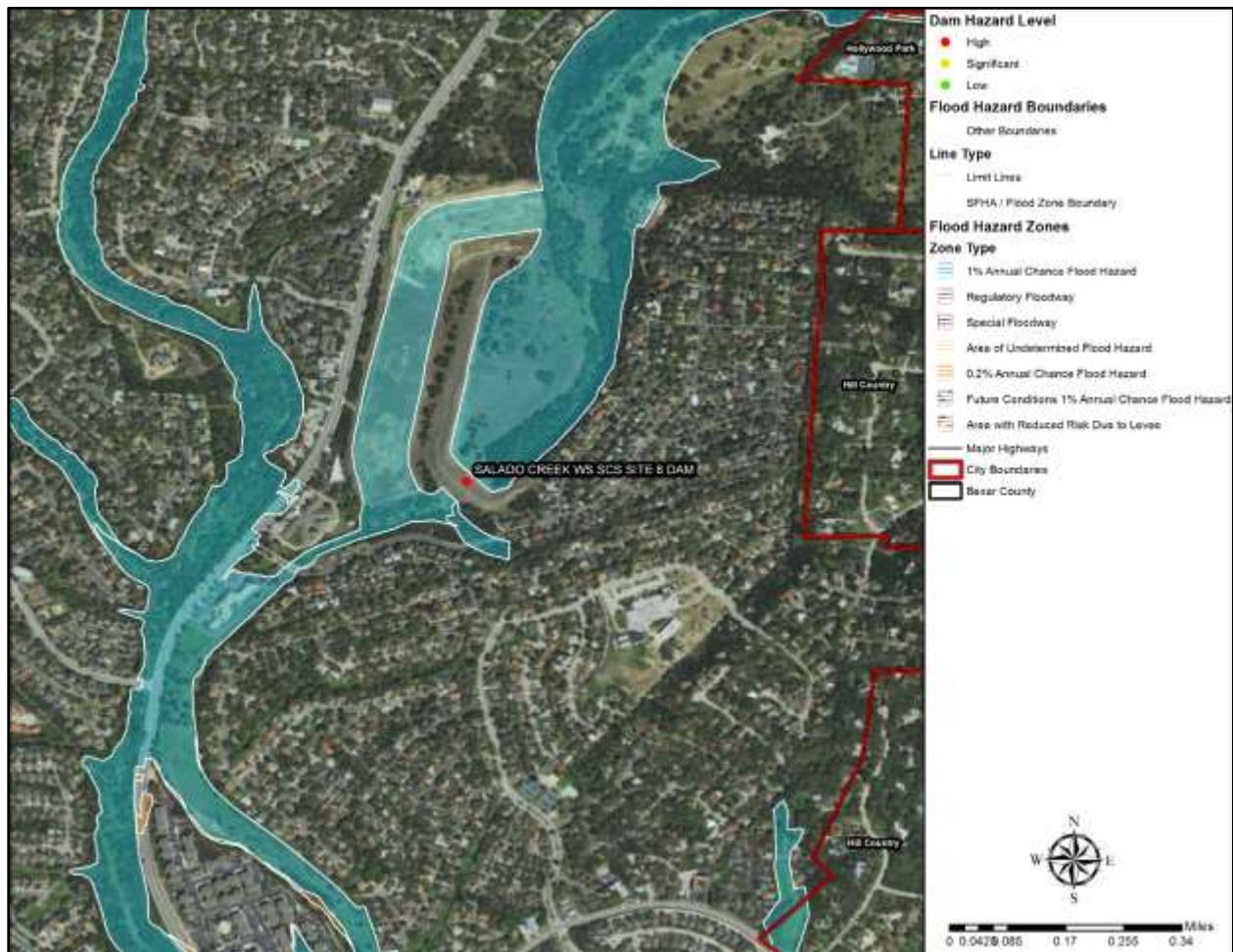
Figure 14-24. Salado Creek WS SCS Site 9 Dam Flood Risk Area



Salado Creek Watershed SCS Site 9 Dam is on the Mud Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1979. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 33,827 people, 14,781 housing units, 1 agriculture and food facility, 5 banking and finance facilities, 29 chemical and hazardous materials facilities, 4 energy facilities, 6 emergency services facilities, 7 communication facilities, 26 healthcare and public health facilities, 1 transportation facility, 11 water facilities, 64 commercial facilities, 10 government facilities, 3 dams, 7 nuclear reactors, materials, and waste facilities, and 2 manufacturing facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 185.0 feet with a maximum breach flow of 6,657 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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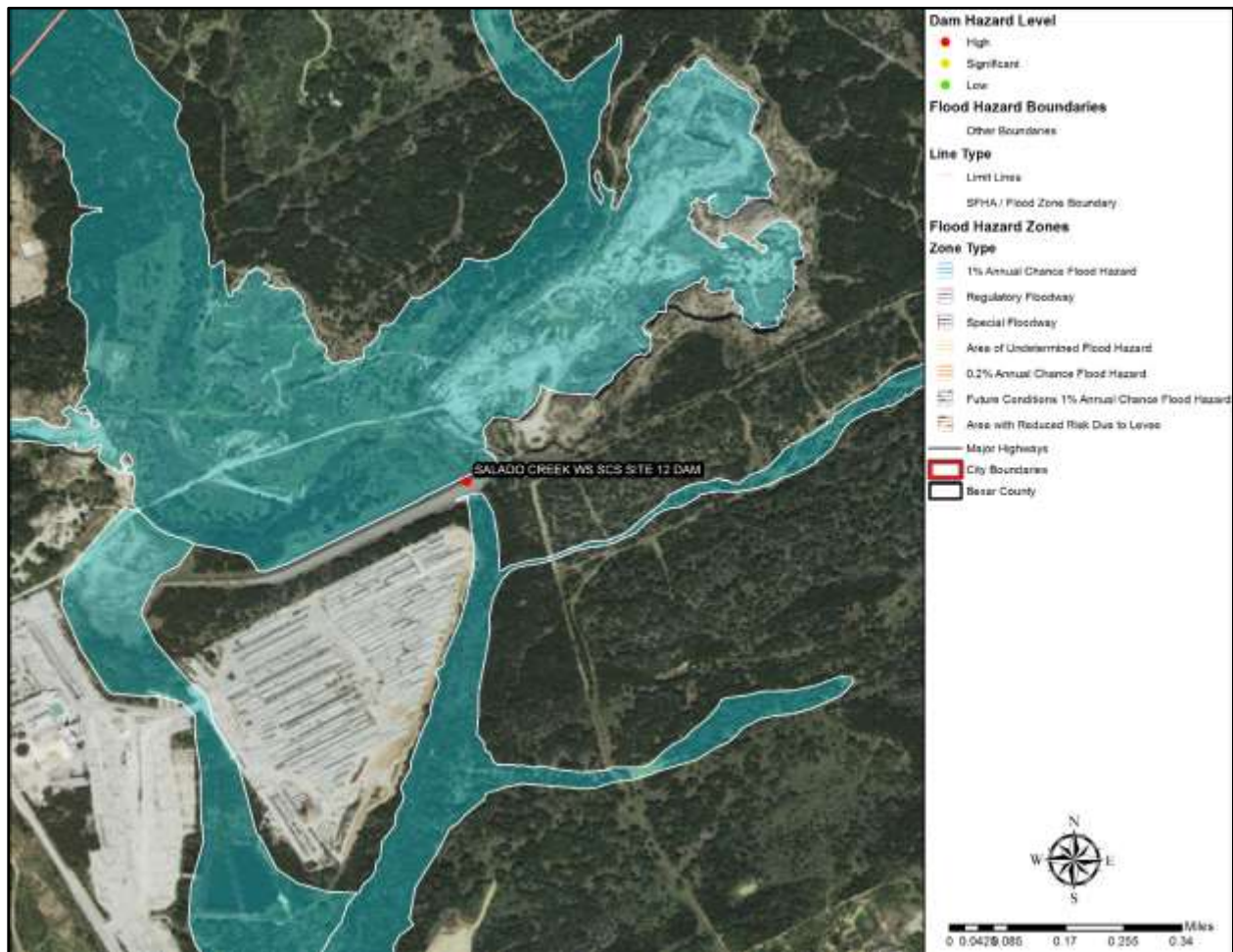
Figure 14-25. Salado Creek WS SCS Site 6 Flood Risk Area



Salado Creek Watershed SCS Site 6 Dam is on the Panther Springs Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1979. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 23,930 people, 11,924 housing units, 5 banking and finance facilities, 27 chemical and hazardous materials facilities, 3 energy facilities, 5 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 23 healthcare and public health facilities, 1 transportation facility, 5 water facilities, 51 commercial facilities, 9 government facilities, 2 dams, and 8 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 196.7 feet with a maximum breach flow of 7,434 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

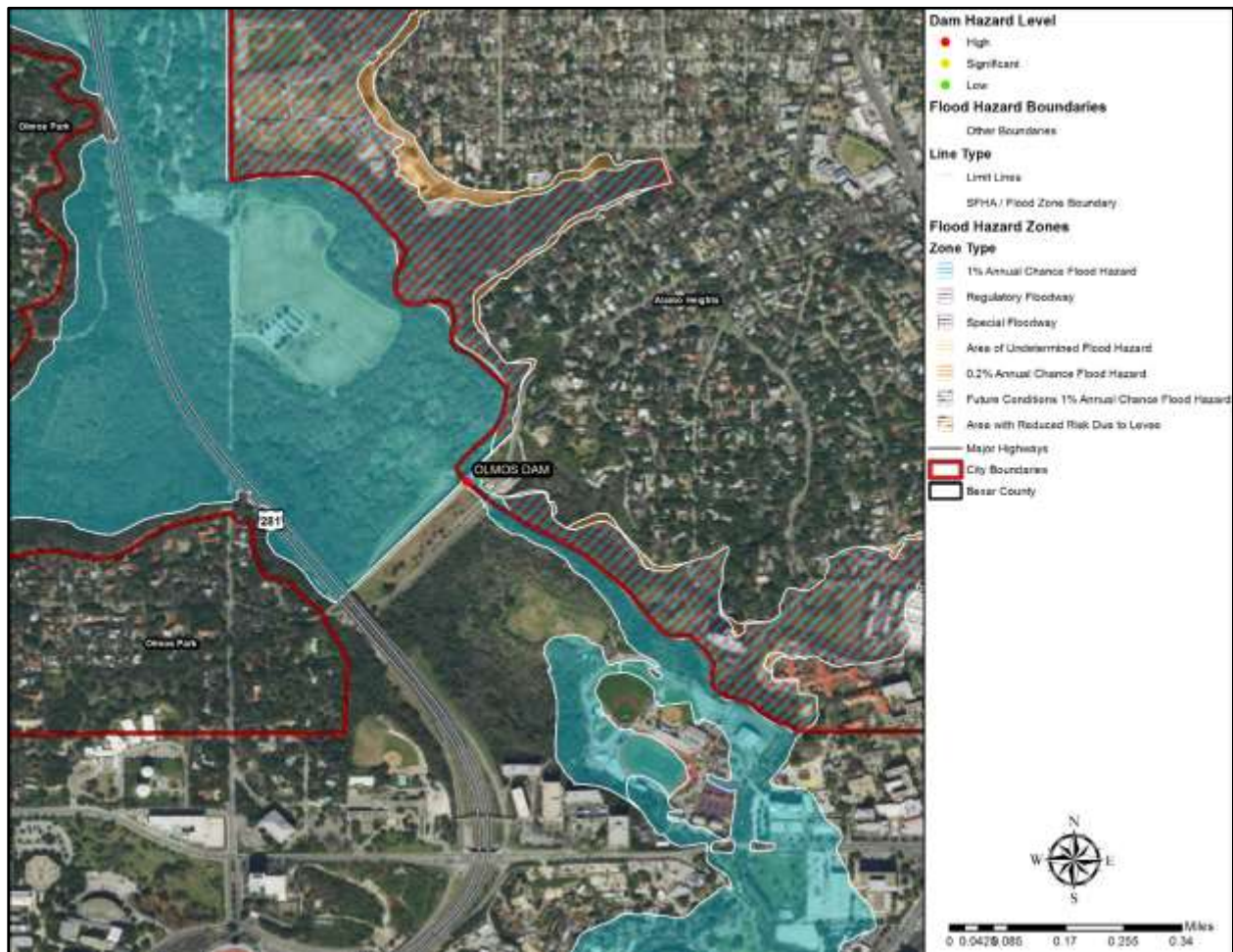
Figure 14-26. Salado Creek WS SCS Site 12 Flood Risk Area



Salado Creek Watershed SCS Site 12 Dam is on the Long Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1974. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 42,366 people, 18,439 housing units, 2 agriculture and food facilities, 6 banking and finance facilities, 35 chemical and hazardous materials facilities, 5 energy facilities, 6 emergency services facilities, 6 communication facilities, 2 postal and shipping facilities, 36 healthcare and public health facilities, 1 transportation facility, 12 water facilities, 86 commercial facilities, 13 government facilities, 4 dams, 8 nuclear reactors, materials, and waste facilities, and 3 manufacturing facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 281.2 feet with a maximum breach flow of 17,911 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

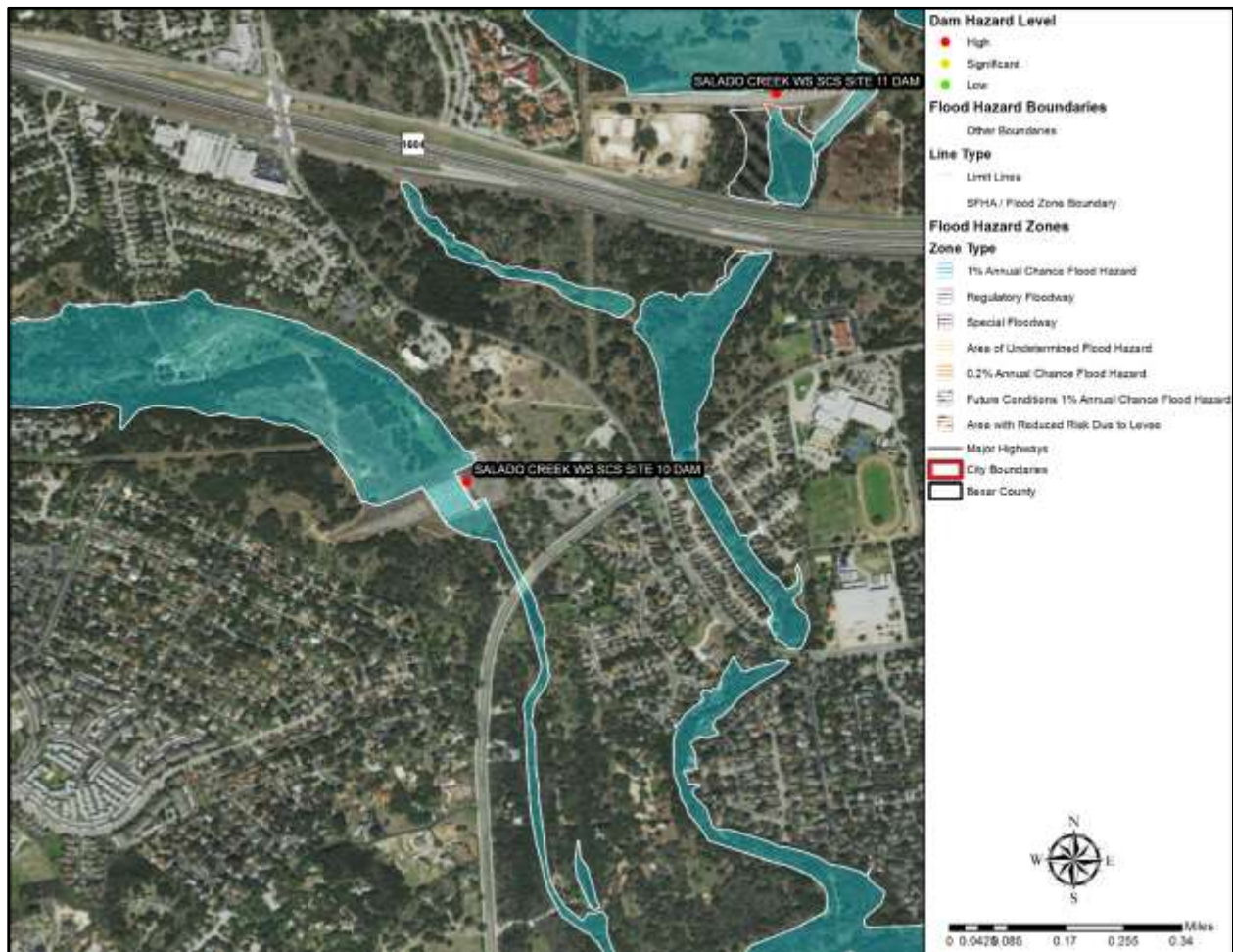
Figure 14-27. Olmos Dam Flood Risk Area



Olmos Dam is on the Olmos Creek in the City of San Antonio and is used for flood control purposes. The dam is owned by the City and was constructed in 1926 as a gravity dam, with a foundation of rock and soil. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 28,111 people, 12,566 housing units, 1 agriculture and food facility, 29 banking and finance facilities, 55 chemical and hazardous materials facilities, 5 energy facilities, 25 emergency services facilities, 8 communication facilities, 6 postal and shipping facilities, 52 healthcare and public health facilities, 3 transportation facilities, 19 water facilities, 2 national monuments and icons, 217 commercial facilities, 28 government facilities, 3 dams, 13 nuclear reactors, materials, and waste facilities, and 3 manufacturing facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 319.2 feet with a maximum breach flow of 260,594 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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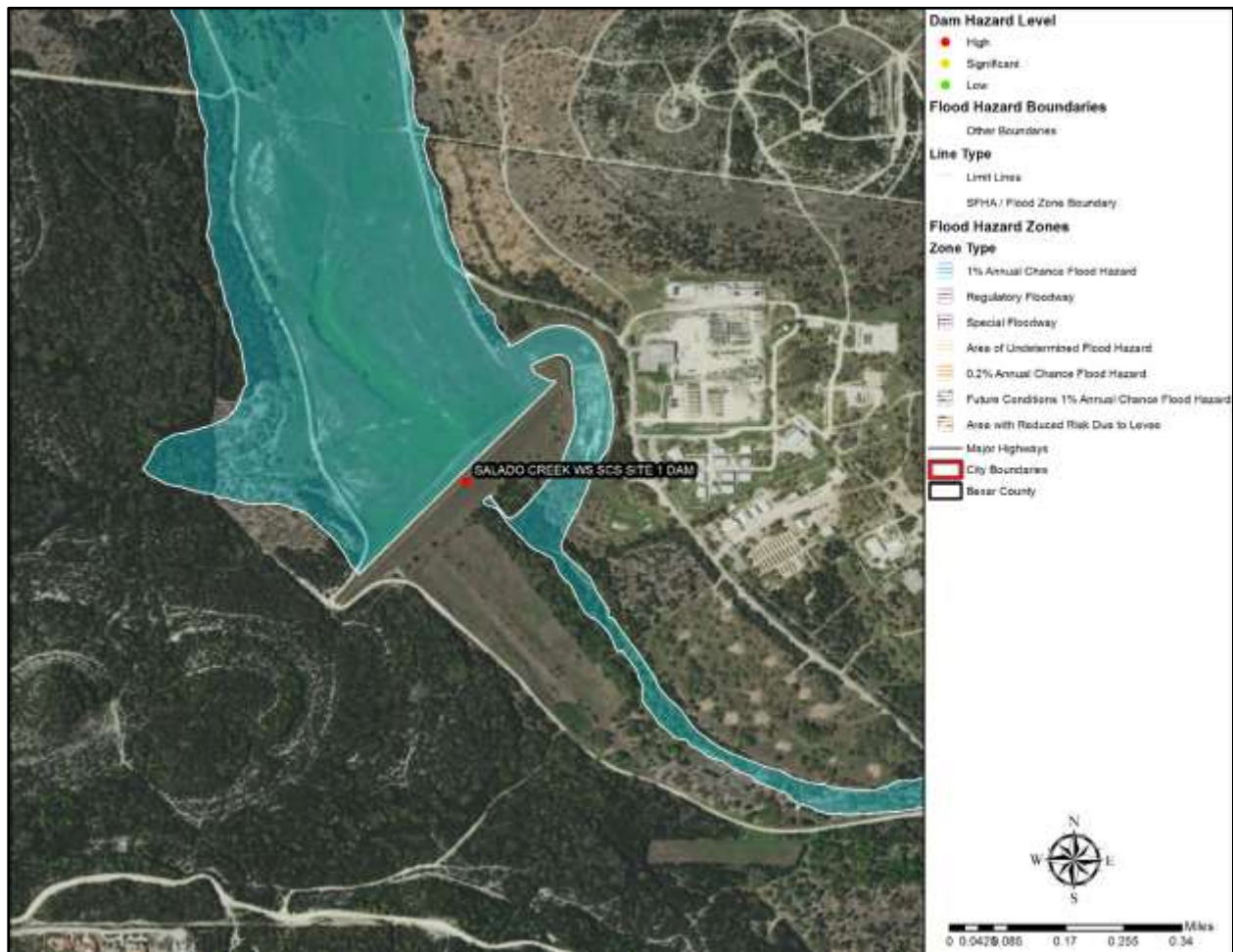
Figure 14-28. Salado Creek WS SCS Site 10 Dam Flood Risk Area



Salado Creek Watershed SCS Site 10 Dam is on the Mud Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1994. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 37,618 people, 16,528 housing units, 1 agriculture and food facility, 5 banking and finance facilities, 29 chemical and hazardous materials facilities, 4 energy facilities, 6 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 26 healthcare and public health facilities, 1 transportation facility, 11 water facilities, 64 commercial facilities, 10 government facilities, 3 dams, 7 nuclear reactors, materials, and waste facilities, and 1 manufacturing facility vulnerable. In the event of a breach, it is estimated the average breach width would be 228.2 feet with a maximum breach flow of 7,463 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Section 14: Dam Failure

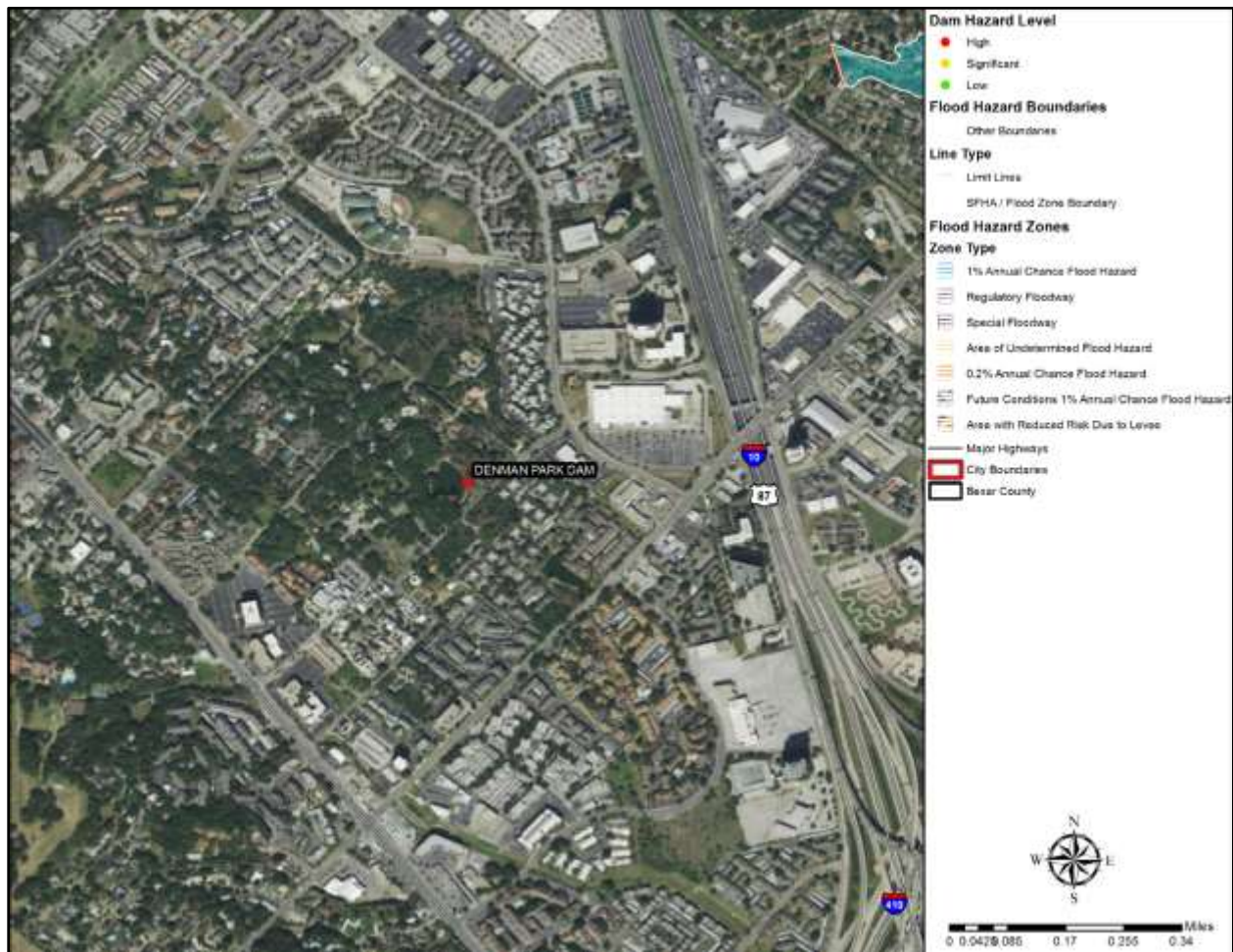
Figure 14-29. Salado Creek WS SCS Site 1 Dam Flood Risk Area



Salado Creek Watershed SCS Site 1 Dam is on Salado Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1975. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, a military training facility would be vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 276.7 feet with a maximum breach flow of 8,538 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

Section 14: Dam Failure

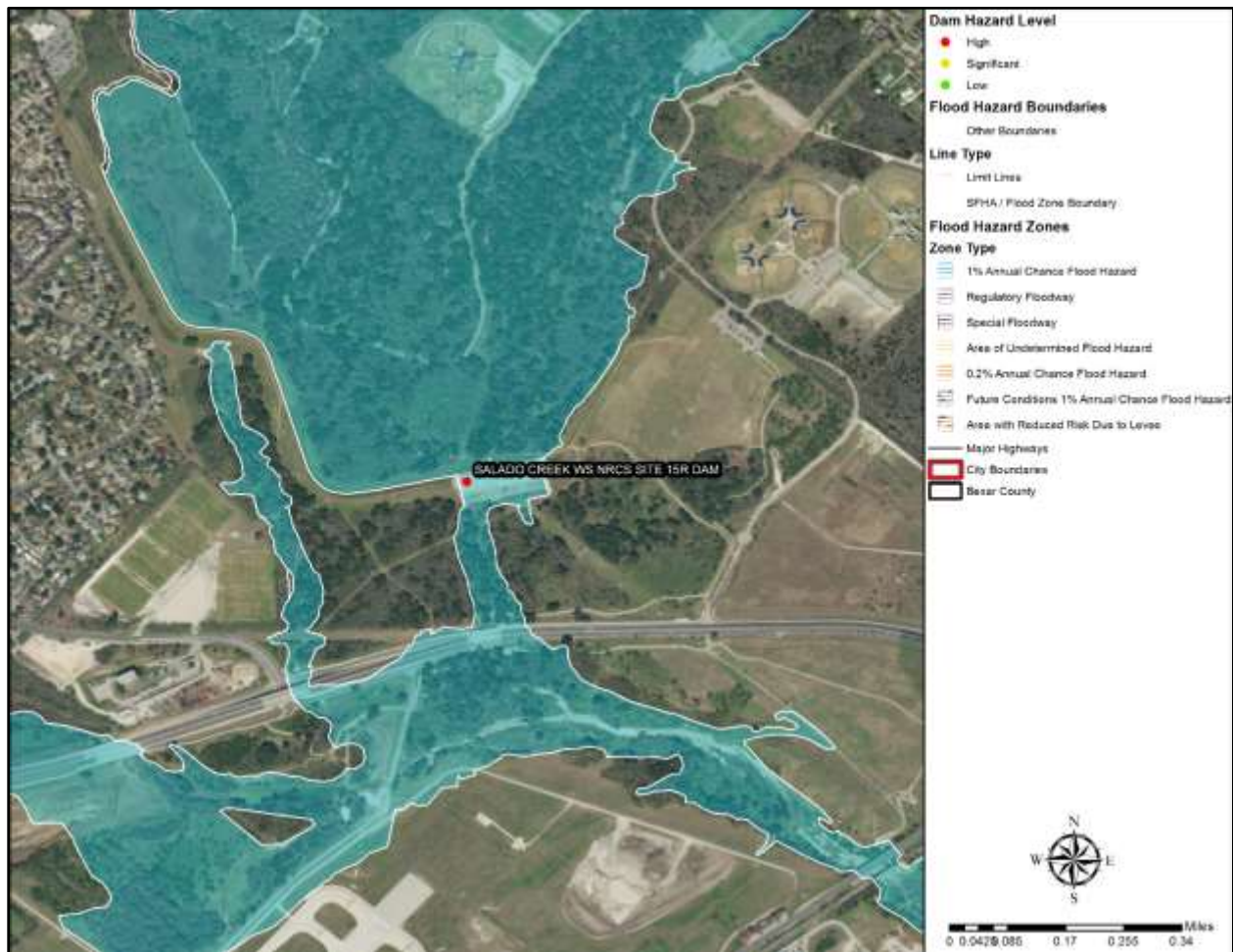
Figure 14-30. Denman Park Dam Flood Risk Area



Denman Park Dam is located on a tributary to the San Antonio River in the City of San Antonio and is used for recreational purposes. The earthen dam is owned by the City of San Antonio and its construction date is unknown. While the dam is located in a densely populated area the extremely limited storage capacity and low dam height indicates a low extent classification. In the event of dam failure, there would be several residential structures that could be minimally vulnerable. No structural damages have occurred or are anticipated in the event of a breach. In the event of a breach, it is estimated the average breach width would be 42.0 feet with a maximum breach flow of 1,910 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 10 feet.

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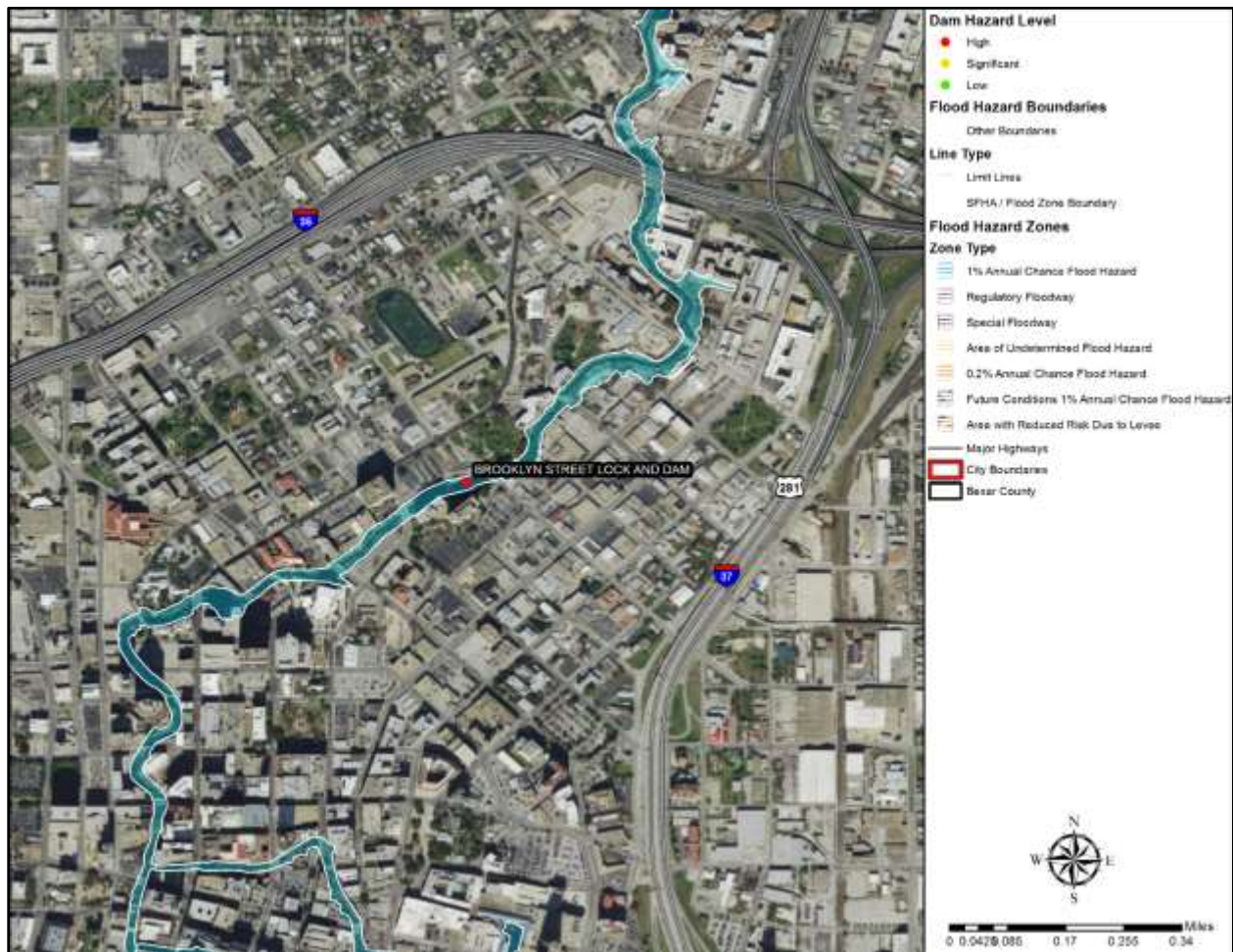
Figure 14-31. Salado Creek WS NRCS Site 15R Dam Flood Risk Area



Salado Creek Watershed NRCS Site 15R Dam is located in the City of San Antonio in McAllister Park and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 2004. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 20,176 people, 9,438 housing units, 3 banking and finance facilities, 17 chemical and hazardous materials facilities, 3 energy facilities, 3 emergency services facilities, 6 communication facilities, 1 postal and shipping facility, 22 healthcare and public health facilities, 11 water facilities, 48 commercial facilities, 9 government facilities, 1 dam, and 7 nuclear reactors, materials, and waste facilities vulnerable. In the event of a breach, it is estimated the average breach width would be 243 feet with a maximum breach flow of 250,724 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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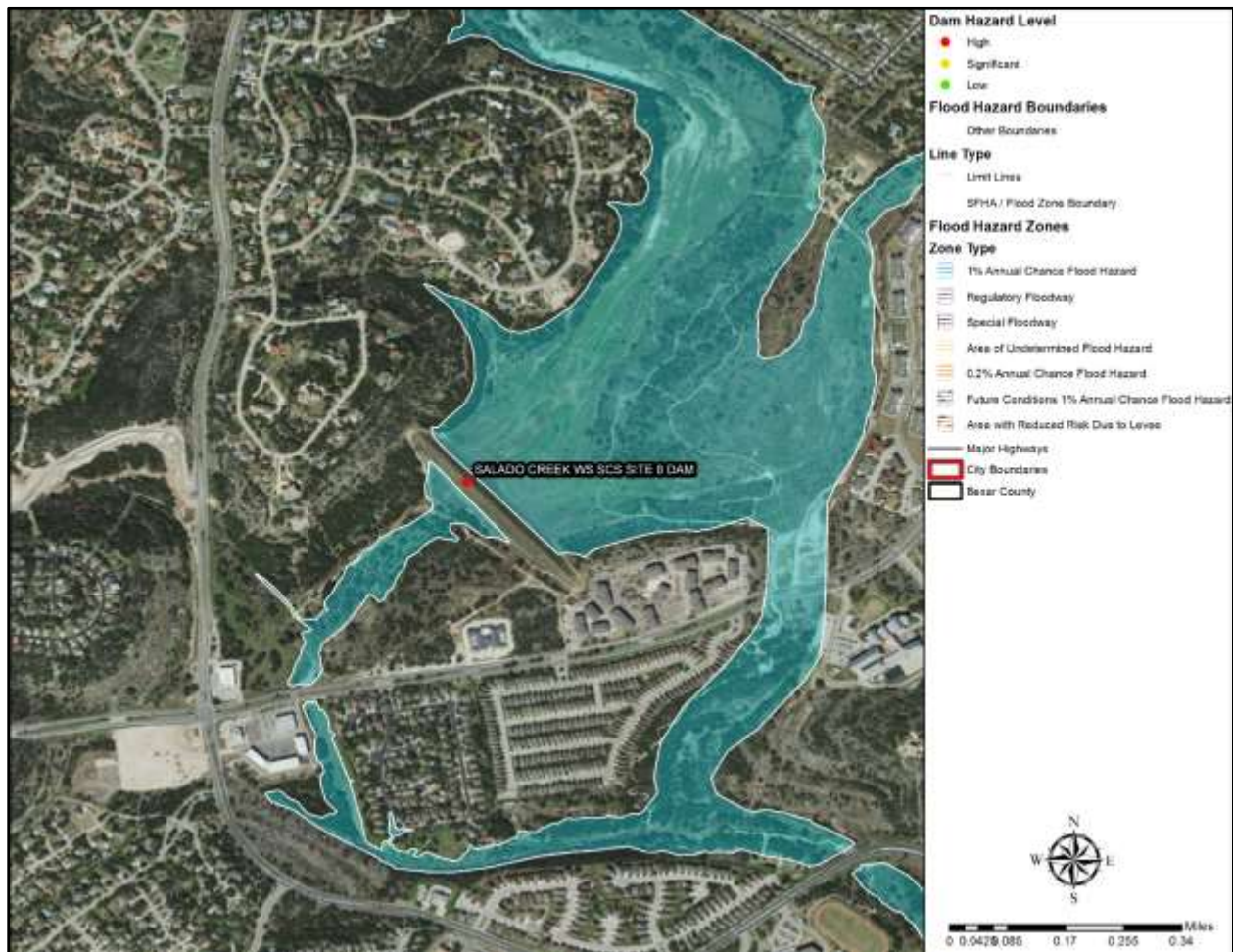
Figure 14-32. Brooklyn Street Lock and Dam Flood Risk Area



Brooklyn Street Lock and Dam are on the San Antonio River and part of the River Walk in the City of San Antonio. The lock and dam is owned and operated by the San Antonio River Authority and was constructed in 2009. The extent classification is considered low since a breach would follow the river course. Therefore, populations, buildings, and infrastructure would not be vulnerable to dam failure. In the event of a breach, it is estimated the average breach width would be 46.0 feet with a maximum breach flow of 10,763 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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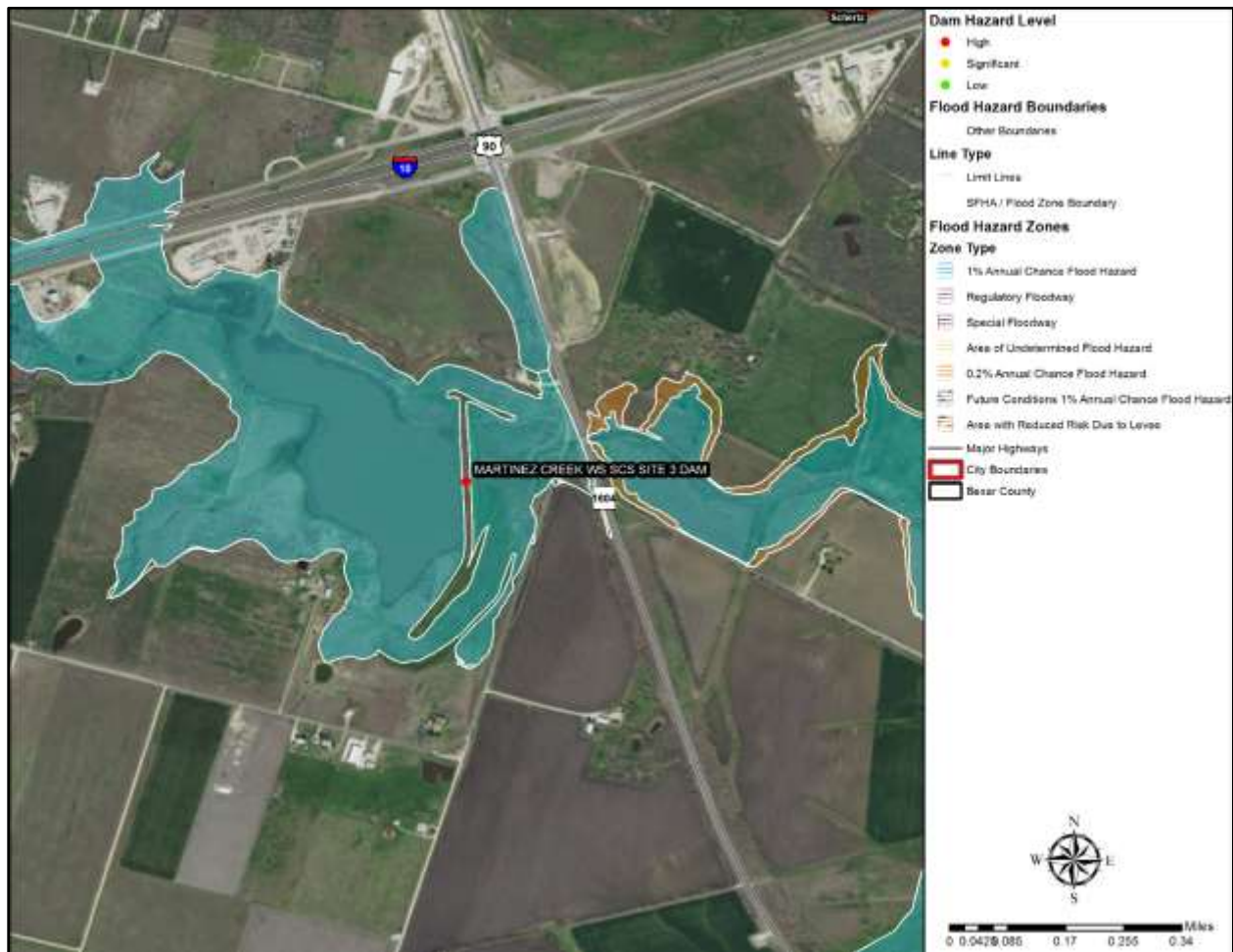
Figure 14-33. Salado Creek WS SCS Site 8 Dam Flood Risk Area



Salado Creek Watershed SCS Site 8 Dam is on the Mud Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1973. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 40,072 people, 17,271 housing units, 2 agriculture and food facilities, 7 chemical and hazardous materials facilities, 6 energy facilities, 37 healthcare and public health facilities, 1 transportation facility, 14 water facilities, 76 commercial facilities, 11 government facilities, 4 dams, 7 nuclear reactors, materials, and waste facilities, and 1 manufacturing facility vulnerable. In the event of a breach, it is estimated the average breach width would be 243.7 feet with a maximum breach flow of 10,029 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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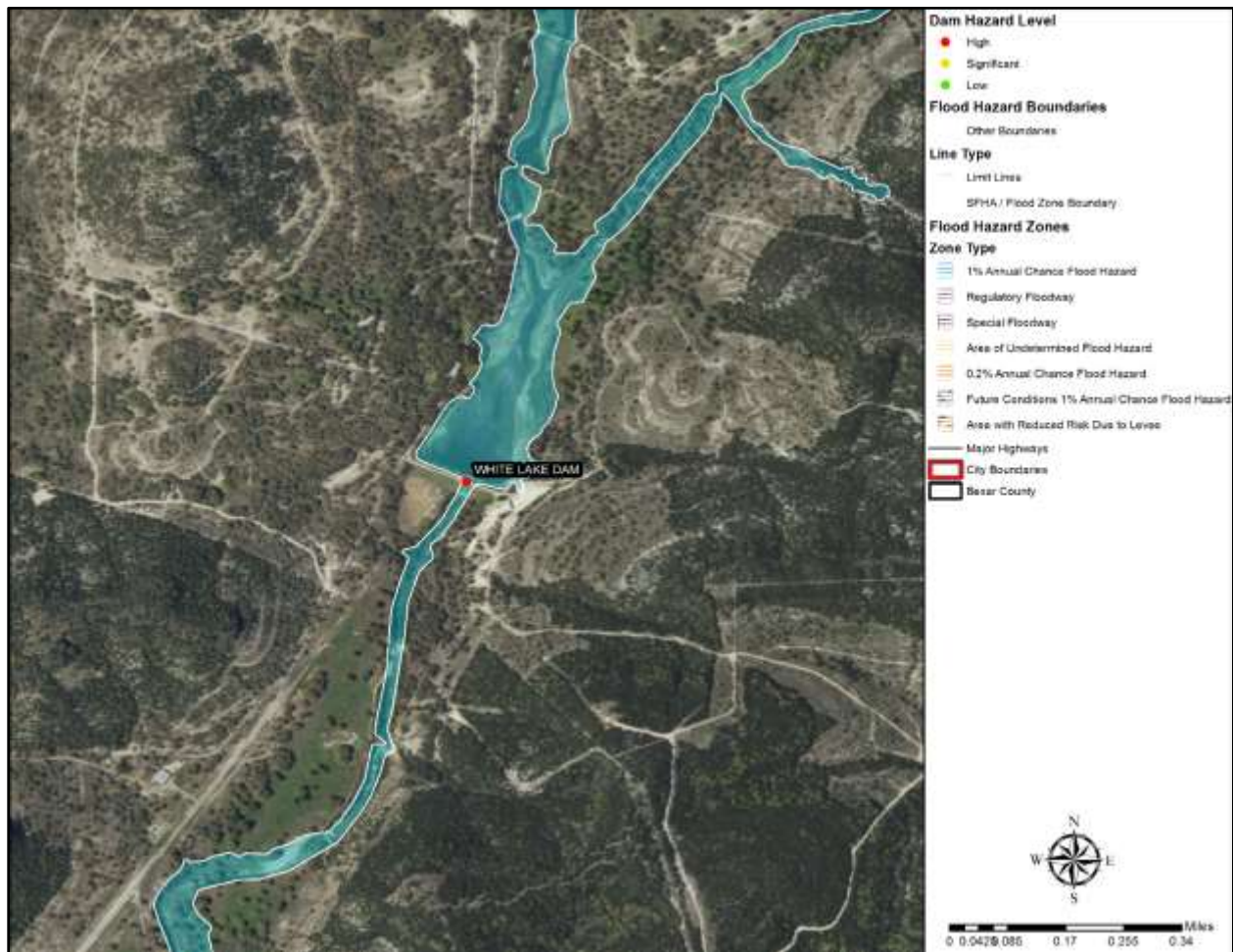
Figure 14-34. Martinez Creek WS SCS Site 3 Dam Flood Risk Area



Martinez Creek Watershed SCS Site 3 Dam is on Escondido Creek in Bexar County and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1964. The extent classification is considered low and the area located near the dam is a rural area. In the event of dam failure, there would be several residential structures vulnerable. A dam failure could cause power outages and disrupt utility systems. In the event of a breach, it is estimated the average breach width would be 141.1 feet with a maximum breach flow of 14,335 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

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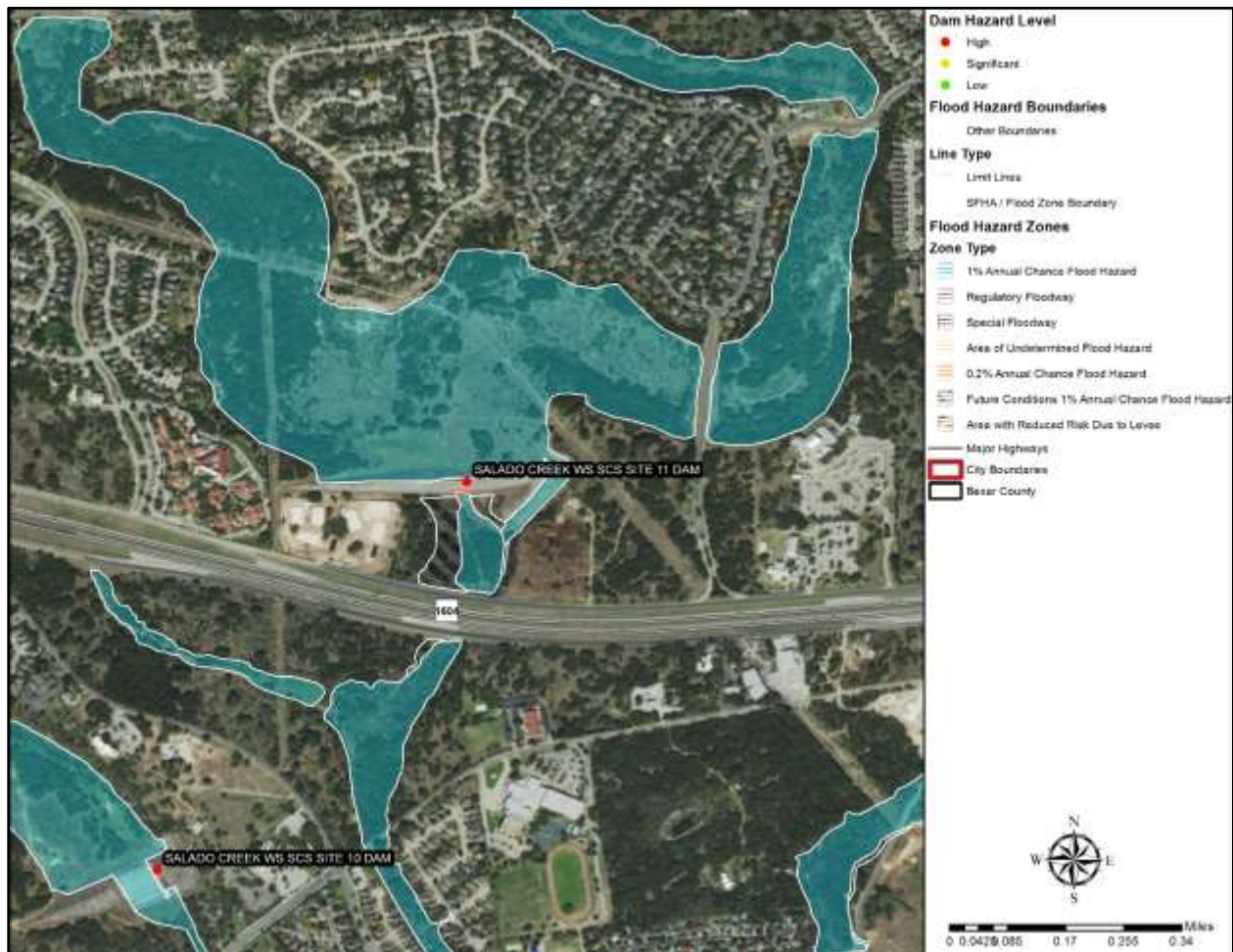
Figure 14-35. White Lake Dam Flood Risk Area



White Lake Dam is located on a tributary of San Geronimo Creek in Bexar County and is used for recreational purposes. The dam is privately owned and was constructed in 1970. The extent classification is considered low and a breach would follow the river course. The area located near the dam is a rural area. Populations, buildings, and infrastructure would not be vulnerable to dam failure. In the event of a breach, it is estimated the average breach width would be 109.7 feet with a maximum breach flow of 26,267 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 25 feet.

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Figure 14-36. Salado Creek WS SCS Site 11 Dam Flood Risk Area



Salado Creek Watershed SCS Site 11 Dam is on the Elm Creek in the City of San Antonio and is used for flood control purposes. The earthen dam is owned by the San Antonio River Authority and was constructed in 1979. The extent classification is considered high and the area located near the dam is a densely populated area. A dam failure could cause power outages and disrupt utility systems. There would also be 24,027 people, 10,784 housing units, 2 agriculture and food facilities, 6 banking and finance facilities, 31 chemical and hazardous materials facilities, 5 energy facilities, 6 emergency services facilities, 6 communication facilities, 2 postal and shipping facilities, 36 healthcare and public health facilities, 1 transportation facility, 12 water facilities, 72 commercial facilities, 11 government facilities, 3 dams, 7 nuclear reactors, materials, and waste facilities, and 1 manufacturing facility vulnerable. In the event of a breach, it is estimated the average breach width would be 253.3 feet with a maximum breach flow of 5,051 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. A dam breach could result in an estimated depth of 0 to 15 feet.

Table 14-3 represents the average extent or magnitude of a dam failure event that could be expected for the Bexar County planning area, including all participating jurisdictions. The “Extent Classification” column was determined by taking the average of dams in the jurisdiction and weighing low hazard dams as a 1, significant hazard dams as a 2, and high hazard dams as a 3 based on the potential severity, warning time, and duration.

Section 14: Dam Failure

Table 14-3. Extent by Jurisdiction

JURISDICTION	DAMS & CLASSIFICATION	EXTENT CLASSIFICATION	LEVEL OF INTENSITY TO MITIGATE	HAZARD PROFILED
Bexar County ⁶	35 – High 2 – Significant 30 – Low	High	Dam failure presents a substantial threat as the county has 35 high hazard dams. Loss of life is probable and economic impact appreciable in the event of a failure.	Yes
Alamo Heights	None	None	There are no dams or inundation areas located within the city limits.	No
Balcones Heights	None	None	There are no dams or inundation areas located within the city limits.	No
Castle Hills	None	None	There are no dams or inundation areas located within the city limits.	No
China Grove	None	None	There are no dams or inundation areas located within the city limits.	No
Converse	None	None	There are no dams or inundation areas located within the city limits.	No
Elmendorf	None	None	There are no dams or inundation areas located within the city limits.	No
Fair Oaks Ranch	None	None	There are no dams or inundation areas located within the city limits.	No
Grey Forest	None	None	There are no dams or inundation areas located within the city limits.	No
Helotes	1 – High 1 – Low	High	The City of Helotes has one high hazard dam located in a densely populated area. Loss of life is probable, if a dam failure were to occur.	Yes
Hill Country Village	None	None	There are no dams or inundation areas located within the city limits.	No

⁶ Bexar County Dam inventory includes the City of San Antonio.

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JURISDICTION	DAMS & CLASSIFICATION	EXTENT CLASSIFICATION	LEVEL OF INTENSITY TO MITIGATE	HAZARD PROFILED
Hollywood Park	None	None	There are no dams or inundation areas located within the city limits.	No
Kirby	None	None	There are no dams or inundation areas located within the city limits.	No
Leon Valley	None	None	There are no dams or inundation areas located within the city limits.	No
Live Oak	None	None	There are no dams or inundation areas located within the city limits.	No
Olmos Park	None	None	There are no dams or inundation areas located within the city limits.	No
St. Hedwig	None	None	There are no dams or inundation areas located within the city limits.	No
Sandy Oaks	None	None	There are no dams or inundation areas located within the city limits.	No
Schertz	None	None	There are no dams or inundation areas located within the city limits.	No
Shavano Park	None	None	There are no dams or inundation areas located within the city limits.	No
Somerset	None	None	There are no dams or inundation areas located within the city limits.	No
Terrell Hills	None	None	There are no dams or inundation areas located within the city limits.	No
Universal City	2 – Low	None	The city has 2 low hazard dams. All dams in the city have an extent classification of “Low” due to the limited storage capacity of each dam. Loss of life is not expected and any economic loss would be negligible.	No

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JURISDICTION	DAMS & CLASSIFICATION	EXTENT CLASSIFICATION	LEVEL OF INTENSITY TO MITIGATE	HAZARD PROFILED
Von Ormy	None	None	There are no dams or inundation areas located within the city limits.	No
Windcrest	None	None	There are no dams or inundation areas located within the city limits.	No

Historical Occurrences

There are approximately 84,000 dams in the United States today.⁷ Catastrophic dam failures have occurred frequently throughout the past century. Between 1918 and 1958, 33 major U.S. dam failures caused 1,680 deaths. From 1959 to 1965, 9 major dams failed worldwide. Some of the largest disasters in the U.S. have resulted from dam failures. More than 90 dam incidents, including 23 dam failures, were reported in the past 10 years to the National Performance of Dams Program, which collects and archives information on dam performance from state and federal regulatory agencies and dam owners.

The State of Texas has not experienced loss of life or extensive economic damage due to a dam failure since the first half of the 20th century. However, there may be many incidents that are not reported and, therefore, the actual number of incidents is likely to be greater.

There has not been a recorded dam failure event for the entire Bexar County planning area, including all participating jurisdictions.

Probability of Future Events

No historical events of dam failure have been recorded in the Bexar County planning area, though the risk of dam failure is monitored closely. Due to the lack of historical occurrences, the probability of a future event is unlikely, meaning an event is possible in the next 10 years.

Vulnerability and Impact

There are 67 dams in the Bexar County planning area: 30 of them are considered low hazard dams, 2 are considered significant hazard dams, and 35 considered high hazard dams based on their classification. While low hazard dams are those at which failure or mis-operation probably would not result in loss of human life and would cause limited economic and/or environmental losses, damage to agriculture and housing is possible due to the number of low hazard dams in the planning area.

Flooding is the most prominent effect of dam failure. If the dam failure is extensive, a large amount of water would enter the downstream waterways forcing them out of their banks. There may be significant environmental effects, resulting in flooding that could disperse debris and hazardous materials downstream that can damage local ecosystems. If the event is severe, debris carried downstream can block traffic flow,

⁷ Source: Federal Emergency Management Agency, Dam Safety Program, available at: <http://www.fema.gov/hazards/damsafety/>

Section 14: Dam Failure

cause power outages, and disrupt local utilities, such as water and wastewater, which could result in school closures. **For specific vulnerability, please refer to the narratives below each high hazard dam in this section.**

Annualized loss-estimates for dam failure are not available; neither is there a breakdown of potential dollar losses for critical facilities, infrastructure and lifelines, or hazardous-materials facilities. Typically, if a major dam should fail, the severity of impact could be substantial. The potential severity of a dam failure in the planning area would be substantial. As a result, a dam breach could result in multiple deaths with facilities being shut down for 30 days or more, and more than 50 percent of property destroyed or damaged.

Assessment of Impacts

Any individual dam has a very specific area that will be impacted by a catastrophic failure. Dams identified as high or significant hazards can directly threaten the lives of individuals living or working in the inundation zone below the dam. The impact from any catastrophic failure would be similar to that of a flash flood. Potential impacts for the planning area include:

- Lives could be lost.
- There could be injuries from impacts with debris carried by the flood.
- Swift-water rescue of individuals trapped by the water puts the immediate responders at risk for their own lives.
- Individuals involved in the cleanup may be at risk from the debris left behind.
- Continuity of operations for any jurisdiction outside the direct impact area could be very limited.
- Roads and bridges could be destroyed.
- Homes and businesses could be damaged or destroyed.
- Emergency services may be temporarily unavailable.
- Disruption of operations and the delivery of services in the impacted area.
- A large dam with a high head of water could effectively scour the terrain below it for miles, taking out all buildings, and other infrastructure.
- Scouring force could erode soil and any buried pipelines.
- Scouring action of a large dam will destroy all vegetation in its path.
- Wildlife and wildlife habitat caught in the flow will likely be destroyed.
- Fish habitat will likely be destroyed.
- Topsoil will erode, slowing the return of natural vegetation.
- The destructive high velocity water flow may include substantial debris and hazardous materials, significantly increasing the risks to life and property in its path.
- Debris and hazardous material deposited downstream may cause further pollution of areas far greater than the inundation zone.
- Destroyed businesses and homes may not be rebuilt, reducing the tax base and impacting long term economic recovery.
- Historical or cultural resources may be damaged or destroyed.
- Recreational activities and tourism may be temporarily unavailable or unappealing, slowing economic recovery.

The economic and financial impacts of dam failure on the area will depend entirely on the location of the dam, scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any dam failure event.

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Mitigation Goals

Based on the results of the risk and capability assessments, the Planning Team developed and prioritized the mitigation strategy. At the Mitigation Workshop in November 2016, Planning Team members refined the Plan’s mitigation strategy. The following goals and objectives were identified.

Goal 1

Protect public health and safety.

Objective 1.1

Advise the public about health and safety precautions to guard against injury and loss of life from hazards.

Objective 1.2

Maximize utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.

Objective 1.3

Reduce the danger to, and enhance protection of, high risk areas during hazard events.

Objective 1.4

Protect critical facilities and services.

Goal 2

Build and support local capacity and commitment to continuously become less vulnerable to hazards.

Objective 2.1

Build and support local partnerships to continuously become less vulnerable to hazards.

Objective 2.2

Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.

Objective 2.3

Build hazard mitigation concerns into county planning and budgeting processes.

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Goal 3

Increase public understanding, support, and demand for hazard mitigation.

Objective 3.1

Heighten public awareness regarding the full range of natural and man-made hazards the public may face.

Objective 3.2

Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards and increase individual efforts to respond to potential hazards.

Objective 3.3

Publicize and encourage the adoption of appropriate hazard mitigation measures.

Goal 4

Protect new and existing properties.

Objective 4.1

Reduce repetitive losses to the National Flood Insurance Program (NFIP).

Objective 4.2

Use the most cost-effective approach to protect existing buildings and public infrastructure from hazards.

Objective 4.3

Enact and enforce regulatory measures to ensure that future development will not put people in harm's way or increase threats to existing properties.

Goal 5

Maximize the resources for investment in hazard mitigation.

Objective 5.1

Maximize the use of outside sources of funding.

Objective 5.2

Maximize participation of property owners in protecting their properties.

Objective 5.3

Maximize insurance coverage to provide financial protection against hazard events.

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Objective 5.4

Prioritize mitigation projects, based on cost-effectiveness and sites facing the greatest threat to life, health, and property.



Goal 6

Promote growth in a sustainable manner.

Objective 6.1

Incorporate hazard mitigation activities into long-range planning and development activities.

Objective 6.2

Promote beneficial uses of hazardous areas while expanding open space and recreational opportunities.

Objective 6.3

Utilize regulatory approaches to prevent creation of future hazards to life and property.

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Summary

As discussed in Section 2, at the mitigation workshop the planning team and stakeholders met to develop mitigation actions for each of the natural hazards included in the Plan. Each of the actions in this section were prioritized based on FEMA’s Social, Technical, Administrative, Political, Legal, Economic, and Environmental

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(STAPLEE) criteria necessary for the implementation of each action. As a result of this exercise, an overall priority was assigned to each mitigation action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as “High” indicates that the action will be implemented as soon as funding is received. A “Moderate” action is one that may not be implemented right away depending on the cost and number of citizens served by the action. Actions ranked as “Low” indicate that they will not be implemented without first seeking grant funding and after “High” and “Moderate” actions have been completed.

All mitigation actions created by Planning Team members are presented in this section in the form of Mitigation Action Worksheets. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including two actions, per hazard, and of two different types.

Table 16-1. Bexar County and Participating Jurisdictions Mitigation Action Matrix

TYPE OF ACTION:	
Action #1 – Plans/Regulations (Blue)	Action #4 - Structural (Orange)
Action #2 - Education/Awareness (Red)	Action #5 – Preparedness/Response (Black)
Action #3 - Natural Resource (Green)	

Jurisdiction	Extreme Heat	Drought	Flood	Thunderstorm Wind	Hail	Winter Storm	Wildfire	Tornado	Hurricane	Dam Failure
Bexar County	XXX	XX	XXXXX	XXXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX	XX
Alamo Heights	XXX	XX	XXXXX	XXXXX	XXXX	XXXX	XX	XXXX	XXXXX	N/A
Balcones Heights	XXX	XX	XXXX	XXXX	XXXX	XXXX	XX	XXXX	XXXX	N/A
Castle Hills	XXX	XX	XXXX	XXXX	XXXX	XXXX	XX	XXXX	XXXX	N/A
China Grove	XXX	XXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	N/A
Converse	XXX	XXX	XXXX	XXXX	XXXX	XXXX	XX	XXXX	XXXX	N/A
Elmendorf	XXX	XX	XXXX	XXXX	XXXX	XXXX	XX	XXXX	XXXX	N/A
Fair Oaks Ranch	XXX	XX	XXXX	XXXX	XXXX	XXXXX	XX	XXXX	XXXX	N/A
Grey Forest	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	N/A
Helotes	XXX	XXX	XXXXX	XXXX	XXXX	XXXX	XXXXX	XXXX	XXXX	XX
Hill Country Village	XXX	XX	XXXXX	XXXXX	XXXX	XXXX	XXXXX	XXXX	XXXXX	N/A
Hollywood Park	XXX	XX	XXXXX	XXXXX	XXXX	XXXX	XXXXX	XXXX	XXXXX	N/A
Kirby	XXXX	XXX	XXXXX	XXXXX	XXXX	XXXXX	XX	XXXXX	XXXXX	N/A
Leon Valley	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	N/A

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Jurisdiction	Extreme Heat	Drought	Flood	Thunderstorm Wind	Hail	Winter Storm	Wildfire	Tornado	Hurricane	Dam Failure
Live Oak	XXX	XX	XXXXX	XXXXX	XXXX	XXXXX	XXX	XXXX	XXXX	N/A
Olmos Park	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXXXX	XXXX	XXXX	N/A
St. Hedwig	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXX	XXXX	XXXX	N/A
Sandy Oaks	XXXX	XXX	XXXXX	XXXXX	XXXXX	XXXXX	XXX	XXXXX	XXXXX	N/A
Schertz	XXX	XXX	XXXX	XXXXX	XXXX	XXXXX	XXXX	XXXXX	XXXXX	N/A
Shavano Park	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	N/A
Somerset	XXX	XX	XXXX	XXX	XXX	XXX	XX	XXX	XXX	N/A
Terrell Hills	XXX	XX	XXXXX	XXXX	XXXX	XXXX	XXX	XXXX	XXXX	N/A
Universal City	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	N/A
Von Ormy	XXX	XX	XXXX	XXXX	XXXX	XXXX	XXX	XXXX	XXXX	N/A
Windcrest	XXXX	XXX	XXXXX	XXXXX	XXXXX	XXXXX	XXX	XXXXX	XXXXX	N/A

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Bexar County

Bexar County – Action #1	
Proposed Action:	Develop and implement a Bexar County policy for existing Bexar County facilities that calls for reducing electrical load during peak electrical usage during extreme hot weather conditions. Reductions such as turning off unnecessary lights and equipment, raising the air conditioning temperature by a degree, etc., to reduce electrical load to prevent overload blackouts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County existing facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce heat risk to employees; reduce on-going utility costs; reduce the likelihood of an “Excessive Demand Blackout”.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	Reduce effect on new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000
Potential Funding Sources:	Bexar County Funds
Lead Agency/Department Responsible:	Bexar County Facilities
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plan; Bexar County Energy Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

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Bexar County – Action #2	
Proposed Action:	Purchase six fuel tanks and mount them on trailers to be taken to county facilities to run generators and equipment if needed for extended outages during disasters or severe weather.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	It would provide a means to allow 24 hour facilities (jail and juvenile centers) to operate during extended outages, reducing the risk of hazardous situations (loss of use of medical equipment, safe food storage, etc.).
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Flood, Thunderstorm Winds, Hurricane, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Grant/budget item
Lead Agency/Department Responsible:	BCOEM, Bexar County Facilities
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Incorporated into local Standard Operating Guidelines

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

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Bexar County – Action #3	
Proposed Action:	Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County
Risk Reduction Benefit (Current Cost/Losses Avoided):	The awareness promoted and the completion of the identified mitigation projects will significantly reduce the possibility of loss of life in the event of a wildfire.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000/year
Potential Funding Sources:	Grant Funding
Lead Agency/Department Responsible:	BCOEM-WUI Coordinator
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

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Bexar County – Action #4	
Proposed Action:	Work with state and local agencies to determine locations to reduce fuel on public and private lands. Implement fuels reduction program in identified priority areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County
Risk Reduction Benefit (Current Cost/Losses Avoided):	The implementation of identified fuels mitigation projects will significantly reduce the possibility of a wildfire spreading to residential areas from open space land areas.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000/year
Potential Funding Sources:	Grant Funding
Lead Agency/Department Responsible:	BCOEM-WUI Coordinator
Implementation Schedule:	A minimum of four projects per year as they are identified
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

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Bexar County – Action #5	
Proposed Action:	Develop and implement a Community Wildfire Protection Plan (CWPP).
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County
Risk Reduction Benefit (Current Cost/Losses Avoided):	It will promote awareness and reduce the risk to lives and property by educating homeowners about the risk of wildfire and ways to harden their homes. It will also identify mitigation projects to be completed.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	County organizational funds
Lead Agency/Department Responsible:	BCOEM-WUI Coordinator
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

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Bexar County – Action #6	
Proposed Action:	Purchase a community utility trailer to assist with brush removal.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County
Risk Reduction Benefit (Current Cost/Losses Avoided):	By offering incentive, it could promote the mitigation of fuels of private lands, thus reducing the chance of a wildfire destroying homes and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000
Potential Funding Sources:	Grant, budget item
Lead Agency/Department Responsible:	BCOEM-WUI Coordinator
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

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Bexar County – Action #7	
Proposed Action:	All participating jurisdictions will work with Bexar County to educate local citizens on natural hazards and preparatory actions to reduce risk of injury and property loss. The Bexar County-wide Public Education/Outreach and Citizen Preparedness programs will be expanded to include natural hazard awareness and mitigation techniques.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve life safety and reduce risk to the residents of Bexar County, including all participating jurisdictions, through disaster preparedness education and training.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000/year
Potential Funding Sources:	Organization funding, Homeland Security Grant, other Grant funding
Lead Agency/Department Responsible:	Bexar County OEM, local emergency managers
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Bexar County and local Emergency Management Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

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Bexar County – Action #8	
Proposed Action:	Bexar County Storm Water Quality Department does an annual aerial assessment of the rivers, creeks, and streams in Bexar County. We will add assessing major water impoundment ponds to this annual aerial assessment to assess dams within Bexar County and identify possible problem dams for additional assessment. These assessments will be used to identify and implement land use restrictions in the highest risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County and the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Identify possible dam failure locations and downstream residential properties.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood
Effect on New/Existing Buildings:	Identify potential failure locations and impacted properties
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	Bexar County Storm Water Quality Funds
Lead Agency/Department Responsible:	Bexar County Storm Water Quality in coordination with the City of Helotes Public Works
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Bexar County MS4 SWMP

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

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Bexar County – Action #9	
Proposed Action:	Develop and implement a landscaping policy that calls for all new City- and County-owned landscaping to be as drought tolerant as possible allowing for the purpose of the landscaping and that replacement landscaping of existing unsuitable vegetation be replaced with drought tolerant landscaping.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase water conservation; decrease maintenance costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Retrofit existing building as maintenance is needed, design new building with drought resistant landscaping
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000
Potential Funding Sources:	Local budgets
Lead Agency/Department Responsible:	Bexar County Parks/Facilities and City Administration/ Parks Departments
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Existing landscaping maintenance plans and new landscaping plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

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Bexar County – Action #10	
Proposed Action:	Develop and implement policy for new public building construction that encourages the incorporation of heat reflective roofing, exterior walls, windows and other energy efficiencies to mitigate the effects of extreme heat.
BACKGROUND INFORMATION	
Jurisdiction/Location:	New public buildings in Bexar County, and all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce heat risk to employees; reduce on-going repair costs; reduce on-going utility costs; reduce the likelihood of an “Excessive Demand Blackout”.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	Enhances new building’s ability to withstand extreme heat
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local general funds/budgets
Lead Agency/Department Responsible:	County and City administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plans, County and City Energy Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

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Bexar County – Action #11	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes additional future drainage improvement projects and raising flood prone low water crossings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources. Reduce impacts to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

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Bexar County – Action #12	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes future buyouts of flood prone residential areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources; Reduce impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County – Action #13	
Proposed Action:	Harden local critical facilities to ensure continuity of services during extreme events. Actions include but are not limited to storm shutters, window film, surge protectors, roof straps, hail and fire resistant roofing material, purchase and installation of generator with permanent hook-ups.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County and City Police Stations, Fire Stations, EOCs, and other critical facilities, as necessary
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect critical facilities from damages and ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Extreme Heat, Hail, Dam Failure
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000 per structure
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	County and City Administration
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plans

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Bexar County – Action #14	
Proposed Action:	Develop/create areas of defensible space to prevent damage due to wildfires.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Wildland Urban Interface (WUI) of Bexar County or forested/undeveloped vegetated areas in the county and all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of damages to structures in or near the WUI or forested/undeveloped vegetated areas in all participating jurisdictions
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	County and City Fire Departments
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County – Action #15	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes future installation of a High Water Detection and Warning System.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County – Action #16	
Proposed Action:	Develop and implement policy for new building construction that encourages the incorporation of hail resistance construction on roofs, windows, and sky lights.
BACKGROUND INFORMATION	
Jurisdiction/Location:	New public buildings in Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to employees from flying glass and debris; reduce water damage; reduce on-going repair costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	New facility enhancement to protect essential resources used in a disaster; reduce impacts to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$125,000
Potential Funding Sources:	Local County and City funds
Lead Agency/Department Responsible:	County and City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plan; Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Bexar County – Action #17	
Proposed Action:	Construction of covered, wind-resistant parking for first responder and emergency public works vehicles to protect essential assets from hail damage, wind-driven falling objects, thunderstorm winds, tornado, hurricane damage, extreme heat (for vehicles with computer equipment), and other severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County and City Police and Fire Stations, Public Works facilities (as necessary)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents by improving emergency services response; reduce on-going repair costs; continue essential utility services during severe weather events; reduce disaster response time.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Tornado, Hurricane, Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$225,000
Potential Funding Sources:	County and local funds
Lead Agency/Department Responsible:	County and City Facilities, as necessary
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County – Action #18	
Proposed Action:	Develop a comprehensive Severe Weather Response Plan that addresses both Extreme Heat and Winter Storm Hazards. This plan would contain preparation, response, mitigation, and recovery actions needed to protect the populace and governmental organizations during extreme temperature events. This plan will identify, designate, and publicize warming and cooling shelters to be utilized during Winter Storms and Extreme Heat events, respectively.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of death and injury during extreme temperature events, and provide for governmental continuity of operations during extreme heat and winter storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	Protect infrastructure during extreme temperature events
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$12,000
Potential Funding Sources:	Federal / State Grant Funding
Lead Agency/Department Responsible:	Bexar County OEM and participating jurisdictions' emergency management
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	This would complement or replace existing San Antonio Metropolitan Health District Heat Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County – Action #19	
Proposed Action:	Development of a Training Course for Heavy Equipment Use in fighting Wildfire. Course will be developed by the University of Texas at Arlington / Bexar County Public Works and offered through TxLTAP PW Institute.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County Public Works; University of Texas at Arlington, TxLTAP
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents, Public Works employees and equipment; reduce on-going infrastructure repair costs; continue essential services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	TxLTAP / Bexar County Funds
Lead Agency/Department Responsible:	University of Texas at Arlington / Bexar County Public Works, and participating jurisdictions
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plan

COMMENTS
Course will provide skills, safety, preoperational inspection, driving and steering, hand signaling while operating heavy equipment in a Firefighting Environment. Heavy Equipment includes Track Loaders, Gradalls, and Wheel Loaders.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County – Action #20	
Proposed Action:	Adopt and implement program to remove tree branches in and around power lines. Inspect electrical transmission structures and infrastructure on a recurring basis to ensure any potential threat (such as tree branches, signs, poles, vegetation) is removed from the area around power transmission lines and equipment, to prevent such treat from causing damage to power transmission during high winds storms.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions, and outside Bexar County where CPS provides service
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents from power outages; reduce on-going repair costs; continue essential utility services during sever weather event
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Tornado, Hail, Hurricane
Effect on New/Existing Buildings:	New and existing power lines are inspected and cleared; reduce impact of power loss to new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	City Public Service (CPS) Maintenance funds
Lead Agency/Department Responsible:	City Public Service (CPS)
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	CPS Power Line Maintenance plans

COMMENTS
While the CPS has a current program for this activity, the rapid growth in Bexar County and participating jurisdictions has necessitated an extension of the current program to accommodate the periodic maintenance cycle period to provide for adequate storm preparation for the entire planning area.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County – County-wide Actions

Bexar County (County-wide) – Action #1	
Proposed Action:	All participating jurisdictions will work with Bexar County to educate local citizens on natural hazards and preparatory actions to reduce risk of injury and property loss. The Bexar County-wide Public Education/Outreach and Citizen Preparedness programs will be expanded to include natural hazard awareness and mitigation techniques.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve life safety and reduce risk to the residents of Bexar County, including all participating jurisdictions, through disaster preparedness education and training.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000/year
Potential Funding Sources:	Organizational funding, Homeland Security Grant, other Grant funding
Lead Agency/Department Responsible:	Bexar County OEM, local emergency managers
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Bexar County and local Emergency Management Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #2	
Proposed Action:	Develop and implement a landscaping policy that calls for all new City- and County-owned landscaping to be as drought tolerant as possible allowing for the purpose of the landscaping and that replacement landscaping of existing unsuitable vegetation be replaced with drought tolerant landscaping.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase water conservation; decrease maintenance costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Retrofit existing building as maintenance is needed, design new building with drought resistant landscaping
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000
Potential Funding Sources:	Local budgets
Lead Agency/Department Responsible:	Bexar County Parks/Facilities and City Administration/ Parks Departments
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Existing landscaping maintenance plans and new landscaping plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #3	
Proposed Action:	Develop and implement policy for new public building construction that encourages the incorporation of heat reflective roofing, exterior walls, windows and other energy efficiencies to mitigate the effects of extreme heat.
BACKGROUND INFORMATION	
Jurisdiction/Location:	New public buildings in Bexar County, and all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce heat risk to employees; reduce on-going repair costs; reduce on-going utility costs; reduce the likelihood of an “Excessive Demand Blackout”.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	Enhances new building’s ability to withstand extreme heat
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	Local general funds/budgets
Lead Agency/Department Responsible:	County and City administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plans, County and City Energy Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #4	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes additional future drainage improvement projects and raising flood prone low water crossings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources. Reduce impacts to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #5	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes future buyouts of flood prone residential areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources; Reduce impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 3; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #6	
Proposed Action:	Bexar County, including all participating jurisdictions, is engaged in an on-going 10-year, \$500 Million flood control program, which includes future installation of a High Water Detection and Warning System.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going infrastructure repair costs; continue essential utility services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000,000
Potential Funding Sources:	Bond Funds
Lead Agency/Department Responsible:	Bexar Regional Watershed Management (BRWM)
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Bexar Regional Watershed Management Flood Control Plans

COMMENTS
These projects are sponsored and managed by a special committee (the Bexar Regional Watershed Management (BRWM)) which is comprised of high level representatives from the county and all the municipalities and the San Antonio River Authority which includes all participating jurisdictions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #7	
Proposed Action:	Develop and implement policy for new building construction that encourages the incorporation of hail resistance construction on roofs, windows, and sky lights.
BACKGROUND INFORMATION	
Jurisdiction/Location:	New public buildings in Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to employees from flying glass and debris; reduce water damage; reduce on-going repair costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	New facility enhancement to protect essential resources used in a disaster; reduce impacts to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$125,000
Potential Funding Sources:	Local County and City funds
Lead Agency/Department Responsible:	County and City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plan; Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #8	
Proposed Action:	Construction of covered, wind-resistant parking for first responder and emergency public works vehicles to protect essential assets from hail damage, wind-driven falling objects, thunderstorm winds, tornado, hurricane damage, extreme heat (for vehicles with computer equipment), and other severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County and City Police and Fire Stations, Public Works facilities (as necessary)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents by improving emergency services response; reduce on-going repair costs; continue essential utility services during severe weather events; reduce disaster response time.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Tornado, Hurricane, Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$225,000
Potential Funding Sources:	County and local funds
Lead Agency/Department Responsible:	County and City Facilities, as necessary
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #9	
Proposed Action:	Develop a comprehensive Severe Weather Response Plan that addresses both Extreme Heat and Winter Storm Hazards. This plan would contain preparation, response, mitigation, and recovery actions needed to protect the populace and governmental organizations during extreme temperature events. This plan will identify, designate, and publicize warming and cooling shelters to be utilized during Winter Storms and Extreme Heat events, respectively.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire Bexar County, including all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of death and injury during extreme temperature events, and provide for governmental continuity of operations during extreme heat and winter storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	Protect infrastructure during extreme temperature events
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$12,000
Potential Funding Sources:	Federal / State Grant Funding
Lead Agency/Department Responsible:	Bexar County OEM and participating jurisdictions' emergency management
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	This would complement or replace existing San Antonio Metropolitan Health District Heat Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #10	
Proposed Action:	Development of a Training Course for Heavy Equipment Use in fighting Wildfire. Course will be developed by the University of Texas at Arlington / Bexar County Public Works and offered through TxLTAP PW Institute.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bexar County Public Works; University of Texas at Arlington, TxLTAP
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents, Public Works employees and equipment; reduce on-going infrastructure repair costs; continue essential services during severe weather event; reduce disaster response time; ensure continuation of critical public services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	TxLTAP / Bexar County Funds
Lead Agency/Department Responsible:	University of Texas at Arlington / Bexar County Public Works, and participating jurisdictions
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Disaster Preparedness Plan

COMMENTS
Course will provide skills, safety, preoperational inspection, driving and steering, hand signaling while operating heavy equipment in a Firefighting Environment. Heavy Equipment includes Track Loaders, Gradalls, and Wheel Loaders.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #11	
Proposed Action:	Adopt and implement program to remove tree branches in and around power lines. Inspect electrical transmission structures and infrastructure on a recurring basis to ensure any potential threat (such as tree branches, signs, poles, vegetation) is removed from the area around power transmission lines and equipment, to prevent such treat from causing damage to power transmission during high winds storms.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all participating jurisdictions, and outside Bexar County where CPS provides service
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents from power outages; reduce on-going repair costs; continue essential utility services during sever weather event
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Tornado, Hail, Hurricane
Effect on New/Existing Buildings:	New and existing power lines are inspected and cleared; reduce impact of power loss to new and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	City Public Service (CPS) Maintenance funds
Lead Agency/Department Responsible:	City Public Service (CPS)
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	CPS Power Line Maintenance plans

COMMENTS
While the CPS has a current program for this activity, the rapid growth in Bexar County and participating jurisdictions has necessitated an extension of the current program to accommodate the periodic maintenance cycle period to provide for adequate storm preparation for the entire planning area.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #12	
Proposed Action:	Harden local critical facilities to ensure continuity of services during extreme events. Actions include but are not limited to storm shutters, window film, surge protectors, roof straps, hail and fire resistant roofing material, purchase and installation of generator with permanent hook-ups.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County and City Police Stations, Fire Stations, EOCs, and other critical facilities, as necessary
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect critical facilities from damages and ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000 per structure
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	County and City Administration
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plans

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Bexar County (County-wide) – Action #13	
Proposed Action:	Develop/create areas of defensible space to prevent damage due to wildfires.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Wildland Urban Interface (WUI) of Bexar County or forested/undeveloped vegetated areas in the county and all participating jurisdictions
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk of damages to structures in or near the WUI or forested/undeveloped vegetated areas in all participating jurisdictions
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	County and City Fire Departments
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plans

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights

Alamo Heights – Action #1	
Proposed Action:	Distribute commercial and residential drought tolerant or xeriscape landscape practices flyer.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Issued to new residents / business owners in their “welcome to COAH” package
Risk Reduction Benefit (Current Cost/Losses Avoided):	Information on drought tolerant plants and the water saved by using them in a new planting schedule.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50
Potential Funding Sources:	COAH
Lead Agency/Department Responsible:	COAH Building Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Welcome COAH package

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Alamo Heights – Action #2	
Proposed Action:	Distribute public education flyer to students of AHISD on the benefits of turning off the water while brushing your teeth.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights in coordination with AHISD
Risk Reduction Benefit (Current Cost/Losses Avoided):	Excessive water loss avoided.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50
Potential Funding Sources:	AHFD
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #3	
Proposed Action:	During summer months, educate citizens on how to protect themselves against extreme heat exposures.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Educate via COAH website on different types of heat exposure and symptoms they cause.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Managers Assistant
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster management plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #4	
Proposed Action:	Notify citizens of NOAA Extreme Heat Days.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Warn citizens on potential elevated heat days.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Managers Assistant
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster management plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #5	
Proposed Action:	Require developers to plan / use site sediment run off protection.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Losses avoided at contractor expense.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	New and existing/remodeled buildings
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	COAH Building Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	COAH Permit Process

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #6	
Proposed Action:	Implement program for routinely cleaning debris from support bracing under bridges and drainage waterways.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights drainage
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood damages by reducing debris in waterways which reduces damages resulting from debris filled flood waters and reduces backwater flooding created by debris dam formation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	COAH Public Works
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Standard Operating Procedures

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #7	
Proposed Action:	Warn citizens through the city’s website of potential hail events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Situation awareness – warn citizens of potential severe weather.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through early warning and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Managers Assistant
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #8	
Proposed Action:	During Fire Prevention week, hand out flyers to elementary students on hail safety precautions.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Local elementary schools in City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Educating citizens on hail safety precautions.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50
Potential Funding Sources:	AHFD
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Fire Safety Programs

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #9	
Proposed Action:	Notify citizens through City’s website portal of hurricane warnings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Severe weather announcements – warn citizens of potential severe weather.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through early warning and disaster preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Managers Assistant
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Severe weather announcements

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #10	
Proposed Action:	Develop and maintain tree lines as wind buffers on residential streets – 10% of trees over 10 years, then start over.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wind damage to structures through natural wind buffer mitigation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce impacts to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$15,000
Potential Funding Sources:	Local funding
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Land use plan, Annual plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #11	
Proposed Action:	Establish standards for utilities regarding tree pruning around lines. Notify CPS of potential dangers of tree limbs that require pruning around powerlines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Utilities in the City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of downed power lines from tree branches; reduce power outages and associated repair costs and damages.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane, Hail, Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structure and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	COAH Code Enforcement
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Alamo Heights – Action #12	
Proposed Action:	Alamo Heights Fire Department to participate in tornado drills at local schools and provide educational materials to students on tornado safety.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights local schools
Risk Reduction Benefit (Current Cost/Losses Avoided):	Awareness to AHFD on school practices; reduce risk to citizens through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Alamo Heights – Action #13	
Proposed Action:	Participate in “Severe Weather Awareness” week and provide information to local businesses on tornado risks and safety.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights local businesses
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to citizens through education and awareness
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Preparedness Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #14	
Proposed Action:	During “Home Safety” inspections, encourage homeowners to install Carbon Monoxide monitors.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Residents in the City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents of carbon monoxide poisoning.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	AHFD
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Home Safety Inspection Program

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Alamo Heights – Action #15	
Proposed Action:	Inform citizens through City’s website of local storm warnings issued by NOAA.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Alamo Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Inform residents of winter storms and safety measures they can take.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Managers Assistant
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Preparedness Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Balcones Heights

Balcones Heights – Action #1	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Pleasant Road Leisure Drive Bobbies Lane
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2.5 Million
Potential Funding Sources:	HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Balcones Heights – Action #2	
Proposed Action:	Trim trees and low hanging limbs near public right-of-ways and utility lines to reduce falling limbs during severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire area within the City Limits of Balcones Heights
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce damage to Public Works and Public Safety Vehicles; and reduce on-going repair costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane, Winter Storm, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local revenue, HMGP
Lead Agency/Department Responsible:	Local Fire Department / Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Preparedness Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills

Castle Hills – Action #1	
Proposed Action:	Trim trees and low hanging limbs near public right-of-ways and utility lines to reduce falling limbs during severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire area within the City Limits of Castle Hills
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce damage to Public Works and Public Safety Vehicles; and reduce on-going repair costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane, Winter Storm, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Local revenue, HMGP
Lead Agency/Department Responsible:	Local Fire Department / Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Preparedness Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills – Action #2	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Phase 1 Watershed II – Lockhill Selma to West Avenue Dogwood Drive E. Castle Lane Wisteria Drive Mimosa Drive Krameria Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$3.5 Million
Potential Funding Sources:	Local revenue, HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills – Action #3	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Phase 1 Watershed III – Lockhill Selma to Northwest Military Carolwood and Lockhill Selma Carolwood and Banyan Glentower and N.W. Military Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$3.4 Million
Potential Funding Sources:	Local revenue, HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills – Action #4	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Watershed area on Foxhill Lane
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$728,000
Potential Funding Sources:	Local revenue, HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills – Action #5	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Watershed area on Lemonwood Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2 Million
Potential Funding Sources:	Local revenue, HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Castle Hills – Action #6	
Proposed Action:	Implement Flood Control measures such as detention ponds, flood diversion improvements, conveyance improvements, etc., to reduce or eliminate flood damages at various locations throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Project locations: Watershed area on Atwater Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residences; reduce flooding; and reduce on-going repair costs to streets and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1.3 Million
Potential Funding Sources:	Local revenue, HMGP grants, bonds
Lead Agency/Department Responsible:	Public Works / Streets and Drainage Committee
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

China Grove

China Grove – Action #1	
Proposed Action:	Educate property owners of benefits of properly insulating houses and structures, outside faucets, and pipes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Prevent damages and lower utility bills through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Public Education, SOP

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #2	
Proposed Action:	Provide a location / building for vulnerable populations during extreme heat or severe winter storms. Publicize availability of heating/cooling center.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall or Fire Department
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide protection and relief to vulnerable residents; reduce potential injury or illness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000 per event
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #3	
Proposed Action:	Educate property owners on plumbing leaks and detection. Provide assistance to low income citizens in need of repairs.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce unnecessary water waste due to leaks.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000 [500 homes at \$20 per home]
Potential Funding Sources:	HMGP, PDM, local budgets, private donations
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Water Use Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #4	
Proposed Action:	Adopt plan to enforce water conservation in accordance with SAWS rules and City of San Antonio.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve water conservation during drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Minimal – Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #5	
Proposed Action:	Acquire and install high water warning signs at low water crossings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Water crossings: FM 1516 Triple Bend
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk of injury or death during flood events.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,200
Potential Funding Sources:	Local budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

China Grove – Action #6	
Proposed Action:	Clear all drainage culverts of debris to allow run-off with TECQ permission.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damages to structures and infrastructure through improved drainage flow and reduce backwater flooding.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000
Potential Funding Sources:	Local budget, Federal grants
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

China Grove – Action #7	
Proposed Action:	Install lightning rods and surge protectors in critical facilities.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall, Fire Department
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damages to critical facilities; ensure continuity of services.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$3,000
Potential Funding Sources:	Local budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Infrastructure Improvement Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #8	
Proposed Action:	Remove dead or hazardous trees near roadways and hanging in right-of-way or over utility lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to structures, cost of clearing debris, and reduction in power outages and associated costs; fuels reduction.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Tornado, Winter Storm, Wildfire, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	HMGF, PDM, Forestry Service, Local budgets
Lead Agency/Department Responsible:	City Council in coordination with CPS Energy
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

China Grove – Action #9	
Proposed Action:	Provide covered parking for police, fire and other city vehicles.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to public vehicles and equipment.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to city vehicles
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000
Potential Funding Sources:	HMGP, PDM, Federal grants
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Infrastructure Improvement Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

China Grove – Action #10	
Proposed Action:	Community education regarding replacing roofs with hail resistant materials.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to residential structures through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #11	
Proposed Action:	Strengthen building code to include restrictions on commercial structures and hazardous materials storage and requirements for fire safety such as fire prevention plan, number of extinguishers and smoke detectors. Require fire resistant materials in new commercial development.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages resulting from structural fires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000
Potential Funding Sources:	Local Budgets, Building Permit Fees
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Building Codes

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

China Grove – Action #12	
Proposed Action:	Educate citizens on prevention of wildfires, proper use of fire extinguishers, and outdoor burning rules.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages resulting from fires; reduce number of wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,500
Potential Funding Sources:	Local budgets
Lead Agency/Department Responsible:	City Council and Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

China Grove – Action #13	
Proposed Action:	Adopt improved building codes to require wind resistant building techniques.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to future structures through improved building techniques.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local budgets
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Building Codes, Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

China Grove – Action #14	
Proposed Action:	Require safe rooms in all new construction.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk or injury or loss of life.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Budgets, Permit Fees
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Building Codes, Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Converse

Converse – Action #1	
Proposed Action:	Promote use of drought resistant vegetation and landscaping to reduce water consumption and control erosion. Implement policy requiring drought resistant landscaping at new public buildings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Erosion control and water conservation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Reduce effect of drought on new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000
Potential Funding Sources:	City Budget
Lead Agency/Department Responsible:	Building Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Converse – Action #2	
Proposed Action:	Public Education about all Natural Hazards that can impact the city, Fire Prevention, CPR and First Aid, including NFIP Community assistance, education and monitoring.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	City Budget
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Converse – Action #3	
Proposed Action:	Install misting systems on pavilions at city parks.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Park and North Park Pavilions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide shaded and cooled areas for public during times of extreme heat.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, City Budget
Lead Agency/Department Responsible:	Public Works Department
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Converse – Action #4	
Proposed Action:	Acquire and install water level sensing automatic gates at all low water crossings in the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents and manpower requirements on City Staff in event of flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	City Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Converse – Action #5	
Proposed Action:	Hardening of generators at critical infrastructure sites.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall, Police Department, Fire Stations, and well sites
Risk Reduction Benefit (Current Cost/Losses Avoided):	Continue essential utility services during severe weather events; reduce disaster response times.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Tornado, Hurricane, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$80,000
Potential Funding Sources:	HMGP, City Budget
Lead Agency/Department Responsible:	City Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Converse – Action #6	
Proposed Action:	Convert to underground utilities.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; continue essential utility services during severe weather events; reduce disaster response time.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Wildfire, Tornado, Hurricane, Hail, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$45,000,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Elmendorf

Elmendorf – Action #1	
Proposed Action:	Provide a location/building for vulnerable populations during extreme heat or severe winter storms. Publicize availability of heating/cooling center. Collect (through donations) and distribute fans to vulnerable populations during extreme heat events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide protection and relief to vulnerable residents; reduce potential injury or illness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000 per event
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Elmendorf – Action #2	
Proposed Action:	Remove dead or hazardous trees near roadways and hanging in right-of-ways or over utility lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to structures, cost of clearing debris, and reduction in power outages and associated costs; fuels reduction.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Tornado, Winter Storm, Wildfire, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGF, PDM, Forestry Service, local budgets
Lead Agency/Department Responsible:	City Administration in coordination with CPS Energy
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Elmendorf – Action #3	
Proposed Action:	Provide covered parking for police, fire and other city vehicles.
BACKGROUND INFORMATION	
Jurisdiction/Location:	8304 FM 327 Elmendorf, TX 78112
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to public vehicles and equipment.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to city vehicles
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	HMGP, PDM, Federal grants
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Elmendorf – Action #4	
Proposed Action:	Conduct a multi-hazard education program for the community to minimize bodily injury or death and mitigate property damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to property and limit injuries to citizens through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat, Hail, Drought, Flood, Thunderstorm Wind, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local budgets, HMGP, PDM
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Elmendorf – Action #5	
Proposed Action:	Utilize city website and other social media platforms to provide early warning for severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to property and limit injuries to citizens through early warning and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Hail, Flood, Thunderstorm Wind, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budgets
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Elmendorf – Action #6	
Proposed Action:	Implement drainage improvements throughout the flood prone areas of the city where drainage systems are inadequate. Implement stream restoration and/or bank stabilization to ensure adequate drainage capacity and reduce risk of flooding.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide, various locations
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate repetitive flood damages to structures and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and new structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Elmendorf – Action #7	
Proposed Action:	Adopt water contingency plan to include water conservation methods, water rationing, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce water usage during drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Elmendorf – Action #8	
Proposed Action:	Implement plan for periodic inspection and maintenance of fire hydrants to ensure proper function during emergency.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire risk.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Elmendorf – Action #9	
Proposed Action:	Acquire and install early warning sirens.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce tornado injury and fatalities through early warning.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, PDM, Federal Grants
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Fair Oaks Ranch

Fair Oaks Ranch – Action #1	
Proposed Action:	Improve low water crossing areas to provide better drainage. Improvements will be determined per site, but may include box culverts, elevated crossings, drainage improvements, bridges, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	4 locations with the City of Fair Oaks Ranch: 1 Cibolo Creek Crossing, 2 Post Oak Creek Crossings, and 1 Unnamed Tributary Crossing
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of vehicle and life related damages due to high water at these crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flooding risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2 Million
Potential Funding Sources:	Local Revenues, Grants, Storm Utility
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Capital Improvement Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #2	
Proposed Action:	Create a web-based GIS Map for all low water crossings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Include on the Map: 4 locations within the City of Fair Oaks Ranch 1 Cibolo Cree Crossing, 2 Post Oak Creek Crossings, 1 unnamed Tributary Crossing
Risk Reduction Benefit (Current Cost/Losses Avoided):	Offer quick views and proposed alternate routes during high rain events; improve flood risk assessment and increase awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Revenue, Grants, Storm Utility
Lead Agency/Department Responsible:	GIS Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Capital Improvements Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #3	
Proposed Action:	Install flow gauges and early warning detection in order to remotely assess flood waters and potential road closures.
BACKGROUND INFORMATION	
Jurisdiction/Location:	4 locations within the City of Fair Oaks Ranch: 1 Cibolo Creek Crossing, 2 Post Oak Creek Crossings, and 1 unnamed Tributary Crossing
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of vehicle and life related damages due to high water at these crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$800,000
Potential Funding Sources:	Local Revenue, Grants, budget
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Capital Improvements Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #4	
Proposed Action:	Survey and remove hazardous trees from drainage areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Floodplain
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of large debris impeding the drainage system or damaging structures or infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Flood
Effect on New/Existing Buildings:	Reduce risk of damage to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$15,000
Potential Funding Sources:	Local Revenue, Grants
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City's Storm Water Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 2; Legal = 5; Economically Sound = 5; and Environmentally Sound = 2</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #5	
Proposed Action:	Require the installation of lightning rods in high risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Lightning strike prone areas
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of property damage caused by lightning strikes.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk of damage to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$3,000
Potential Funding Sources:	Grants, Local Revenue
Lead Agency/Department Responsible:	Building Codes Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City’s Storm Water Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #6	
Proposed Action:	Adopt campaign for routine fire hydrant inspection, maintenance and upgrades/improvements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide fire hydrants
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure fire hydrants are well worked and functional in case of emergency; replace or repair as necessary.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$8,000
Potential Funding Sources:	Local Revenue, Grants, Water Utility Fund
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City’s Capital Improvement Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3 ; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #7	
Proposed Action:	Implement a Wildfire Community Education Program.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve the knowledge of local residents when it comes to preventing wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$3,000
Potential Funding Sources:	Local Revenue, Grants
Lead Agency/Department Responsible:	Department of Public Safety – Fair Oaks Ranch
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	City’s Resident Education Programs

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #8	
Proposed Action:	Implement a Water Conservation Community Education Program.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve the knowledge of local residents when it comes to saving water during times of drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Revenue, Grants
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City’s Resident Education Programs

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #9	
Proposed Action:	Develop an Incentive Program for using and applying Water Use Data from City SMART Meters.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Residents on the City Water System
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide a useful tool to residents in order to save water during times of drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Reduce effect to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Local Revenue, Grants, Water Utility Fund
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City’s SMART Meter Implementation Program

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #10	
Proposed Action:	Improve CODE RED alert system to include Tornado warnings to more residents.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide quick and accurate updates to residents to decrease loss of life and property damage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce risk to existing structures through early warning
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Revenue, Grants
Lead Agency/Department Responsible:	Department of Public Safety – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Emergency Action Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 3; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #11	
Proposed Action:	Educate the public on Tornado Action Plans and Preparedness.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Educate residents to decrease loss of life and property damage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce effect on existing structure through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Revenue, Grants
Lead Agency/Department Responsible:	Department of Public Safety – Fair Oaks Ranch
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Emergency Action Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 3; Economically Sound = 2; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #12	
Proposed Action:	Update City Building Permit requirements to include shatter resistant glass and materials for hail damage protection.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of broken debris injuring citizens.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Revenue, Grants, budget
Lead Agency/Department Responsible:	Building Codes Department – Fair Oaks Ranch
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Policy Adjustment Planning

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 3; Legal = 3; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #13	
Proposed Action:	Provide larger canopies for entire city vehicle fleet
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall Building Areas
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce vehicle damage for First Responders and Public Works employees.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Winter Storm, Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$25,000
Potential Funding Sources:	Local Revenue, Grants, Budget
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Capital Improvement Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #14	
Proposed Action:	Upgrade City equipment and raw material for combating frozen roads.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City equipment for use City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	City assets can be upgraded to provide better service when de-icing roads.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$15,000
Potential Funding Sources:	Local Revenue, Grants, Budget
Lead Agency/Department Responsible:	Public Works Department – Fair Oaks Ranch
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Emergency Action Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Fair Oaks Ranch – Action #15	
Proposed Action:	Analyze the effectiveness of winter storm protocol and consider ordinance adjustments.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Respond quickly to ensure City thoroughfare is clear and open to traffic.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$20,000
Potential Funding Sources:	Local Revenue, Grants, Budget
Lead Agency/Department Responsible:	Department of Public Safety – Fair Oaks Ranch
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	City Emergency Action Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 4; Economically Sound = 3; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest

Grey Forest – Action #1	
Proposed Action:	Install and maintain flood gates at low water crossings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of injury and fatalities at low water crossings; reduce cost of man hours to manually barricade flooded crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Operations

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Grey Forest – Action #2	
Proposed Action:	Implement schedule for cleaning and clearing drain pipes, culverts and debris at bridges to ensure maximum drainage capacity.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood damages to structures and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Monthly after plan adoption
Incorporation into Existing Plans:	Maintenance and Operations

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #3	
Proposed Action:	Expand program to trim trees hanging in right-of-way throughout the city.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages associated with falling tree limbs and power outages; keep roadways passable.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Quarterly after plan adoption
Incorporation into Existing Plans:	Maintenance and Operations

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Grey Forest – Action #4	
Proposed Action:	Implement a plan for periodic inspection and maintenance of fire hydrants to ensure proper function during emergency.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire risk.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	District 8 Fire Department
Implementation Schedule:	Monthly after plan adoption
Incorporation into Existing Plans:	Maintenance and Operations, Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #5	
Proposed Action:	Implement and enforce burn bans within the city limits.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire risk.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #6	
Proposed Action:	Implement plan to regularly check for leaks in the city water system.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce/prevent unnecessary water loss.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Grey Forest Utilities
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Standard Operating Procedures

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #7	
Proposed Action:	Adopt ordinance to control water usage during droughts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce/prevent overuse of water during drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #8	
Proposed Action:	Conduct a multi-hazard education program for the community to minimize bodily injury or death and mitigate property damages. Utilize available FEMA literature to reduce costs.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to property and limit injuries to citizens through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat, Hail, Drought, Flood, Thunderstorm Wind, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Local budgets, HMGP
Lead Agency/Department Responsible:	City Community Board
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Operations Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #9	
Proposed Action:	Identify and publicize acceptable shelter locations for use during extreme weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Flood, Thunderstorm Wind, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,000
Potential Funding Sources:	Local budgets, HMGP
Lead Agency/Department Responsible:	City Community Board
Implementation Schedule:	Within 36-48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Operations Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #10	
Proposed Action:	Provide covered parking for police, fire, and other city vehicles and equipment.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall, Public Works Yard
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to public vehicles and equipment
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to city vehicles
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$3,500
Potential Funding Sources:	HMGP, PDM, Federal grants, local revenue
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Grey Forest – Action #11	
Proposed Action:	Conserve and utilize easements and adopt additional land use restrictions to prevent development in known high risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages in high risk areas through development restrictions.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Grey Forest – Action #12	
Proposed Action:	Organize volunteers to reach out to vulnerable populations for welfare checks during extreme heat events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to vulnerable populations.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	City Community Board
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Operations

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes

Helotes – Action #1	
Proposed Action:	Perform Antonio Drive Drainage Improvements by installing one of two options: Option A: 10% annual chance design storm by replacing the low water crossing with a bridge, low chord elevation of 1039.5 feet. Option B: 1% annual chance design storm by replacing the low water crossing with a bridge, low chord elevation of 1043.5 feet.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Antonio Drive crossing of Los Reyes Creek, west of Old Bandera Road
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce the risk of damages to structures and infrastructure in the immediate area and preserve emergency access route.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Option A: \$2,306,000; Option B: \$2,982,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan, Flood Risk Reduction Plan

COMMENTS
The Antonio Drive low water crossing at Los Reyes Creek floods frequently, limiting access for nearby residences and critical SAWS water facility. The culverts are also susceptible to clogging from debris.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #2	
Proposed Action:	Bandera Road / Cedar Trail Drainage Improvements: Installation of five (5), 5-foot by 6-foot box culverts at the Bandera Road (S.H. 16) crossing of French Creek Tributary B along with the removal of a low water crossing and drop structure north of Bandera Road and 1,140 feet of channel improvements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Bandera Road (State Highway 16) at French Creek Tributary B near the intersection with Cedar Trail
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk of damages to structures and infrastructure in the immediate area and reduce risk to citizens traveling across low water crossing.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,220,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan, Flood Risk Reduction Plan

COMMENTS
The intersection of Bandera Road and Cedar Trail frequently floods. A hydrologic and hydraulic study was performed in 2013 to identify modifications to the drainage infrastructure to alleviate flooding. The proposed solution was designed for the 4% annual chance storm event.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #3	
Proposed Action:	Parrigin Road Drainage Improvements: Option A: 10% annual chance design storm; install five (5), 6-foot by 4-foot culverts. Option B: 1% annual chance design storm; install a prefabricated arch bridge with a width of 36 feet and a height of 7.39 feet.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Parrigin Road low water crossing of Helotes Creek Tributary A near Indian Trail
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk of damages to structures and infrastructure in the immediate area and reduce risk to citizens traveling across low water crossing.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Option A: \$423,000; Option B: \$1,053,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan, Flood Risk Reduction Plan

COMMENTS
The Parrigin Road low water crossing at Helotes Creek Tributary A floods frequently, limiting access for nearby residences. The ends of the existing culvert have become damaged and exposed and are at risk for more damage.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #4	
Proposed Action:	Install three (3) sets of solar powered, remotely operated flood gates.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Three (3) low water crossings along Scenic Loop Road north of Bandera Road (S.H. 16)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Scenic Loop Road floods in several locations when Helotes Creek overtops its banks. Bexar County installed flood gates in one (1) location and the City of Helotes installed flood gates in (2) locations to reduce the number of vehicles entering flood waters. The gates require manual operation, but during the events, the flooded road prevents emergency personnel from accessing the gates on the far side of the flooded area.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to residents
Priority (High, Moderate, Low):	High
Estimated Cost:	\$210,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #5	
Proposed Action:	Detailed Hydrologic and Hydraulic Study of Culebra Creek Tributary C for: Beverly Hills Drive Drainage Improvements Doheny/FM 1560 Drainage Improvements FM 1560 Drainage Improvements Validation and update of DFIRM hydrologiv model and extension of DFIRM hydraulic model. Survey will be needed for structures within the hydraulic model limits.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Culebra Creek Tributary C from 2,800 feet upstream of Galm Road to upstream of Beverly Hills Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Three low water crossings of Culebra Creek Tributary C experience frequently flooding: Beverly Hills Drive, Doheny at FM 1560, and FM1560. A detailed hydrologic and hydraulic study is needed to determine appropriate drainage improvements.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$65,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #6	
Proposed Action:	Detailed Hydrologic and Hydraulic Study of Unnamed Tributary 3 to Helotes Creek for: Braun Road / Leslie Road drainage improvements Validation and update of DFIRM hydrologic model and development of new hydraulic model. Survey will be needed for structures within the hydraulic model limits.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unnamed Tributary 3 to Helotes Creek near the intersection of Leslie and Braun Roads
Risk Reduction Benefit (Current Cost/Losses Avoided):	Braun Road and Leslie Road near Unnamed Tributary 3 to Helotes Creek experience frequent flooding. A detailed hydrologic and hydraulic study is needed to determine appropriate drainage improvements.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$40,000
Potential Funding Sources:	Local Revenue, HMGP, PDM
Lead Agency/Department Responsible:	Helotes Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #7	
Proposed Action:	Build and/or secure shelters for Police, Fire, Emergency, and Public Works response vehicles and equipment.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Helotes Municipal Complex
Risk Reduction Benefit (Current Cost/Losses Avoided):	Avoid damage to vehicles allowing fleet to be response ready.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	Reduce risk to municipal vehicles
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Revenue, HMGP
Lead Agency/Department Responsible:	City of Helotes – Police, Fire and Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Capital Improvements Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Helotes – Action #8	
Proposed Action:	Install window shutters on the City of Helotes Emergency Operations Center.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Helotes Municipal Complex Building #2
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce property damage and allow EOC to stay functional during storm incidents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Hurricane, Tornado, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	Local Revenue, HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #9	
Proposed Action:	Promoting the purchase and use of NOAA weather radios by residents.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All residents of the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Residents would have a notification source of pending severe weather.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Flood, Hail, Extreme Heat, Winter Storm, Tornado, Wildfire, Dam Failure
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #10	
Proposed Action:	Implement a tree trimming program that routinely clears tree limbs hanging in roadways and right-of-way.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All roadways and right-of-way in the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat of tree limbs impeding response vehicles in roadways.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Winter Storm, Tornado, Hurricane, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Local Budget, HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding and need
Incorporation into Existing Plans:	Maintenance Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #11	
Proposed Action:	Purchase NOAA “All Hazards” radios for early warning and post-event information and place in City offices and buildings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All City of Helotes Municipal Buildings
Risk Reduction Benefit (Current Cost/Losses Avoided):	Alert visitors and employees to special weather related events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Winter Storm, Tornado, Hurricane, Hail, Dam Failure, Flood, Wildfire
Effect on New/Existing Buildings:	Keep people informed, life safety issues
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #12	
Proposed Action:	Educate the public on the dangers of Tornadoes and high winds in an effort to bring awareness to the community. Include mitigation measures to reduce damages and protect residents from injury.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All City of Helotes residents
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat to life and property due to tornado and high winds.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budget
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Distribute and advertise FEMA “How-To” documents to educate citizens on how to protect their property from high winds.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Helotes – Action #13	
Proposed Action:	Develop and implement a shaded fuel break / fuel reduction project to prevent / reduce the spread of wildfires.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Los Reyes Subdivision Government Canyon Natural Area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Minimize the spread of wildfire in a high hazard area.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	State, Texas A&M Forest Service Grant
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Shaded fuel break / fuel reduction projects as per Community Wildfire Protection Plan and Los Reyes FIREWISE program.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Helotes – Action #14	
Proposed Action:	Continue to support and expand the communities within the City to gain FIREWISE designation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Areas that have been evaluated and are a high hazard for wildfire
Risk Reduction Benefit (Current Cost/Losses Avoided):	Prevent/reduce the impact of wildfire; increase safety of people/residents; reduce damage to property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000
Potential Funding Sources:	Private, local funds, Fire Department budget
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Maintain FIREWISE designation which requires mitigating actions by residents. Comply with Community Wildfire Protection Plan.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Helotes – Action #15	
Proposed Action:	Encourage homeowners to install carbon monoxide detectors / monitors / alarms in residences.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All City of Helotes residential properties subjected to possible carbon monoxide accidents/poisoning
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat to life and harm created by carbon monoxide poisoning.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to residents
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Local, private corporation sponsorship
Lead Agency/Department Responsible:	Fire Department, Emergency Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #16	
Proposed Action:	Identify specific at-risk populations that are exceptionally vulnerable in the event of long-term power outage. Create a database to track local residents / individuals affected by long term power outages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Residents of the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Assist elderly and medical assisted residents dependent upon electricity impacted by long term power outage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Tornado, Hurricane, Extreme Heat, Flood
Effect on New/Existing Buildings:	Reduce risk to residents
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000
Potential Funding Sources:	Local, private corporation sponsorship
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #17	
Proposed Action:	Identify and evaluate dams upstream from the City of Helotes. Once a hazard is identified, work with appropriate responsible party or agency (private land owner, Bexar County, State) to resolve the issue. Adopt land use restrictions to limit development in high risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	TBD with evaluations
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat to life and property due to dam failure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Helotes – Action #18	
Proposed Action:	Develop and implement a warning system in the event of a dam failure in conjunction with flood warning system.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Los Reyes Creek Helotes Creek
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat to life and property down-stream.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Effect on New/Existing Buildings:	Reduce risk to residents and existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Revenue, HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Helotes – Action #19	
Proposed Action:	Education to the public of water conservation measures during periods of drought, using social media, City newsletter, and Television Government access channel.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Areas of the City where there are private water wells
Risk Reduction Benefit (Current Cost/Losses Avoided):	To help maintain aquifer water levels at a safe and dependable level.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #20	
Proposed Action:	Provide alternate potable water supplies for residents on private water wells during drought. Provide emergency hook-ups with San Antonio Water System. In critical situations maintain trucked water and emergency bottle water supply.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the City where residents are on private water wells
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain safe and dependable water supply when water levels drop to unsafe level on private wells.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Local Revenue, HMGP, State and Federal Grants
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Water Contingency Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #21	
Proposed Action:	Educating citizens regarding the dangers of extreme heat and the steps they can take to protect themselves when extreme heat temperatures occur, through the use of the Television Government Channel for distribution.
BACKGROUND INFORMATION	
Jurisdiction/Location:	All residents of the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the threat of life and harm due to extreme heat temperatures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Helotes – Action #22	
Proposed Action:	Organize outreach to vulnerable population of elderly and medical assisted individuals. Create a database to track these individuals locally.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Vulnerable populations in the City of Helotes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Assistance to individuals who may not be capable of providing themselves relief due to extreme heat temperatures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Revenue
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village

Hill Country Village – Action #1	
Proposed Action:	Update, implement and enforce the City’s water conservation and drought contingency plans.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 36-48 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan, Drought Contingency Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #2	
Proposed Action:	Implement public education campaign regarding drought contingency stages and effectively communicate drought contingency stages and water use limitation via website and/or local media.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 36-48 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #3	
Proposed Action:	Implement a fan donation and distribution program which will allow our city to give fans to residents who need a means to stay cool during the summer.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #4	
Proposed Action:	Clear debris from bridges, drains, and culverts. Upgrade storm drain to include culvert repair and/or replacement of inadequate culverts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	100 block of Tower Drive 400 block of Tower Drive 100 block of South Tower Drive Blackhawk Trail @ Bison Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property; reduce the manpower and time required to close low water crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce effect on existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	HMGP, Grants, Local matching funds
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Hill Country Village – Action #5	
Proposed Action:	Build and/or secure shelters for Police response vehicles by constructing additional bays and/or covered/secure parking.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Winter Storm, Extreme Heat
Effect on New/Existing Buildings:	Reduce damage to property and equipment
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hill Country Village – Action #6	
Proposed Action:	Develop shelter/safe room sites for first responders and critical staff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Sites TBD within Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to first responders, critical staff, and vulnerable populations; ensure continuity of services following an event.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hill Country Village – Action #7	
Proposed Action:	Implement and enhance an area wide Telephone Emergency Notification System – Reverse 911.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #8	
Proposed Action:	Prepare and advertise local emergency evacuation plan such as escape routes and educate the community on such routes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Flood, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #9	
Proposed Action:	Implement tree trimming program that routinely clears tree limbs hanging in the right-of-way or near power lines. Survey and remove hazardous trees from drainage systems.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Tornado, Winter Storm, Hurricane
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$150,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Hill Country Village – Action #10	
Proposed Action:	Improve early warning systems by subscribing to a community-wide early warning system to include a Civil Alert Siren.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Flood, Hail, Winter Storm, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$20,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hill Country Village – Action #11	
Proposed Action:	Educate the public on the dangers of tornadoes and high winds in an effort to bring awareness to the community. The mitigation action will focus on how to protect life and property from high wind.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	Reduce risk to property through education and preparedness
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hill Country Village – Action #12	
Proposed Action:	Remove downed trees and fire fuels that increase fire risk. Educate the citizens of the city to monitor and clear large acres of brush.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hill Country Village – Action #13	
Proposed Action:	Conduct public education program on fire risks and wildfire mitigation. Implement a community education program regarding fire dangers for identified risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hill Country Village – Action #14	
Proposed Action:	Remove downed trees and fire fuels that increase fire risk. Develop and implement a program for routine fire hydrant maintenance and upgrades, and scheduled fuels reduction in Wildland Urban Interface.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hill Country Village – Action #15	
Proposed Action:	Develop and conduct public awareness program related to winter storms, including road conditions, safety tips, travel strategies, care of pipes, tree maintenance, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Entire community of City of Hill Country Village
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to new and existing structures through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park

Hollywood Park – Action #1	
Proposed Action:	Implement public education campaign regarding drought contingency stages and effectively communicate drought contingency stages and water use limitations via website or local media.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Drought Contingency Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park – Action #2	
Proposed Action:	Update, implement, and enforce the Town’s water conservation and drought contingency plans.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 36-48 months of plan adoption
Incorporation into Existing Plans:	Drought Contingency Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park – Action #3	
Proposed Action:	Develop and conduct public awareness program related to extreme heat, including the dangers and how to protect yourself during extreme heat.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park – Action #4	
Proposed Action:	Implement a fan donation and distribution program which will allow our town to give fans to residents who need a means to stay cool during the summer.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park – Action #5	
Proposed Action:	Clear debris from bridges, drains and culverts, and upgrade storm drains to include culvert repair and/or replacement of inadequate culverts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	132 & 242 Yosemite 112 & 219 El Cerrito Circle 136 & 256 Sagecrest 231 & 270 Donella Drive 105 Coolway 104 Garrapata 232 Sunway 104 Antelop
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property; reduce the manpower and time required to close crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce effect on existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, Grants, local revenue
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hollywood Park – Action #6	
Proposed Action:	Expand and conduct a Hail Storm Safety Education Program that includes a community campaign to reduce losses during hail events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs due to hail damage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce hail damage to property
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Hollywood Park – Action #7	
Proposed Action:	Build and/or secure shelters for police and fire emergency response vehicles and trailers by constructing additional bays and/or covered parking areas for fleet vehicles at city hall.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Winter Storm, Extreme Heat
Effect on New/Existing Buildings:	Reduce damage to property and equipment
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hollywood Park – Action #8	
Proposed Action:	Implement and enhance an area wide telephone Emergency Notification System (“reverse 911”).
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hollywood Park – Action #9	
Proposed Action:	Develop shelter/safe room sites for first responders and critical staff during extreme events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Sites TBD within Hollywood Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to first responders, critical staff, and vulnerable populations; ensure continuity of services following an event.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5 Million
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Shelter Plan, Evacuation Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hollywood Park – Action #10	
Proposed Action:	Implement a tree trimming program that routinely clears tree limbs hanging in right-of-way or near power lines. Survey and remove hazardous trees from drainage systems.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Tornado, Winter Storm, Hurricane, Flood
Effect on New/Existing Buildings:	Reduce risk to new and existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department, Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Hollywood Park – Action #11	
Proposed Action:	Prepare and advertise local emergency evacuation plan, such as escape routes, and educate the community on such routes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Flood, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department, Public Works
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Evacuation Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hollywood Park – Action #12	
Proposed Action:	Educate the public on the dangers of tornadoes and high winds in an effort to bring awareness to the community. The mitigation action will focus on how to protect life and property from high winds.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	Reduce risk to property through education and preparedness
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hollywood Park – Action #13	
Proposed Action:	Improve early warning system by subscribing to a community-wide early warning system to include a Civil Alert Siren.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Flood, Hail, Winter Storm, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$10,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Hollywood Park – Action #14	
Proposed Action:	Conduct public education program on fire risks and wildland fire mitigation. Implement a community education program regarding fire dangers for identified risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents and loss of property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to new and existing structures through education
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hollywood Park – Action #15	
Proposed Action:	Remove downed trees and fire fuels that increase fire risk. Develop and implement a program for routine fire hydrant maintenance and upgrades and scheduled fuels reduction in the Wildland Urban Interface.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents and loss of property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural Systems Protection Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Hollywood Park – Action #16	
Proposed Action:	Develop and conduct public awareness program related to winter storms, including road conditions, safety tips, travel strategies, care of pipes, tree maintenance, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Hollywood Park (entire community)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Local Funding, Grants
Lead Agency/Department Responsible:	Emergency Management, Fire Department, Public Works
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Hollywood Park – Action #17	
Proposed Action:	Educate the community on the dangers of low water crossings through the installation of automatic early warning signs and promotion of “Turn Around, Don’t Drown” program. Identify sites where low water crossing gauges need to be installed and coordinate installation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	134 & 242 Yosemite 112 & 219 El Cerrito Circle 136 & 256 Sagecrest 231 & 270 Donella Drive 105 Coolway 104 Garrapata 232 Sunway 103 Antelope
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property; reduce the manpower and time required to close crossings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$150,000
Potential Funding Sources:	HMGP, Grants, local revenue
Lead Agency/Department Responsible:	Emergency Management, Fire Department
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Kirby

Kirby – Action #1	
Proposed Action:	Trim trees near public right-of-ways and utility lines to reduce falling limbs during severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk to residents; reduce on-going repair costs; continue essential utility services during severe weather events; and reduce disaster response times.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Winter Storm, Tornado, Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	HMGP, PDM, Local Budgets
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	SOPs

COMMENTS
Might look at property owners' responsibility for trimming trees on property that overlook the streets.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Kirby – Action #2	
Proposed Action:	Identify sites where low water crossing gauges need to be added. Obtain and install gauges to warn drivers of hazardous conditions.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Swann Drainage
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents driving into high water; reduce disaster response time during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$15,000
Potential Funding Sources:	HMGP, PDM, Local Budgets
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Kirby – Action #3	
Proposed Action:	Upgrade and maintain storm drains.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Swann Drainage
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents driving into high water; reduce disaster response times during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000
Potential Funding Sources:	HMGP, PDM, Local Budgets
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Kirby – Action #4	
Proposed Action:	Educate community on the dangers of floods including driving through high water, floodplain locations, flood insurance protection, and mitigation measures to reduce damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents driving into high water; reduce disaster response times during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	HMGP, PDM, Local Budgets
Lead Agency/Department Responsible:	Fire Department, Police Department, Emergency Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Kirby – Action #5	
Proposed Action:	Identify and create a database for residents that require special assistance to evacuate to safe location.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; preserve life; reduce disaster response times during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Flood, Hail, Extreme Heat, Winter Storm, Tornado, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Federal Grants, Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Evacuation Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Kirby – Action #6	
Proposed Action:	Purchase a generator and install permanent generator quick connections at City Hall to establish a back-up EOC.
BACKGROUND INFORMATION	
Jurisdiction/Location:	112 Bauman
Risk Reduction Benefit (Current Cost/Losses Avoided):	Having a secondary location, with power, in the event that the primary EOC is out of service; ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Flood, Hail, Hurricane, Thunderstorm Wind, Tornado, Wildfire, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,500,000
Potential Funding Sources:	HMGP, PDM, Local Budgets
Lead Agency/Department Responsible:	City Hall
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Kirby – Action #7	
Proposed Action:	Implement program to require drought tolerant landscaping at public parks and public facilities.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Parks and facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Conserve water resources.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Taxes
Lead Agency/Department Responsible:	City Hall
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Kirby – Action #8	
Proposed Action:	Implement public education campaign regarding drought contingency stages and effectively communicate drought contingency stages and water use limitations via website, local media, and utility bills.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase water conservation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$80,000
Potential Funding Sources:	Taxes
Lead Agency/Department Responsible:	City Hall, Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Kirby – Action #9	
Proposed Action:	Obtain and promote an early warning system that can work in a community-wide emergency.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents during severe weather events, with early notification to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Winter Storm, Thunderstorm Wind, Flood, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$80,000
Potential Funding Sources:	Taxes
Lead Agency/Department Responsible:	City Hall, Police, Fire, Emergency Management, Public Works
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Kirby – Action #10	
Proposed Action:	Install two early warning sirens that can be activated from a central location.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents during severe weather events with early notification to residents.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hail, Winter Storm, Thunderstorm Wind, Flood, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	Taxes
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Kirby – Action #11	
Proposed Action:	Purchase equipment for local CERT teams.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase response and safety of local volunteer response teams.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Winter Storm, Thunderstorm Wind, Extreme Heat, Flood, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Taxes
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Leon Valley

Leon Valley – Action #1	
Proposed Action:	Bank stabilization along Huebner Creek between Evers Road and Bandera Road. Install concrete retaining wall to prevent erosion of the creek bank all along the route throughout the city limits.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the entire course of the Huebner Creek within the city limits
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; preserve natural area.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Public Works and Others
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
We are observing rapid erosion during flood events.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #2	
Proposed Action:	Update Flood Warning System Data Wise Software to improve/expand early warning system.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Flood warning communications center
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; update software that is at end of life.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Winter Storm, Wildfire, Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$8,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Fire Department EMC
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Software in use at this time is at the end of life. Upgrading system will improve and expand current warning system.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #3	
Proposed Action:	Purchase of a weather station to add to an existing Flood sensor station.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Huebner Creek at Evers Road sensor station
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; provide additional weather data during severe weather events; ability to live stream weather related information to the public via the internet.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Winter Storm, Wildfire, Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Fire Department EMC
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	N/A

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Leon Valley – Action #4	
Proposed Action:	Upgrade/Elevate bridge at 6400 Evers Road to increase waterway capacity, prevent overtopping, reduce damages, and maintain evacuation routes and emergency access.
BACKGROUND INFORMATION	
Jurisdiction/Location:	6400 Evers Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; maintain traffic flow during severe weather events; maintain the flow of waterway due to lack of culverts; maintain evacuation route during severe events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan, Evacuation Plan

COMMENTS
Elevation of the bridge will allow the roadway to remain open during severe weather events.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #5	
Proposed Action:	Purchase of generator and installation of permanent hardwired connections for Fire Department.
BACKGROUND INFORMATION	
Jurisdiction/Location:	6300 Elverde Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain communication and emergency response during severe weather events; maintain service to EOC during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Winter Storm, Wildfire, Hurricane, Extreme Heat, Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Public Works and Others
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
EOC is located within the Fire Station and needs ability to maintain full service.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #6	
Proposed Action:	Zarzamora Creek Improvement downstream from area southwest of Wurzburg through the end of the city limits. Improvements will increase capacity, prevent backwater flooding, and reduce flood damages. Improvements to include most feasible, cost-effective improvements to accomplish mitigation such as channel widening, bank stabilization, detention ponds, or other drainage improvements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Zarzamora Creek southwest of Wurzburg through the end of the city limits
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; management of flood waters during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Public Works and Others
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Improvements to the creek will aid in management of flood waters.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #7	
Proposed Action:	Huebner Creek channel improvement above Evers Road to reduce flooding in the Canterfield area. Improvements will increase capacity, prevent backwater flooding, and reduce flood damages. Improvements to include most feasible, cost-effective improvements to accomplish mitigation such as channel widening, bank stabilization, detention ponds, or other drainage improvements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Huebner Creek northeast of Evers to the city limits
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; management of flood waters during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Public Works and Others
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Improvements to the creek will aid in management of flood waters.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Leon Valley – Action #8	
Proposed Action:	Create shaded fuel break in the Shadow Mist subdivision.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Shadow Mist subdivision
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents from wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	Fire Department and Others
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Shaded Fuel Break will reduce the risk of loss from wildfires and help control the spread of fires.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak

Live Oak – Action #1	
Proposed Action:	Educate the citizens of Live Oak by publicizing water restrictions, times, usage, and conservation methods such as drought tolerant landscaping.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Conservation of water during periods of drought.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Code Compliance
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Water usage, day and time restriction follows local SAWS guidelines and are posted on the City website, code enforcement vehicles and Facebook. Additional educational links can also be posted to the site.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #2	
Proposed Action:	Implement City program to pay for the purchase of low flow toilets as incentive for Live Oak residents to install.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Water conservation through city funded program.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Reduce drought impacts to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000 annually
Potential Funding Sources:	General Fund budget
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption and annually thereafter
Incorporation into Existing Plans:	City Ordinance

COMMENTS
City sponsored program to purchase replacement low flow toilets for Live Oak residents in an effort to conserve water.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #3	
Proposed Action:	Educate the citizens of Live Oak by providing safety information on preventing heat related illness and injury.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to residents during periods of extreme heat.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Provide education awareness to prevent heat related illness or injury, through Facebook, Instagram, and CTY Connect to all residents of Live Oak.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #4	
Proposed Action:	Implement fan drive and distribution program to provide fans for those who do not have air conditioning or are in need of assistance to protect themselves and family from excessive heat.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to residents during periods of extreme heat.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budget
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption and annually thereafter
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex O

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Live Oak – Action #5	
Proposed Action:	Educate the citizens of Live Oak by providing safety information on preventing flood related property damage, injury, and death.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
<p>“Turn Around, Don’t Drown” education message will be posted on City website along with CTY connect messages, Facebook, and Instagram messages during periods of heavy rain and flooding.</p>
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Live Oak – Action #6	
Proposed Action:	Collection of storm water drainage fees to support city infrastructure related to flooding.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Avoid losses through flooding damage by maintaining existing infrastructure and adding infrastructure as needed.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Fee based on amount of impervious covering per owner or resident
Priority (High, Moderate, Low):	High
Estimated Cost:	\$550,000 annually
Potential Funding Sources:	N/A
Lead Agency/Department Responsible:	City Finance
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City Ordinance

COMMENTS
Collection of storm water drain fees collected from property owners to finance infrastructure improvement and maintenance related to flooding.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #7	
Proposed Action:	Keep citizens informed about the potential for hail storms by providing early warning.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce the danger risks to persons and property during hail storms.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to property through early warning
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Implement notification on social media sites warning of the potential for hail.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #8	
Proposed Action:	Upgrade building codes to require hail resistant materials for new develop to reduce damage from hail.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risks to property during hail storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	City Code Enforcement
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex K

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Live Oak – Action #9	
Proposed Action:	Educate the citizens of Live Oak by providing safety information about hurricane risks and mitigation options to reduce risk of damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to residents during hurricane force winds.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Provide education awareness to prevent personal injury or death to persons during hurricane winds. Educational information will pertain to what to do to reduce damages and where to go during hurricane winds.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #10	
Proposed Action:	Adopt wind resistant building codes to reduce damage from hurricane force winds.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to residents during hurricane force winds.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Code Enforcement
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex K

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Live Oak – Action #11	
Proposed Action:	Educate the citizens of Live Oak by providing safety information related to Thunderstorm Winds as well as mitigation measure to reduce damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the danger risks to persons and property during thunderstorm winds.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Information regarding the maintenance of property to include trimming of trees and securing loose objects to prevent injury and protect property. The information to be posted on the city web site.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #12	
Proposed Action:	Maintenance of city owned property and right-of-ways to clear loose debris and keep tree limbs trimmed to prevent injury or damage.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the danger risks to persons and property during thunderstorm winds.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$60,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex K

COMMENTS
Regular maintenance to be performed by city employees of city property and right-of-ways.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Live Oak – Action #13	
Proposed Action:	Educate the citizens of Live Oak by providing risk, mitigation and safety information about tornadoes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to residents during tornadoes.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Provide educational awareness to prevent personal injury or death to persons during tornadoes. Educational information will pertain to what to do to reduce damages and where to go during a tornado.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #14	
Proposed Action:	Educate the citizens of Live Oak and make them aware of severe winter storm dangers to persons, pets, and property.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risks to persons, pets, and property during winter storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex I

COMMENTS
Educate the public through city sponsored social media.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #15	
Proposed Action:	Monitor building codes to ensure proper construction to reduce damage from heavy icing and snow.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risks to property during winter storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	City Code Enforcement
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex K

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Live Oak – Action #16	
Proposed Action:	Monitor building codes to ensure proper construction to reduce damage from tornadoes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Live Oak
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to property during tornado events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budgets
Lead Agency/Department Responsible:	City Code Enforcement
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	City of Live Oak Emergency Management Plan Annex K

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Olmos Park

Olmos Park – Action #1	
Proposed Action:	Implement public education regarding drought contingency stages and effectively communicate water stages, water use limitations, and water conservation techniques. Educate individuals and the community via website, local media, or utility billing.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce water consumption during drought through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operation Budget
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #2	
Proposed Action:	Develop and implement a drought contingency plan to include water conservation and mandatory water rationing at public buildings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Implement program to promote conservation of landscaping to low water usage landscaping at public buildings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #3	
Proposed Action:	Educate public officials, developers, contractors, realtors, building owners, and the general public about the risk of extreme heat and measures to reduce risk of injury or illness. Educate via website on different types of heat exposure and symptoms they cause.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to citizens through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Olmos Park – Action #4	
Proposed Action:	Analyze flood-prone properties and identify appropriate mitigation options for each repetitive loss structure. Implement mitigation options as appropriate including acquisition/demolition, acquisition/relocation, or elevation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate repetitive losses through acquisition or elevation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce or eliminate risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Land Use Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #5	
Proposed Action:	Update/retrofit public facilities to include safe room locations for employees.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide safe areas for employees to reduce risk of injury.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Olmos Park – Action #6	
Proposed Action:	Develop and implement program to clean and clear current drainage system. Implement upgrades to system to increase capacity and reduce flooding.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood damages through increased capacity and unobstructed flows.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce flood risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Public Works and the Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan, SOP

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Olmos Park – Action #7	
Proposed Action:	Prepare and advertise the local emergency evacuation plan, escape routes, and coordination with Department of Transportation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect residents through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Flood, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Evacuation plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #8	
Proposed Action:	Enforce ordinances as appropriate, related to building materials, and continue adopting current construction codes to address community hazards including wind, hail, flood, and wildfire.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages through improved construction.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Hurricane, Tornado, Flood, Wildfire
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Building Code, Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Olmos Park – Action #9	
Proposed Action:	Develop safe rooms/shelters for first responders and critical employees during severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to first responders and critical employees.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Olmos Park – Action #10	
Proposed Action:	Improve/expand early warning systems by subscribing to a community-wide emergency notification system.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents and property through early warning.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #11	
Proposed Action:	Educate the community on the dangers of tornadoes and high wind events, and mitigation measures to protect against damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Educate the community on requiring proper location and tie-downs of property as needed.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Local Budget
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #12	
Proposed Action:	Conduct public education programs on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service. Adopt campaign for routine fire hydrant maintenance.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of wildfire damages and injuries through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,500
Potential Funding Sources:	Local Funding
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	SOP

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Olmos Park – Action #13	
Proposed Action:	Establish and implement burning regulations. Implement a community education program regarding fire dangers for identified risk areas. Remove downed trees and fire fuels that increase fire risk.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire risk through fuels reduction and education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection Education and Awareness Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$75,000
Potential Funding Sources:	Texas Forest Service, FMA grants, Local Funding
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Olmos Park – Action #14	
Proposed Action:	Expand and improve community resiliency by working with the citizens to reduce emergency risks from natural events. Develop and conduct public awareness program related to winter storms.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Olmos Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents through education and awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Olmos Park Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig

Saint Hedwig – Action #1	
Proposed Action:	Implement program to promote conservation of landscaping to low water usage landscaping (Xeriscaping) through public education programs at City facilities and through city website.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce on-going water costs; enhance public awareness of drought conservation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #2	
Proposed Action:	Adopt program to require drought tolerant landscaping (Xeriscaping) at all city facilities and city parks.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City buildings and parks
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce on-going water costs; promote drought conservation techniques.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Reduce effect on new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Park and Master Comprehensive Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Saint Hedwig – Action #3	
Proposed Action:	Increase awareness by educating citizens regarding the dangers of extreme heat and the steps they can take to protect themselves when extreme temperatures occur.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of loss of life or injury to citizens.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #4	
Proposed Action:	Ensure vulnerable populations are adequately protected from the impacts of extreme temperatures by creating a database to track those individuals at high risk of death, such as the elderly, homeless, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of loss of life or injury to citizens.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 3; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 3</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #5	
Proposed Action:	Identify sites where low water crossing gauges need to be added or upgraded and coordinate installation requests.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs; enhance public awareness of danger areas during flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000
Potential Funding Sources:	HGMP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 3; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #6	
Proposed Action:	Implement a program for clearing debris from bridges, drains and culverts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs; decrease flooding back up in these areas.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000 annually
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #7	
Proposed Action:	<p>Drainage improvements throughout the city including:</p> <ul style="list-style-type: none"> • Using minor structural projects that are smaller and more localized (e.g., floodwalls or small berms) in areas that cannot be mitigated through non-structural activities or where structural activities are not feasible due to low densities • Using bioengineered bank stabilization techniques • Inspecting bridges and identifying if any repairs or retrofits are needed • Installing, re-routing, or increasing the capacity of a storm drainage system • Increasing drainage or absorption capacities with detention and retention basins, relief drains, spillways, drain widening/dredging or re-routing, logjam and debris removal, extra culverts, bridge modification • Increasing capacity of storm water detention and retention basins • Increasing dimensions of drainage culverts in flood-prone areas • Using stream restoration to ensure adequate drainage and diversion of storm water
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs; decrease flooding back up in these areas.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

Section 16: Mitigation Actions

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #8	
Proposed Action:	Contact the Insurance Institute for Business and Home Safety (IBHS) to learn more about the most appropriate type of roof covering for your geographic region. Require appropriate roofing materials on all new public buildings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Strengthen public structures to reduce damage caused by hailstorms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 1; Administratively Possible = 3; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #9	
Proposed Action:	Expand and conduct a Hail Storm Safety Education Program that includes a community campaign to reduce losses during hail events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce potential damages through community education and awareness about hail damage and prevention.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Recovery Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 3; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #10	
Proposed Action:	Trim trees near public right-of-ways and utility lines to reduce falling limbs during severe weather events and reduce power outages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs; continue essential utility services during severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Winter Storm, Tornado, Hail, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000 annually
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 3; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #11	
Proposed Action:	Purchase NOAA “All Hazards” radios for early warning and post-event information and place in schools, businesses, and critical infrastructure.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Hall, Fire Department, School, Post Office, feed stores, American Legion, restaurants
Risk Reduction Benefit (Current Cost/Losses Avoided):	Public awareness and pre-event notification could save lives; reduce damage to property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Extreme Heat, Flood, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Saint Hedwig – Action #12	
Proposed Action:	Purchase a community utility trailer for brush removal.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce brush build up and subsequently reduce fire hazard.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$15,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #13	
Proposed Action:	Implement a community education program regarding fire dangers for identified risk areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Educate community and subsequently reduce fire hazard.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Saint Hedwig – Action #14	
Proposed Action:	Offer tree pruning education classes to reduce debris caused by falling limbs.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage from extreme events by clearing dead limbs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure through education
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP, Other grants
Lead Agency/Department Responsible:	City of Saint Hedwig Administration
Implementation Schedule:	Within 12 months of plan adoption pending funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Sandy Oaks

Sandy Oaks – Action #1	
Proposed Action:	Implement program to trim and remove tree limbs over curbs and easements hanging lower than 13'6" at curb / right-of-way line (fallen limbs and trees obstruct emergency response vehicles and personnel accessing areas hit by severe weather) and to trim trees around power lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the city
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Protection of property by reducing damage to structures and power infrastructure.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Tornado, Hurricane, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Sandy Oaks – Action #2	
Proposed Action:	Adopt local ordinance for citizens to clean the right-of-way in front of their homes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protection of property by reducing flooding and maintain drainage capacity.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Sandy Oaks – Action #3	
Proposed Action:	Implement program to clean ditches and deepen and widen them to increase drainage capacity and reduce flood losses.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protection of property by reducing flood damage to structures and infrastructure.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Sandy Oaks – Action #4	
Proposed Action:	Develop and implement a multi-hazard public education and awareness program utilizing web media and expansion of outreach program. Provide citizens with risk and hazard information along with safety tips, mitigation techniques, and emergency planning. Include NFIP information along with availability and benefits of flood insurance.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protection of property through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Hail, Wildfire, Winter Storm, Flood, Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Sandy Oaks – Action #5	
Proposed Action:	Purchase/identify site and develop a community safe room to be utilized during extreme weather events including tornadoes, thunderstorms, hurricanes, extreme heat (cooling center), and winter storms (heating center), and for use as evacuation center during floods, and wildfires.
BACKGROUND INFORMATION	
Jurisdiction/Location:	TBD within the City of Sandy Oaks
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protection of first responders and vulnerable populations during extreme events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Wildfire, Winter Storm, Flood, Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to citizens and first responders
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$200,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Emergency Management Office
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Sandy Oaks – Action #6	
Proposed Action:	Hardening of existing city buildings to reduce damages and ensure continuity of services including storm shutters, roof straps, window film, generators with permanent hook-ups, and other measures as deemed necessary to protect the building envelope.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City buildings TBD
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to city buildings and ensure continuity of services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Wildfire, Winter Storm, Flood, Thunderstorm Wind, Tornado, Hurricane, Hail
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$200,000
Potential Funding Sources:	City tax, grant funding
Lead Agency/Department Responsible:	Emergency Management Office
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Sandy Oaks – Action #7	
Proposed Action:	Build, develop, and strengthen partnerships with surrounding communities and local businesses to develop and implement hazard mitigation projects.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Throughout the city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduction of risks to citizens; reduction in disaster response times.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	City tax, grants, operating budget
Lead Agency/Department Responsible:	City Council
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Schertz

Schertz – Action #1	
Proposed Action:	Implement public education campaign regarding drought contingency stages and effectively communicate drought contingency stages, water use limitations, and water conservation techniques via website, local media, or utility billings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce the cost for residents and water consumption.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,000
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Water Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Water Use Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Schertz – Action #2	
Proposed Action:	Monitor, update, implement and enforce the City's / County's water conservation and drought contingency plans.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Better planning for water consumption tables.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Staff Time
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Water Department
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Water Use Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Schertz – Action #3	
Proposed Action:	Participate in the CRS Program through the NFIP to help reduce the flood insurance rates for the citizens of Schertz.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	By entering the CRS program and working to move the city up the scoring system, will reduce the rates that our citizens are paying for flood insurance; it will also help educate the citizens on the importance of flood management.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Estimated \$60,000 per year
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Public Works, Storm Water Manager
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
The City received our first Community Assistance Visit (CAV) this past year and told we are doing great with regards to flood management. This is the first step to joining the CRS program. To fully take advantage of the program the City needs to have a full time person to manage it.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Schertz – Action #4	
Proposed Action:	Remove silt from East Dietz Creek drainage channel to bring back to original design. This channel is silted in taking up capacity of the original design to contain the 100-year flood within its banks.
BACKGROUND INFORMATION	
Jurisdiction/Location:	East Dietz Creek drainage channel from Dietz Road and Borgfeld Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	By removing the silt bringing this channel back to its original design will reduce the risk to the homes along this channel by keeping the designed flow within its banks. This will also benefit these homeowners by being able to keep their flood insurance premiums down.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk of flooding to the homes along this channel
Priority (High, Moderate, Low):	High
Estimated Cost:	\$250,000
Potential Funding Sources:	Drainage Utility fund, possible FEMA Participation Grant
Lead Agency/Department Responsible:	Public Works Drainage Division
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	City's Five Year Budget Plan, Disaster Response Plan

COMMENTS
This channel was last cleaned out after the 1998 flood but has since silted in due to development upstream from neighboring cities.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Schertz – Action #5	
Proposed Action:	Educate the public on the risks associated with Hail, how to protect themselves from injury and ways to protect property from damages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Outreach activities are very cost effective; they can be used to engage the public – at large in their own protection by educating them on the risks associated with the hazards and the actions they can take to avoid those risks and also protect their property.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000 annually
Potential Funding Sources:	City budget
Lead Agency/Department Responsible:	Schertz EOC
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	None

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Schertz – Action #6	
Proposed Action:	Update building codes to include wind and hail resistant construction materials and techniques.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Using hail and wind resistant materials would minimize or eliminate the loss of property resulting from hail and wind storms; that would result in decreased insurance claims in return a decrease in insurance premiums; adds value that should offset the upfront cost.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Hurricane, Tornado
Effect on New/Existing Buildings:	New/modified buildings constructed to withstand damage from hail and wind storms
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Schertz EOC
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Building Codes and Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Schertz – Action #7	
Proposed Action:	Protect Power Lines and Infrastructure: <ul style="list-style-type: none"> • Inspect utility poles and power lines • Use designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system, to enable faster restoration • Install redundancies and loop feeds
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	The regular maintenance and upkeep of utilities can help prevent wind damages to structures; alleviates risk of power outages/loss of communication to public; ensures timely repair if lines need maintenance or replacing; enable safety for public.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500 – studies/research
Potential Funding Sources:	Local revenues, grant
Lead Agency/Department Responsible:	Engineering
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Schertz – Action #8	
Proposed Action:	Trim trees along electrical power lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of debris physically damaging structures/people; alleviates risk of power outages; ensures safety of people in nearby area (electrical shock and injury to anyone in the vicinity of an energized tree); reduces voltage fluctuations or outages; trees touching lines can burn the power lines and tree limbs and allows animals to access the lines, causing additional outages; during storms, tree limbs can break off or hit against power lines, damaging equipment and hindering repair crews.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Winter Storm, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Parks, Recreation and Community Services
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Schertz – Action #9	
Proposed Action:	Distribute pamphlets through neighborhood associations or insert flyers in water bills to make residents aware of wildfire hazard areas and fire protection measures for homes and properties.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz Rural/Urban interface
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk for residents and the Fire Department.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Schertz Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Wildfire Protection Plan

COMMENTS
There are many outlying subdivisions that make the rural/urban interface that could be at risk. This would educate to reduce the risk to their properties and reduce the risk for the fire department.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Schertz – Action #10	
Proposed Action:	Remove downed trees and fire fuels that increase fire risk.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz – Cibolo Creek bed
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk in WUI through fuels reduction in the creek bed in hard to reach areas.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Natural System Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	State or local revenue
Lead Agency/Department Responsible:	Schertz Fire Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Wildfire Protection Plan

COMMENTS
Clearing the Cibolo Creek bed will reduce the risk of fire spread in the creek bed in the hard to reach areas and the urban interface.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Schertz – Action #11	
Proposed Action:	Educate the public by use of city website and social media pages regarding road closures due to winter weather conditions, safe driving in icy conditions, mitigation measures to utilize at home, and safety precautions to take during winter storms.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of damages and injuries.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures through education and preparedness
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Local revenue
Lead Agency/Department Responsible:	Public Works Street Division
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Department Operations Plan, Disaster Plan

COMMENTS
Up-to-date road closures will be added to City website and social media pages along with education fliers to help motorists prepare for possible winter weather conditions.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Schertz – Action #12	
Proposed Action:	Ice control on roadways and bridges through the City and TX-DOT bridges.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Schertz
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce traffic accidents during icy conditions.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduction in auto accidents
Priority (High, Moderate, Low):	High
Estimated Cost:	Estimated \$10,000 per year
Potential Funding Sources:	Department Budget
Lead Agency/Department Responsible:	Public Works Street Division
Implementation Schedule:	Ongoing whenever conditions warrant
Incorporation into Existing Plans:	Department Operations Plan, Disaster Plan

COMMENTS
The estimated cost above includes labor, equipment and materials. This service is provided to all necessary city roads along with supporting TX-DOT bridges within Schertz and assistance to the City of Cibolo when requested.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)
Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park

Shavano Park – Action #1	
Proposed Action:	<p>Mitigate flooding through an education and outreach program to inform residents, insurance agents, realtors, and others of the local flood risk, flood insurance availability and requirements, and mitigation techniques that can be employed to reduce or eliminate damages.</p> <ul style="list-style-type: none"> • Implement a flood awareness program by providing FEMA/NFIP materials to mortgage lenders, real estate agents and insurance agents and place them in local libraries • Educate community on the dangers of low water crossings through the installation of warning signs and promotion of “Turn Around, Don’t Drown” program • Provide how-to information to residents for mitigation measures such as installing backflow valves to prevent reverse-flow floods
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk of damages through education and preparedness.
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS

Section 16: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Shavano Park – Action #2	
Proposed Action:	<p>Implement mitigation activities to reduce flood losses throughout the city:</p> <ul style="list-style-type: none"> • Create a GIS map of National Flood Insurance Program policies, claims and losses, including repetitive losses • Analyze flood-prone properties and identify appropriate mitigation options for each repetitive loss structure. Establish a priority system that ranks each repetitive loss structure in order of priority; Acquire properties and remove them from the floodplain • Implement a voluntary buyout program for repetitive flood properties
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate flood damages to repetitive loss or high risk structures; reduce backwater flooding as well as structure and infrastructure damage due to inadequate drainage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Local revenues, HMGP, PDM, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 36-48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan, Drainage Plan

COMMENTS

Section 16: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park – Action #3	
Proposed Action:	Implement the following plans or programs: <ul style="list-style-type: none"> • Implement a Comprehensive Watershed Ordinance for new development to limit or restrict development in high risk areas • Implement a program for clearing debris from bridges, drains and culverts • Educate Floodplain/CRS Coordinators to become CFMs
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate flood damages through development restrictions; reduce backwater flooding as well as structure and infrastructure damage due to debris and sediment building in drainage system.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenues, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park – Action #4	
Proposed Action:	Update, review, adopt and enforce ordinances, as appropriate, related to building materials (hail resistant roofing and glass) and continue adopting current construction codes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate hail damage through improved building practices.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local revenues, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Shavano Park – Action #5	
Proposed Action:	Develop and implement a Hail Storm Safety Education Program that includes a community campaign to reduce losses during hail events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate hail damage through education and awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenues, HMGP, PDM, other funding sources
Lead Agency/Department Responsible:	Public Works, Fire Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	N/A

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Shavano Park – Action #6	
Proposed Action:	Build and/or secure shelters for Police and Fire Emergency response vehicles and trailers by constructing additional bays and covered parking areas for fleet vehicles at fire stations, City Hall and the Police Station to prevent damages, protect equipment, and ensure continuity of emergency services.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate damages to fleet by providing covered protection during events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Winter Storm, Extreme Heat, Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing assets
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$250,000
Potential Funding Sources:	Local revenues, HMGP, PDM, other funding sources
Lead Agency/Department Responsible:	Public Works, Fire Department
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park – Action #7	
Proposed Action:	Implement a tree trimming program that routinely clears tree limbs hanging in right-of-way.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate power outages from downed trees and limbs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane, Winter Storm, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,500
Potential Funding Sources:	Local revenues, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park – Action #8	
Proposed Action:	Purchase NOAA “All-Hazards” radios for early warning and post-event information and place in area schools, businesses, and critical facilities.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate risk to citizens through early warning capabilities.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Tornado, Hurricane, Winter Storm, Hail, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Shavano Park – Action #9	
Proposed Action:	Achieve certification by the National Weather Service as a “StormReady” community.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate risk to citizens and property through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Tornado, Hurricane, Winter Storm, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Shavano Park – Action #10	
Proposed Action:	Install lightning rods on critical facilities
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical facilities within Shavano Park
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate risk to equipment and critical facilities during thunderstorm events; ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Shavano Park – Action #11	
Proposed Action:	<p>Reduce wildfire threat through planning and ordinances including:</p> <ul style="list-style-type: none"> • Adopt campaign for routine fire hydrant maintenance and upgrades • Work with state and local agencies to determine locations to reduce fuel on public and private lands • Develop and implement a Community Wildfire Protection Plan (CWPP) • Create and implement a wildfire recovery plan, including soil erosion control, vegetative recovery, etc. • Revise Landscaping Ordinance to include vegetation more resistant to fire in landscaping design and adopt a revised “Fire Wise” landscaping ordinance
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate damages through restrictive development and best practices.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan, Local Ordinances

COMMENTS

Section 16: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Shavano Park – Action #12	
Proposed Action:	Reduce wildfire threat through education and awareness programs including: <ul style="list-style-type: none"> • Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service • Implement a community education program regarding fire dangers for identified risk areas • Distribute pamphlets through neighborhood associations or insert flyers in water bills to make residents aware of wildfire hazard areas and fire protection measures for homes and yards
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate damages through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works, Fire Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan, Local Ordinance

COMMENTS

Section 16: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Shavano Park – Action #13	
Proposed Action:	Develop and implement a program to bury existing utilities including power, telephone, cable, and fiber optic lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate damages resulting from power outages during extreme events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Hail, Hurricane, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$2,000,000+
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan, Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Shavano Park – Action #14	
Proposed Action:	Develop and conduct public awareness program related to severe storms, including road conditions, safety tips, “Are You Ready” campaign, travel strategies, care of pipes, tree maintenance, and others; and present effective information to community members.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce or eliminate damages resulting from severe weather events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Thunderstorm Wind, Hail, Hurricane, Tornado, Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and future structures and infrastructure
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$3,000
Potential Funding Sources:	Local revenues, HMGP, other funding sources
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Somerset

Somerset – Action #1	
Proposed Action:	Somerset will work with Bexar County to educate local citizens on natural hazards and mitigation actions to reduce risk of injury and property loss.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve life safety and reduce risk to the residents of Somerset through disaster preparedness education and training.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Protect new and existing homes and businesses through disaster preparedness education and training
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000/year
Potential Funding Sources:	Local Budget, Homeland Security Grant, other Grant funding
Lead Agency/Department Responsible:	Somerset emergency manager
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Somerset – Action #2	
Proposed Action:	Develop and implement a landscaping policy that calls for all new City-owned landscaping to be as drought tolerant as possible allowing for the purpose of the landscaping and that replacement landscaping of existing unsuitable vegetation be replaced with drought tolerant landscaping.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase water conservation; decrease maintenance costs.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Retrofit existing building as maintenance is needed, design new building with drought resistant landscaping
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	Local budgets
Lead Agency/Department Responsible:	Somerset City Administration
Implementation Schedule:	Within 24 months of plan adoption pending funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Somerset – Action #3	
Proposed Action:	Elevate or acquire and demolish repetitive loss properties.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk to residents and structural damages; reduce emergency response and evacuations
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness</i>)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Enhanced protection of buildings and other resources; Reduce impacts to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Bond Funds, HMGP, FMA
Lead Agency/Department Responsible:	Somerset City Administration
Implementation Schedule:	Within 12-36 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Somerset – Action #9	
Proposed Action:	Construction of covered, wind-resistant parking for first responder and emergency public works vehicles to protect essential assets from hail damage, wind-driven falling objects, thunderstorm winds, tornado, hurricane damage, extreme heat (for vehicles with computer equipment), and other severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Somerset Police and Fire Stations
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents by improving emergency services response; reduce on-going repair costs; continue essential utility services during severe weather events; reduce disaster response time.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm Wind, Tornado, Hurricane, Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Local funds, HMGP
Lead Agency/Department Responsible:	Somerset City Administration
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Somerset – Action #13	
Proposed Action:	Harden Somerset critical facilities to ensure continuity of services during extreme events. Actions include but are not limited to storm shutters, window film, surge protectors, roof straps, hail and fire resistant roofing material, purchase and installation of generator with permanent hook-ups.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Critical Facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect critical facilities from damages and ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$200,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Somerset City Administration
Implementation Schedule:	Within 48 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Terrell Hills

Terrell Hills – Action #1	
Proposed Action:	Street and Drainage improvements on the City’s South Central side: Elizabeth, Grandview, and Charles.
BACKGROUND INFORMATION	
Jurisdiction/Location:	South Central – Elizabeth, Grandview, and Charles
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repetitive flood damages through improved drainage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,300,000
Potential Funding Sources:	General Fund, HMA Grants
Lead Agency/Department Responsible:	Development Services, Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #2	
Proposed Action:	Planned Bond Election to address street and drainage improvements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Terrell Hills – Roadways and Drainage
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repetitive flood damages through improved drainage; Bond election to obtain \$6.9 Million in funding for drainage improvements.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500 – staff time
Potential Funding Sources:	Potential Bonds
Lead Agency/Department Responsible:	City Manager’s Office
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	N/A

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #3	
Proposed Action:	Clearing of drainage areas within City annually.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood damages through improved drainage capacity.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000 - \$15,000 annually
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Development Services, Public Works
Implementation Schedule:	Within 24 months of plan adoption, then annually
Incorporation into Existing Plans:	Maintenance and Operations

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #4	
Proposed Action:	Continued implementation of the City’s Storm Water Protection Plan (Annual Updates and Management).
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Estimated \$20,000 to \$25,000 annually.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$60,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	City Manager’s Office, Fire Chief
Implementation Schedule:	Within 24 months of plan adoption, then annually
Incorporation into Existing Plans:	Storm Water Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #5	
Proposed Action:	Participation in study with San Antonio River Authority on North New Braunfels and Austin Highway Corridor.
BACKGROUND INFORMATION	
Jurisdiction/Location:	North East Corridor of the City
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved risk assessment.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	City Manager’s Office
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Storm Water Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #6	
Proposed Action:	Evaluate the capacity of the underground drainage system. Implement upgrades to increase capacity where necessary.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages due to flooding caused by inadequate system.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	City Manager's Office
Implementation Schedule:	Within 24-36 months of plan adoption
Incorporation into Existing Plans:	Storm Water Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Terrell Hills – Action #7	
Proposed Action:	Upgrade and maintain radio communication software and equipment that will be utilized during severe weather events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide / Public Safety Department
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk through early warning and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Extreme Heat, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate/High
Estimated Cost:	\$25,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Terrell Hills – Action #8	
Proposed Action:	Upgrade City web-site which will include public service announcements for storm awareness, low water crossings, etc. Utilize the City Reverse 911 (Blackboard) for All Hazards Warning, and public awareness.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide / Public Safety Department
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk through early warning and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Extreme Heat, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane, Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate/High
Estimated Cost:	\$15,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Terrell Hills – Action #9	
Proposed Action:	Develop and implement tree trimming program twice annually to cover all area / corridors of the City. Powerline tree trimming in conjunction with CPS.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages caused by falling tree branches; reduce the risk of power outages.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate/High
Estimated Cost:	\$15,000
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Development Services, Public Works
Implementation Schedule:	Within 12-24 months of plan adoption
Incorporation into Existing Plans:	N/A

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Universal City

Universal City – Action #1	
Proposed Action:	Provide public education on the risk factors of Heat Exposure and the ways to protect themselves. Provide cooling systems and structures in the impacted areas.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of injury to residents through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Universal City – Action #2	
Proposed Action:	Provide public education regarding drought stages and effectively communicate water use limitations via website, social media, and utility billing. Implement a program to promote conservation of landscaping to low water usage, drought tolerant (Xeriscaping) through public education programs at City Council meetings and park meetings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce impact of drought; reduce water consumption through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Universal City – Action #3	
Proposed Action:	Implement storm water drainage fee to assist in funding of flood mitigation infrastructure. Develop a flood protection program for areas prone to flood and erosion.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to life and property from flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Universal City – Action #4	
Proposed Action:	Adopt and implement a tree trimming program that routinely clears tree limbs hanging in right-of-way.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to structures and infrastructure; reduce risk of power outages.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Tornado, Hurricane, Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Universal City – Action #5	
Proposed Action:	Upgrade public community facilities to include designated storm shelters and develop severe weather actions plans.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents from severe weather.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Universal City – Action #6	
Proposed Action:	Conduct a Hail Storm Safety Education Program that includes a community campaign to reduce losses during hail events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of damages and injuries through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Universal City – Action #7	
Proposed Action:	Review and update ordinances, as appropriate, related to building materials (hail resistant roofing and glass) and continue adopting current construction codes.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to structures through improved building techniques.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Universal City – Action #8	
Proposed Action:	Develop and implement a program to bury existing utilities including power, telephone, cable, and fiber optic lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to lines; reduce risk of power outages; ensure continuity of services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm, Hail, Thunderstorm Wind, Tornado, Hurricane, Flood, Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 16: Mitigation Actions

Universal City – Action #9	
Proposed Action:	Conduct public awareness programs, providing information on winter storm protection, road and driver safety, and home protection during winter storms.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of damages and injury to citizens through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Universal City – Action #10	
Proposed Action:	Adopt regulations for new construction to require fire-resistant roofing materials, smoke alarm systems, sprinkler systems, escape roads, and fuel management requirements.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire damage through improved construction practices.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Universal City – Action #11	
Proposed Action:	Conduct public awareness programs, regarding the wildfire dangers for identified risk areas, how to prevent wildfires, and mitigation measures to reduce risk.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce potential for wildfires; reduce wildfire damages through education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Codes and Compliance Department
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Universal City – Action #12	
Proposed Action:	Improve early warning system by subscribing to a community-wide emergency notification system. Conduct public awareness programs, regarding dangers of tornadoes and hurricanes in an effort to bring awareness to the community.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City and community wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to citizens through early warning and education.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$85,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Von Ormy

Von Ormy – Action #1	
Proposed Action:	Conduct public hearings to get input from citizens, specifically those that are continuously being flooded out of their homes. Develop and implement flood mitigation plan with buy-in from impacted residents. Alternatives to consider include acquisition, elevation, drainage improvements, and/or detention ponds.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repetitive flood losses in residential neighborhoods.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Local revenue, HMGP, PDM, other federal and state grants
Lead Agency/Department Responsible:	Board of Commissioners (Mayor)
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Land Use Plan, Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Von Ormy – Action #2	
Proposed Action:	Develop, adopt, and implement tree trimming program to prune trees throughout the city. Powerline tree trimming in conjunction with CPS.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages caused by falling tree branches; reduce risk of power outages.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000 - \$3,000
Potential Funding Sources:	General Fund, CPS
Lead Agency/Department Responsible:	Board of Commissioners
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Storm Preparedness Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 16: Mitigation Actions

Von Ormy – Action #3	
Proposed Action:	Complete flood study to identify flood risk and source. Disseminate information to residents and encourage purchase of flood insurance.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents through awareness; increase insured losses; improve risk assessment.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200 - \$300
Potential Funding Sources:	General Fund
Lead Agency/Department Responsible:	Board of Commissioners
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Land Use Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest

Windcrest – Action #1	
Proposed Action:	Create a functional emergency operations center (EOC) in the City Council Chambers or Civic Center.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Windcrest City Hall 8601 Midcrown Drive Windcrest, TX 78239 City of Windcrest Civic Center 9310 Jim Seal Windcrest, TX 78239
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain continuity of operations and communications for the City of Windcrest during critical events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000 - \$8,000
Potential Funding Sources:	General Funds, Grants
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #2	
Proposed Action:	Build, develop, and strengthen partnerships with surrounding communities and local businesses to develop and implement hazard mitigation projects.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduction of risk to citizens; reduction in disaster response times.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	City Council and City Staff
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Windcrest – Action #3	
Proposed Action:	Assignment of City Executive to participate and identify regional projects and to further develop capability and capacity to implement hazard mitigation projects.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure continuity of services and emergency response.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Staff Time
Potential Funding Sources:	Operating Budget
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #4	
Proposed Action:	Educate Windcrest residents with disaster preparedness information, potential hazards that can affect the city, and mitigation measures that can be implemented to reduce damages and prevent injury. Utilize education programs such as emergency “preparathon” events and distribute literature such as brochures and posters inclusive of the city of Windcrest website.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure residents are better prepared when faced with disaster and critical events; reduce damages through education and awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000 per year
Potential Funding Sources:	Operating Budget, General Fund
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #5	
Proposed Action:	Complete revision of city website inclusive of emergency operations planning and information for emergency response, operations, and education.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure residents are better prepared when faced with disasters and critical events; reduce damages through education and awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Wildfire, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$3,000
Potential Funding Sources:	Operating Budget, General Fund
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 24 months of plan adoption
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #6	
Proposed Action:	Adopt requirements to strengthen code compliance and enforcement regarding tree hazards to prevent power loss and/or downed power lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents; ensure continuity of electrical service.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500
Potential Funding Sources:	Operating Budget, General Fund
Lead Agency/Department Responsible:	Police Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 4

Section 16: Mitigation Actions

Windcrest – Action #7	
Proposed Action:	Increase WMD and HazMat training for Police and Fire Departments.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Help to ensure the safety, proper and updated training for all police officers and fire fighters.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism and Hazardous Materials
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	Operating Budget, General Fund
Lead Agency/Department Responsible:	Police and Fire Department
Implementation Schedule:	Within 12 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #8	
Proposed Action:	Purchase all-terrain vehicle for police and emergency response during critical events, hazardous situations, and disasters, when roadways are poor or difficult to travel.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure emergency response and continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Preparedness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Wildfire, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$15,000
Potential Funding Sources:	Operating Budget, General Fund
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 36 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #9	
Proposed Action:	Upgrade and revitalize the Windcrest Police Department Communications Center.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Windcrest 8601 Midcrown Drive Windcrest, TX 78239
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure emergency response and continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Preparedness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Wildfire, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$110,000
Potential Funding Sources:	Windcrest Crime Control and Prevention District
Lead Agency/Department Responsible:	Police Department
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #10	
Proposed Action:	Obtain and install emergency generator power with permanent hook-ups at critical facilities for continuity of emergency operations and other critical city services. Maintain and exercise city-wide early warning system (reverse 911).
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure emergency response and continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Wildfire, Hurricane, Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000 per site
Potential Funding Sources:	Windcrest Crime Control and Prevention District
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #11	
Proposed Action:	Enhance and maintain community emergency response team (CERT) program to allow community members to assist first responders in emergency situations.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Wildfire, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$1,000 per year
Potential Funding Sources:	General Funds, Operating Budget
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 48 months of plan adoption
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

Section 16: Mitigation Actions

Windcrest – Action #12	
Proposed Action:	Establish surveillance program for all city water facilities and critical infrastructure
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents, visitors and businesses; ensure continuity of service regarding water supply.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000 per year
Potential Funding Sources:	General Fund, Bexar County Water Control Improvement District #10
Lead Agency/Department Responsible:	Office of Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)</p> <p>Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 16: Mitigation Actions

Windcrest – Action #13	
Proposed Action:	Complete development of a business continuity program for area businesses in the City of Windcrest to educate commercial and residential owners about hazard mitigation strategies and local, state and federal disasters, including NFIP education, assistance and compliance activities.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risks to residents and businesses.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Drought, Flood, Thunderstorm Wind, Hail, Winter Storm, Tornado, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,000 per year
Potential Funding Sources:	General Fund, Windcrest EDC
Lead Agency/Department Responsible:	City Administration
Implementation Schedule:	Within 24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

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Plan Maintenance Procedures

The following is an explanation of how Bexar County, participating jurisdictions, and the general public will be involved in implementing, evaluating, and enhancing the Plan over time. The sustained hazard mitigation planning process consists of four main parts:

- Incorporation
- Monitoring and Evaluation
- Updating
- Continued Public Involvement

Incorporation

Bexar County and participating jurisdictions will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the County and participating jurisdictions. The following describes the process by which Bexar County will incorporate elements of the mitigation plan into other planning mechanisms.

Process of Incorporation

Once the Plan is adopted, Bexar County and participating jurisdictions will implement actions based on priority and the availability of funding. The County currently implements policies and programs to reduce loss to life and property from hazards. The mitigation actions developed for this Plan enhance this ongoing effort and will be implemented through other program mechanisms where possible.

The potential funding sources listed for each identified action may be used when the jurisdiction seeks funds to implement actions. An implementation time period or a specific implementation date has been assigned to each action as an incentive for completing each task and gauging whether actions are implemented in a timely manner.

Section 17: Plan Maintenance

Bexar County and participating jurisdictions will integrate implementation of their mitigation actions with other plans and policies such as construction standards and emergency management plans, and ensure that these actions, or proposed projects, are reflected in other planning efforts. Coordinating and integrating components of other plans and policies into goals and objectives of the Plan will further maximize funding and provide possible cost-sharing of key projects, thereby reducing loss of lives and property and mitigating hazards affecting the area.

Upon formal adoption of the Plan, planning team members from each participating jurisdiction will work to integrate the hazard mitigation strategies into other plans and codes as they are developed. Participating team members will conduct periodic reviews of plans and policies, once per year at a minimum, and analyze the need for amendments in light of the approved Plan. The planning team will review all comprehensive land use plans, capital improvement plans, annual budget reviews, emergency operations or management plans, transportation plans, and any building codes to guide and control development. Participating jurisdictions will ensure that capital improvement planning in the future will also contribute to the goals of this hazard mitigation Plan to reduce the long-term risk to life and property from all hazards. Within one year of formal adoption of the hazard mitigation Plan, existing planning mechanisms will be reviewed by each jurisdiction.

Bexar County is committed to supporting the cities, communities, and participating jurisdictions as they implement their mitigation actions. Bexar County and participating planning team members will review and revise, as necessary, the long-range goals and objectives in strategic plan and budgets to ensure that they are consistent with this mitigation action plan. Additionally, the County will work to advance the goals of this hazard mitigation plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 17-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan into other planning efforts. The team members, listed in Table 17-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the plan, with the exception of the Floodplain Management Plans; the jurisdictions who have a Floodplain Administrator on staff will be responsible for incorporating the plan when floodplain management plans are updated or new plans are developed.

Table 17-1. Methods of Incorporation of the Plan

Planning Mechanism	Incorporation of Plan
Grant Applications	The Plan will be evaluated by Bexar County and participating jurisdictions when grant funding is sought for mitigation projects. If a project is not in the Plan, an amendment may be necessary to include the action in the Plan.
Annual Budget Review	Various departments and key personnel that participated in the planning process for Bexar County and participating jurisdictions will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.

Section 17: Plan Maintenance

Planning Mechanism	Incorporation of Plan
Regulatory Plans	Currently, Bexar County and participating jurisdictions have regulatory plans in place, such as Emergency Management Plans, Continuity of Operations Plans, Economic Development, and Evacuation Plans. The Plan will be consulted when County and City departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.
Capital Improvement Plans	Bexar County and participating jurisdictions have a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, County and City departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plans	Bexar County has a Long-term Comprehensive Development Plan in place. Since comprehensive plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management Plans	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding, and information found in Section 7 of this Plan discussing the people and property at risk to flood, will be reviewed and revised when Bexar County updates their management plans or develops new plans.

Monitoring and Evaluation

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. Revisions may be required to ensure the Plan is in compliance with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, and review. Table 17-2 indicates the department and title of the party responsible for Plan monitoring, updating, and review of the Plan.

Section 17: Plan Maintenance

Table 17-2. Team Members Responsible for Plan Monitoring, Updating, and Review of the Plan

JURISDICTION	TITLE
Bexar County	Emergency Management Coordinator
Alamo Heights	Deputy Chief
Balcones Heights	Fire Chief
Castle Hills	Fire Department Chief
China Grove	Mayor
Converse	Assistant Fire Chief
Elmendorf	Chief of Police
Fair Oaks Ranch	Manager of Engineering Services
Grey Forest	Police Chief
Helotes	Emergency Management Coordinator
Hill Country Village	Chief of Police
Hollywood Park	Fire Chief
Kirby	Emergency Management Coordinator
Leon Valley	Assistant Fire Chief
Live Oak	Lieutenant Police Department
Olmos Park	Captain
Saint Hedwig	Mayor
Sandy Oaks	Fire Marshal
Schertz	Captain Emergency Manager
Shavano Park	Assistant Chief Bexar-Bulverde Volunteer Fire Department
Somerset	City Administrator
Terrell Hills	Fire Chief
Universal City	Fire Marshal
Von Ormy	Zoning Chairman
Windcrest	Lieutenant Special Operations

Section 17: Plan Maintenance

Monitoring

Designated Planning Team members are responsible for monitoring, updating, and reviewing the Plan, as shown in Table 17-2. Individuals holding the title listed in Table 17-2 will be responsible for monitoring the Plan on an annual basis. Plan monitoring includes reviewing and incorporating into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various County and City departments to determine if mitigation actions need to be re-evaluated or changed during the next update; evaluating the Plan as necessary; and monitoring plan maintenance to ensure that the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies if changes to the Plan are needed, such as recommending an action for funding. A summary of meeting notes will report the particulars involved in developing an action into a project.

Evaluation

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization.

The Planning Team will meet on an annual basis to evaluate the Plan and identify any changes needed for the next update. The annual evaluation process will help to determine if any changes are necessary during the next planning cycle.

Updating

Plan Amendments

At any time, minor technical changes may be made to update the Bexar County Hazard Mitigation Plan. Material changes to mitigation actions or major changes in the overall direction of the Plan or the policies contained within it, must be subject to formal adoption by the County and participating jurisdictions.

The County will review proposed amendments and vote to accept, reject, or amend the proposed change. Upon ratification, the amendment will be transmitted to TDEM.

In determining whether to recommend approval or denial of a Plan amendment request, the County will consider the following factors:

- Errors or omissions made in the identification of issues or needs during the preparation of the Plan;
- New issues or needs that were not adequately addressed in the Plan; and
- Changes in information, data, or assumptions from those on which the Plan was based.

Five (5) Year Review and Update

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date, to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation.

Section 17: Plan Maintenance

The Plan review and update process provides the County and participating jurisdictions an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

It is recommended that the full Executive and Advisory Planning Team (Section 2, Tables 2-1 and 2-2) meet to review the Plan at the end of three years because grant funds may be necessary for the development of a five-year update. Reviewing planning grant options in advance of the five-year Plan update deadline is recommended considering the timelines for grant and planning cycles can be in excess of a year.

Following the Plan review, any revisions and updates deemed necessary will be summarized and implemented according to the reporting procedures and Plan amendment process outlined herein. Upon completion of the review, update, and amendment process the revised Plan will be submitted to TDEM for final review and approval in coordination with FEMA.

Continued Public Involvement

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. The Public will be directly involved in the annual review and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan on Bexar County's website where officials and the public are invited to provide ongoing feedback, via email to the County's Office of Emergency Management.

The Planning Team may also designate voluntary citizens from the County or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. It is important that stakeholders and the immediate community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning team is responsible for notifying stakeholders and community members on an annual basis and maintaining the Plan.

Media, including local newspaper and radio stations, will be used to notify the public of any maintenance or periodic review activities during the implementation, monitoring, and evaluation phases. Additionally, local news media will be contacted to cover information regarding Plan updates, status of grant applications, and project implementation. Local and social media outlets, such as Facebook and Twitter, will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.

Appendix A: Planning Team

Planning Team Members 1
 Stakeholders 3

Planning Team Members

The Bexar County Plan 2017 was organized using a direct representative model. An Executive Planning Team from Bexar County and participating jurisdictions, shown in Table A-1, was formed to coordinate planning efforts, and request input and participation in the planning process. Table A-2 reflects the Advisory Planning Team, consisting of representatives from area organizations and departments that participated throughout the planning process. Table A-3 is comprised of stakeholders who were invited to provide Plan Update input. Public outreach efforts and meeting documentation is provided in Appendix E.

Table A-1. Executive Planning Team

DEPARTMENTS	TITLE
Bexar County Office of Emergency Management	Emergency Management Coordinator
Bexar County Office of Emergency Management	Assistant Emergency Management Coordinator
City of Alamo Heights	Deputy Chief
City of Balcones Heights	Fire Chief
City of Castle Hills	Fire Department Chief
City of China Grove	Mayor
City of Converse	Assistant Fire Chief
City of Elmendorf	Chief of Police
City of Fair Oaks Ranch	Manager of Engineering Services
City of Grey Forest	Police Chief
City of Helotes	Emergency Management Coordinator
City of Hill Country Village	Chief of Police
Town of Hollywood Park	Fire Chief
City of Kirby	Emergency Management Coordinator
City of Leon Valley	Assistant Fire Chief
City of Live Oak	Lieutenant Police Department
City of Olmos Park	Captain

Appendix A: Planning Team

DEPARTMENTS	TITLE
City of St. Hedwig	Mayor
City of Sandy Oaks	Fire Marshal
City of Schertz	Captain Emergency Manager
City of Schertz	Assistant Emergency Manager
City of Shavano Park	Assistant Chief Bexar-Bulverde Volunteer Fire Department
City of Somerset	City Administrator
City of Terrell Hills	Fire Chief
City of Universal City	Fire Marshal
City of Universal City	Lieutenant
City of Von Ormy	Zoning Chairman
City of Windcrest	Lieutenant Special Operations

Table A-2. Advisory Planning Team

DEPARTMENTS	TITLE
Bexar County	Project Coordinator
Bexar County Community Resources Department	Director
Bexar County Environmental	Director
Bexar County Environmental	Investigator Bexar County
Bexar County Flood Control	Project Manager
Bexar County Office of Emergency Management	CERT Regional Coordinator
Bexar County Office of Emergency Management	Intern
Bexar County Public Works	Wildland Urban Interface Coordinator
Bexar County Public Works	Project Coordinator
City of Castle Hills	Shift Captain Fire Department
City of Converse	Assistant Police Chief
City of Helotes	Public Works Director
Town of Hollywood Park	Fire Department Lieutenant

Appendix A: Planning Team

DEPARTMENTS	TITLE
City of Live Oak	Emergency Manager
City of Live Oak	Corporal Police Department
City of Sandy Oaks	City Alderman
City of Universal City	Fire Marshal

Stakeholders

The following groups listed in Table A-3 represent a list of organizations invited to stakeholder meetings, public meetings and workshops throughout the planning process and include: non-profit organizations, private businesses, universities, and legislators. The public were also invited to participate via e-mail throughout the planning process. For a list of attendees at meetings, please see Appendix E¹.

Table A-3. Stakeholders

AGENCY	TITLE
American Red Cross	Assistant Director
American Red Cross	Local Program Coordinator
Angel Staffing	Director
Association of Contingency Planner – Alamo Chapter/Security Service Federal Credit Union	Planning Coordinator
AT&T	Regional Manager
Baptist Child and Family Services	Assistant Director
Bexar County Sheriff's Office	Sheriff
Bexar Metro 9-1-1 Network District	Coordinator
Brooks Development Authority	Operations Supervisor
Center for Health Care Services	Assistant Director
Chamber of Commerce	Executive Director
Christus Health System	Director
Community Emergency Response Teams	Emergency Management Coordinator
Department of State Health Services	Program Manager

¹ Information contained in Appendix E is exempt from public release under the Freedom of Information Act (FOIA).

Appendix A: Planning Team

AGENCY	TITLE
Education Service Center, Region 20	Assistant Director
Family Endeavors	Assistant Director
Federal Bureau of Investigation	Regional Bureau Chief
Federal Executive Board	Manager
HAM Operators	Volunteer
Haven for Hope	Volunteer
HEB	Business Development
Joint Base San Antonio	Assistant Director
Port San Antonio	Port Chief
Port San Antonio	Program Coordinator
Randolph Brooks	Director of Programs
San Antonio Airport Fire (SAFD) – Airport	Fire Chief
San Antonio Airport Police (SAPD) – Airport	Police Chief
San Antonio Aviation Department	Aviation Administrator
San Antonio Food Bank	Director
San Antonio Library	Senior Librarian
San Antonio Metropolitan Health District	District Supervisor
San Antonio Solid Waste Management	Assistant Director
San Antonio Transportation & Capital Improvements (TCI)	Director
South Texas Blood and Tissue Center	Operations Manager
Southwest Texas Regional Advisory Council	Council President
St. Mary's University	Risk Manager
Telemundo	Chief Photographer
Texas A&M Forest Service	Biologist
Texas A&M University – San Antonio	Risk Manager
Texas Commission on Environmental Quality	San Antonio Region Environmental Investigator
Texas Division of Emergency Management	District Coordinator

Appendix A: Planning Team

AGENCY	TITLE
Texas State Senators	State Senator
Texas State Representatives	State Representatives
United States Marshals Service	Regional Director
United States Postal Service	Program Coordinator
United States Secret Service	Regional Director
University Health System	Emergency Manager
University of North Texas	Undergraduate Student (Emergency Administration and Disaster Planning)
University of Texas at San Antonio	Risk Manager/EMC
University of Texas Health Science Center at San Antonio	Emergency Management Coordinator
United Services Automobile Association	Program Administrator
VIA Metropolitan Transit	Supervisor

Appendix B: Public Survey Results

Overview	1
Public Survey Results	2

Overview

Bexar County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available on the County’s website, along with participating jurisdictions. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

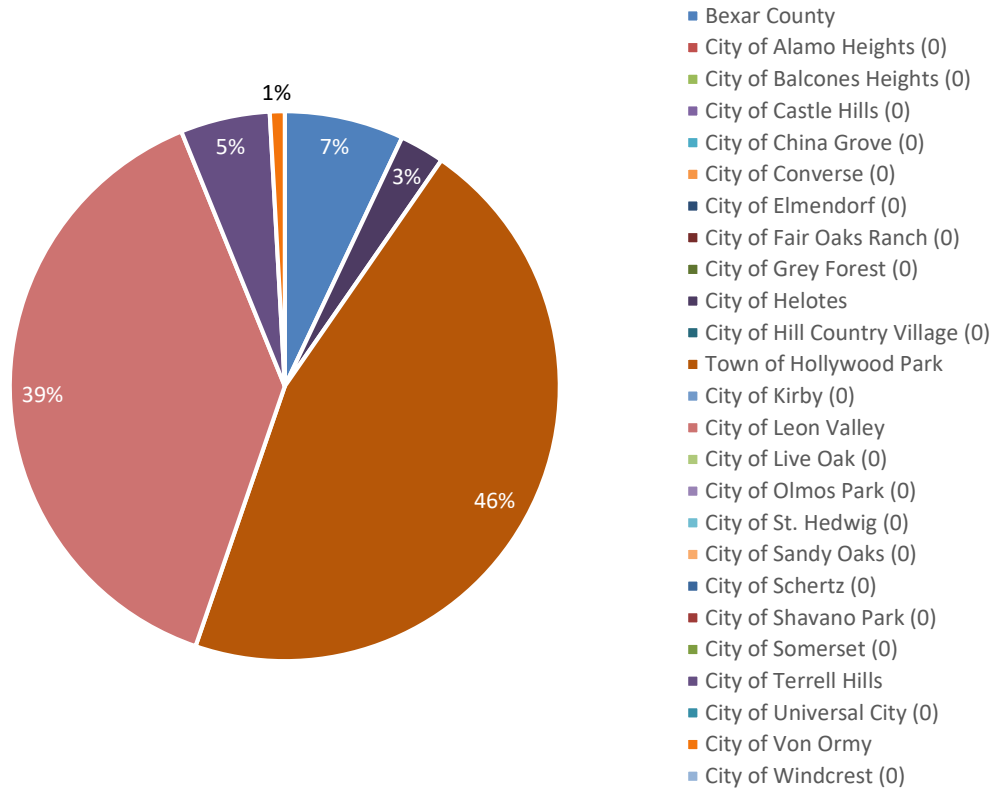
A total of 114 surveys were collected, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential actions or problem areas.

The following survey results depict the percentage of responses for each answer. Similar responses have been summarized for questions that did not provide a multiple-choice answer or that required an explanation.

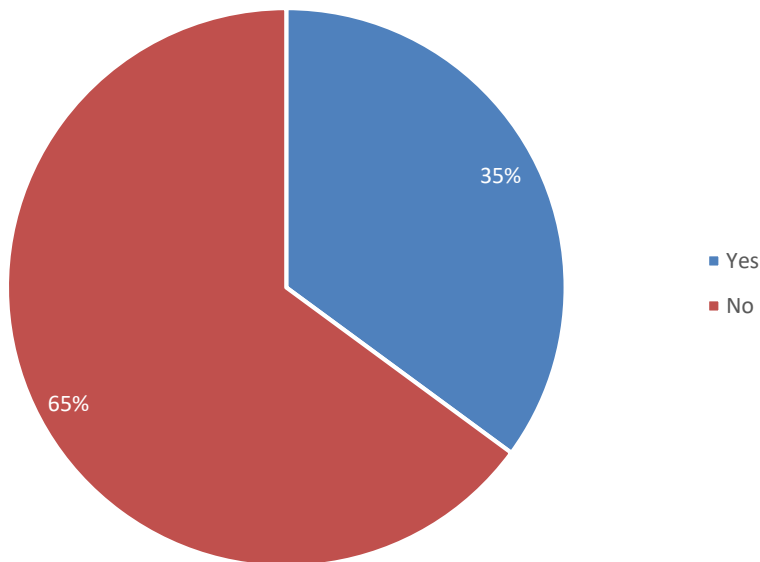
Appendix B: Public Survey Results

Public Survey Results

1. Please state the jurisdiction (city and community) where you reside.

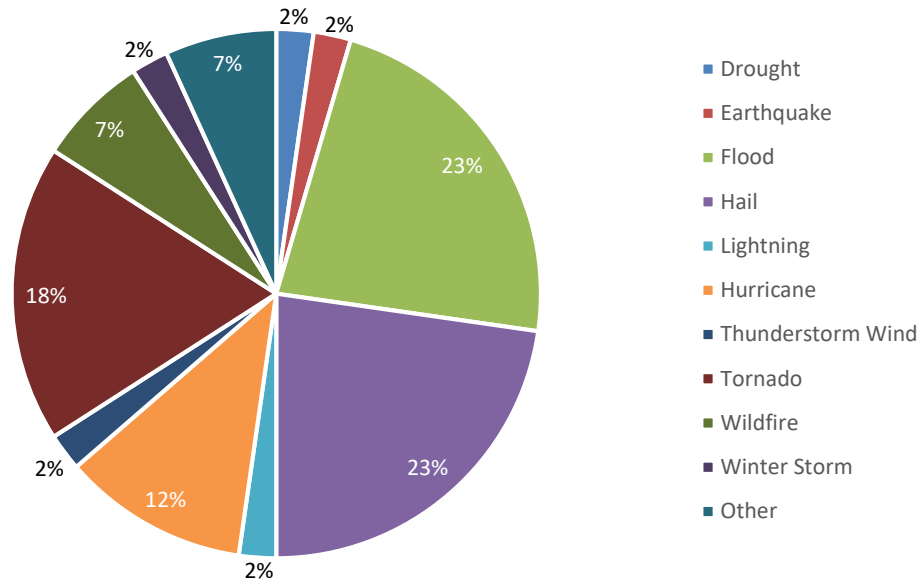


2. A. Have you ever experienced or been impacted by a disaster?

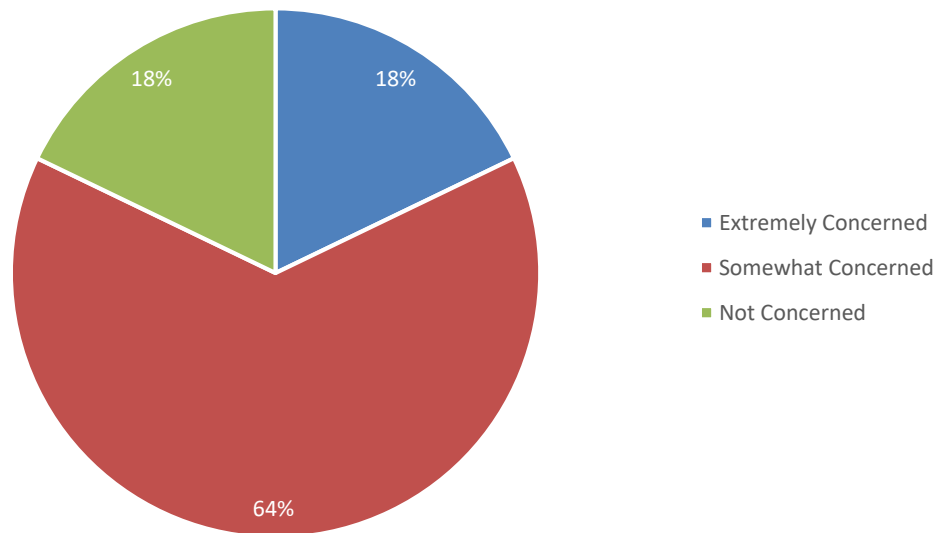


Appendix B: Public Survey Results

2. B. If "yes", please explain:

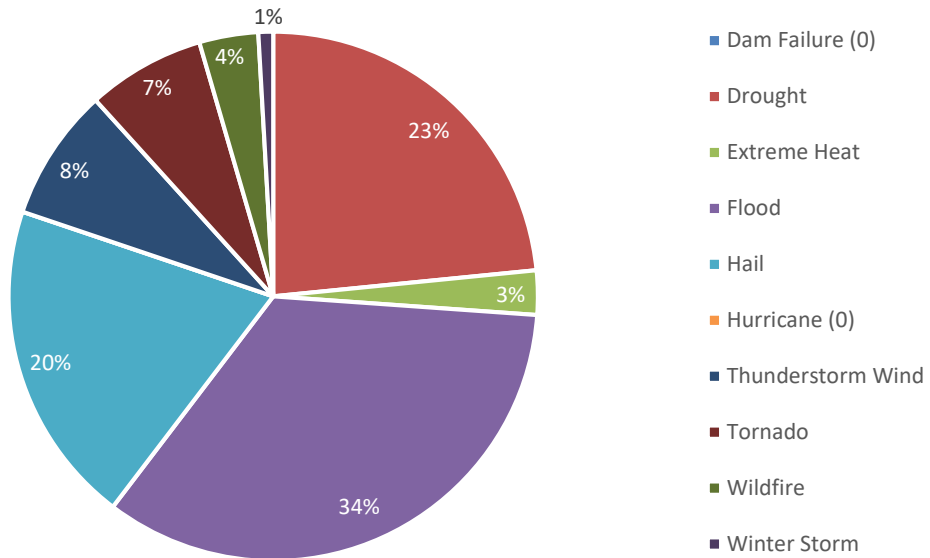


3. How concerned are you about the possibility of your community being impacted by a disaster?

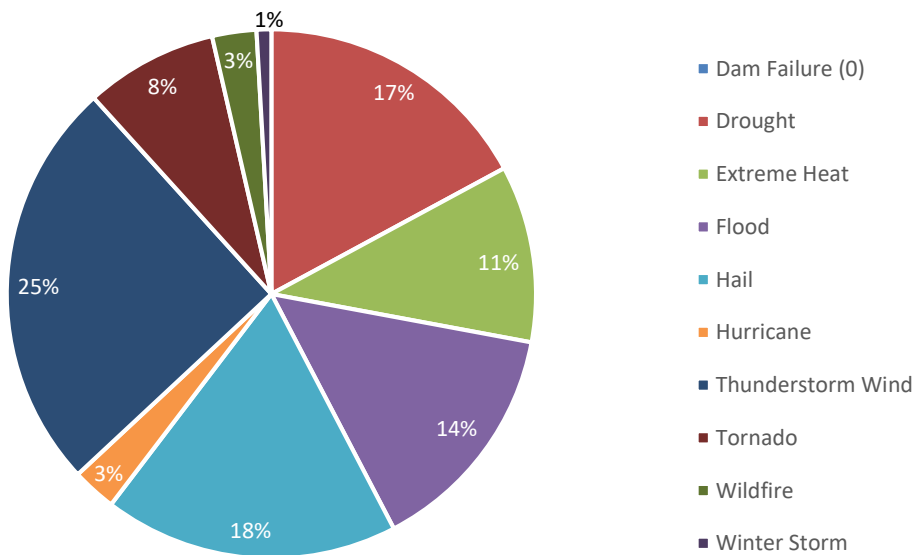


Appendix B: Public Survey Results

4. Please select the one hazard you think is the highest threat to your neighborhood:

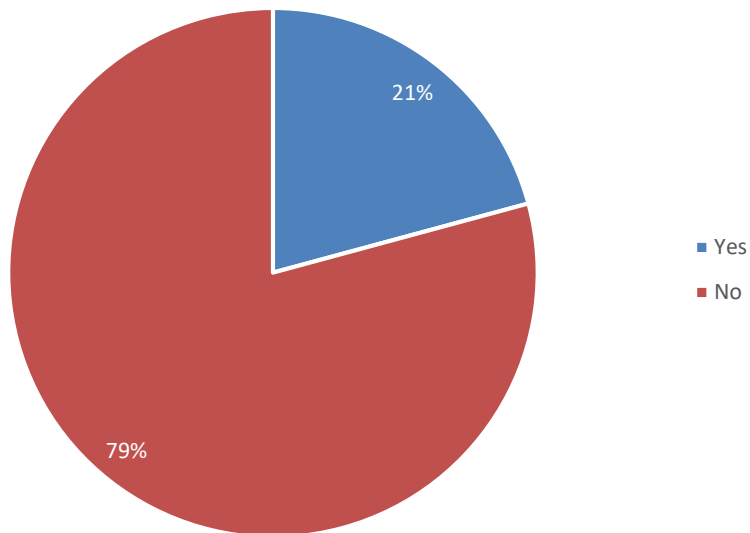


5. Please select the one hazard you think is the second highest threat to your neighborhood:

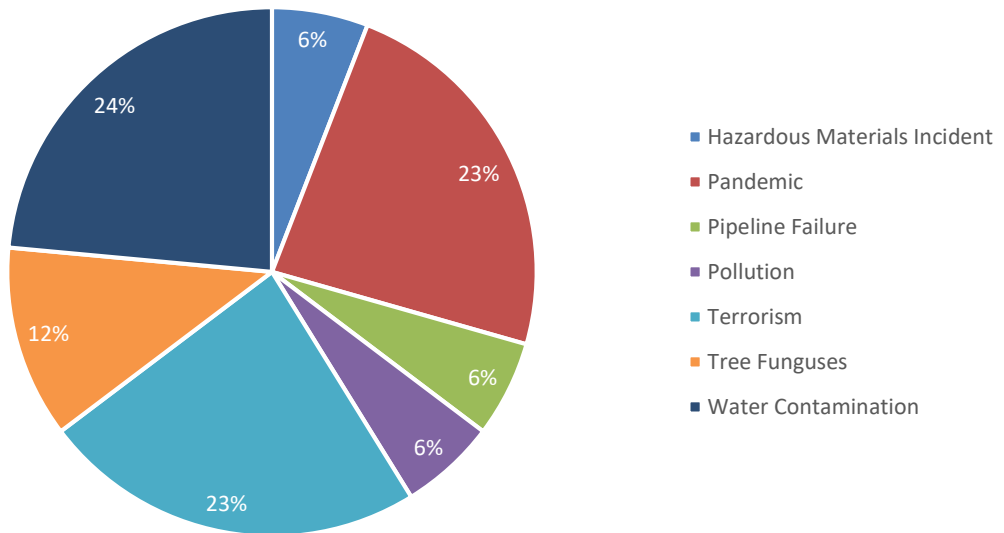


Appendix B: Public Survey Results

6. A. Are there hazards not listed above that you think is a wide-scale threat to your neighborhood?

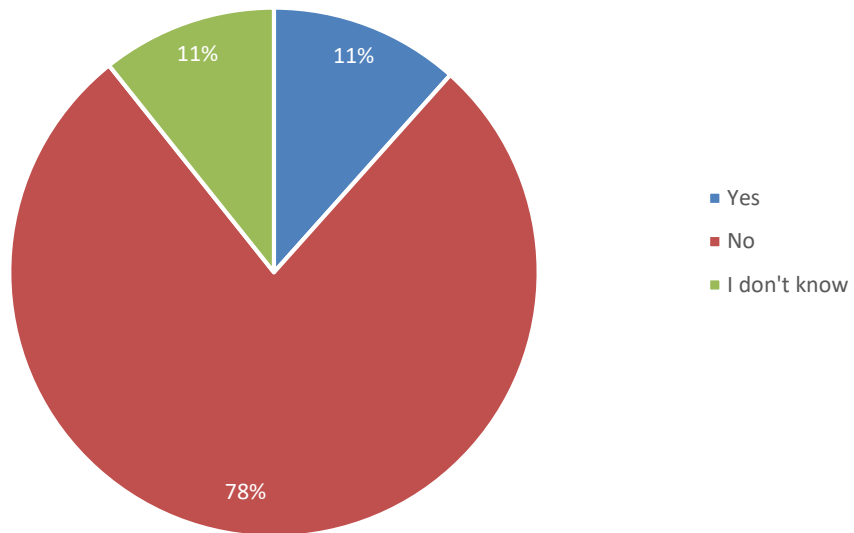


6. B. If "Yes," please explain.

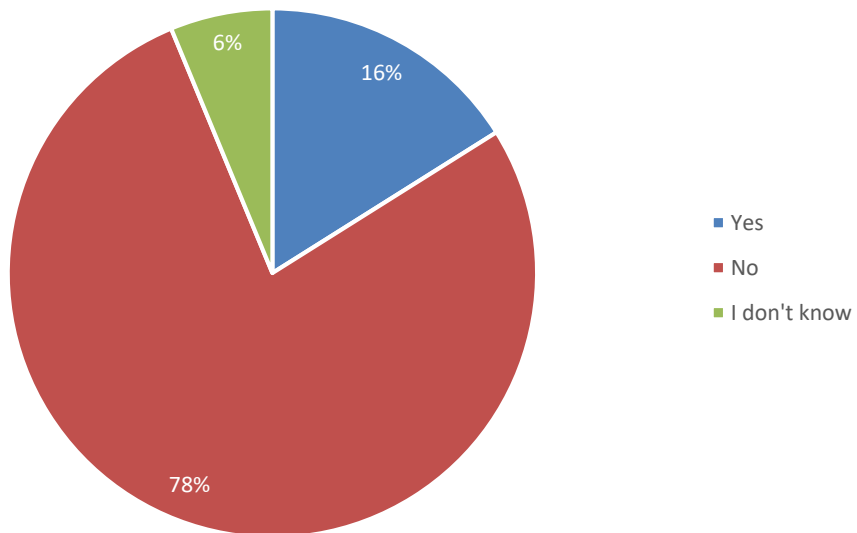


Appendix B: Public Survey Results

7. Is your home located in a floodplain?

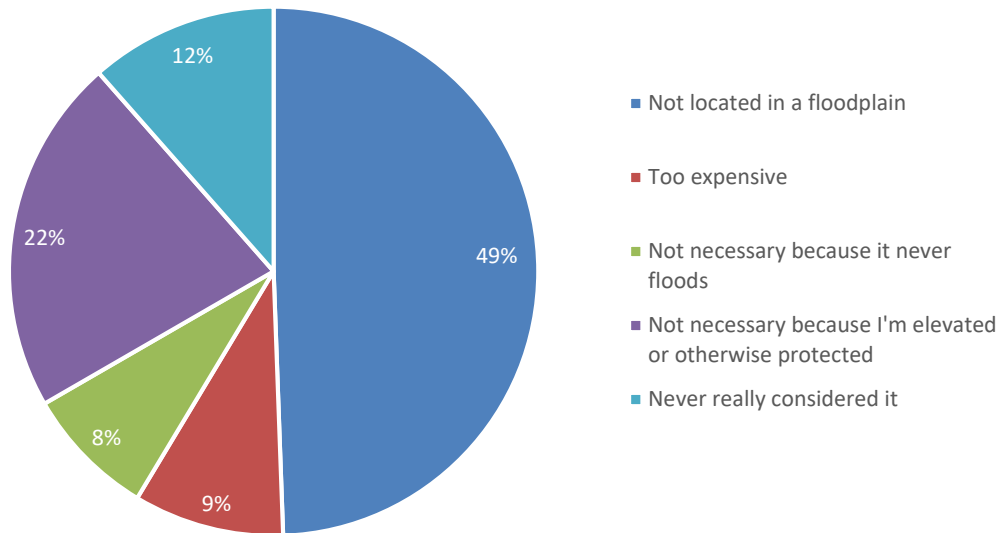


8. Do you have flood insurance?

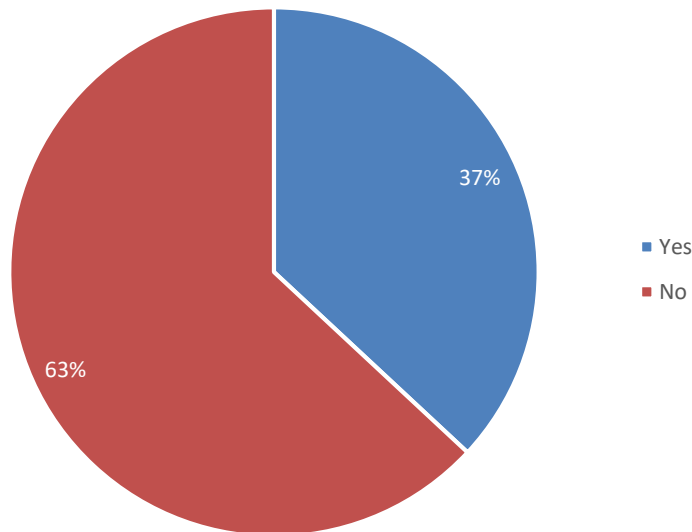


Appendix B: Public Survey Results

9. If you do not have flood insurance, why not?

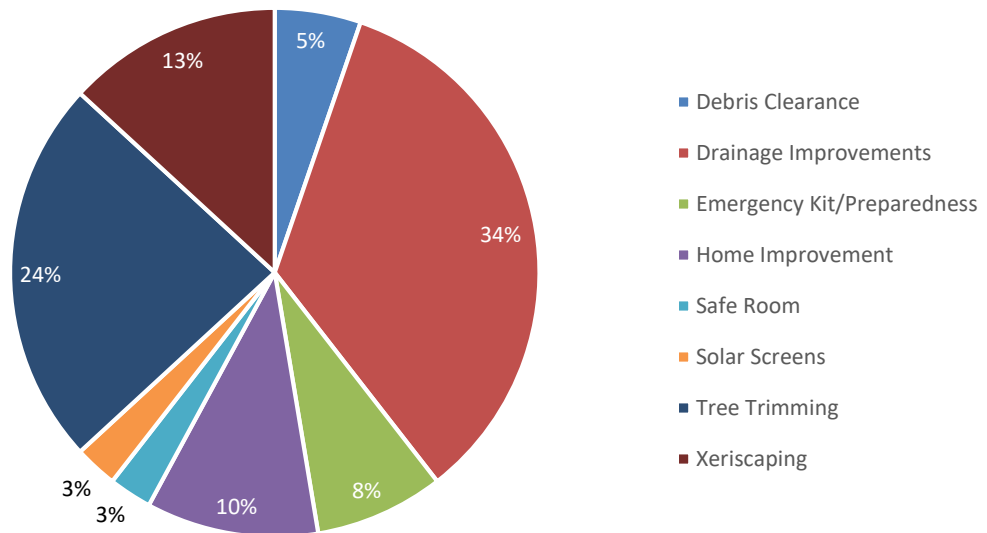


10. A. Have you taken any actions to make your home or neighborhood more resistant to hazards?

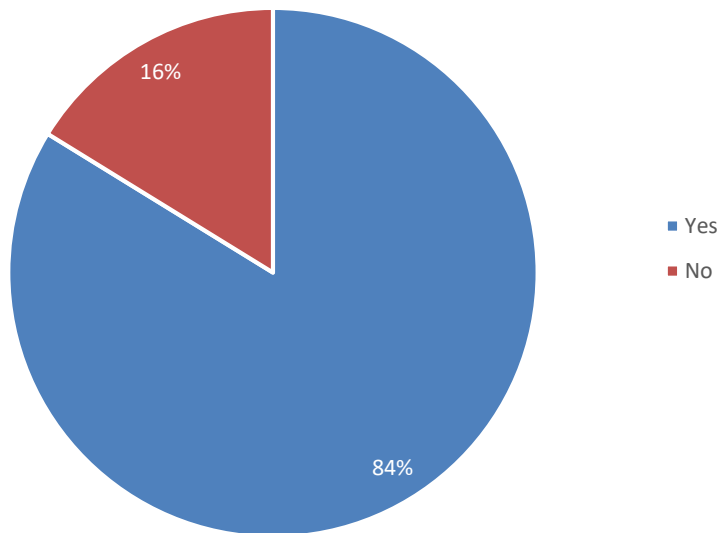


Appendix B: Public Survey Results

10. B. What have you done?

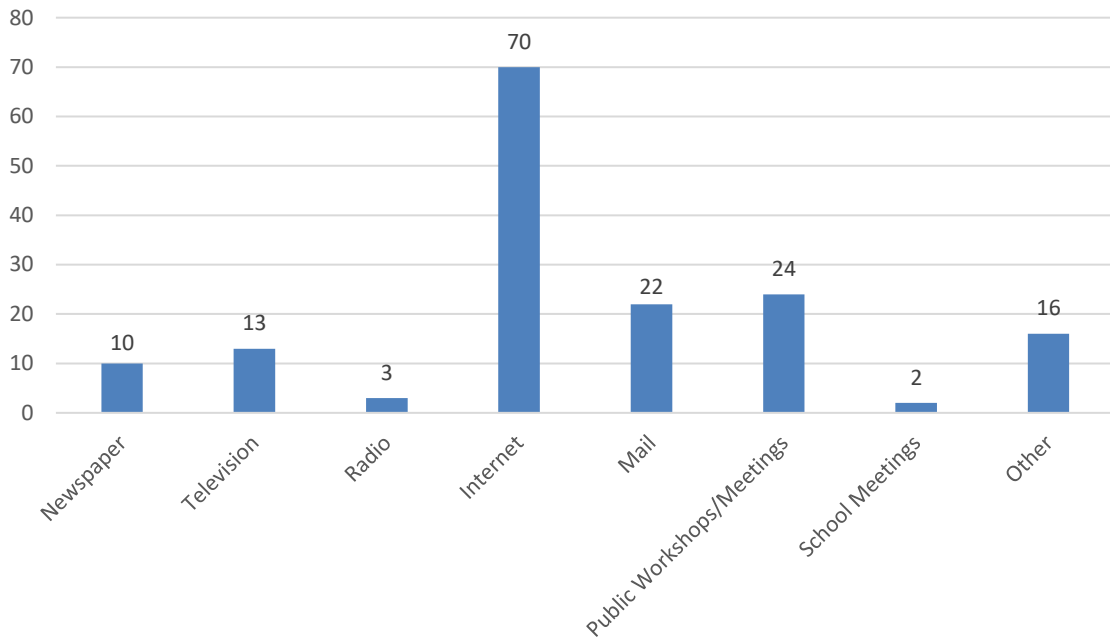


11. Are you interested in making your home or neighborhood more resistant to hazards?

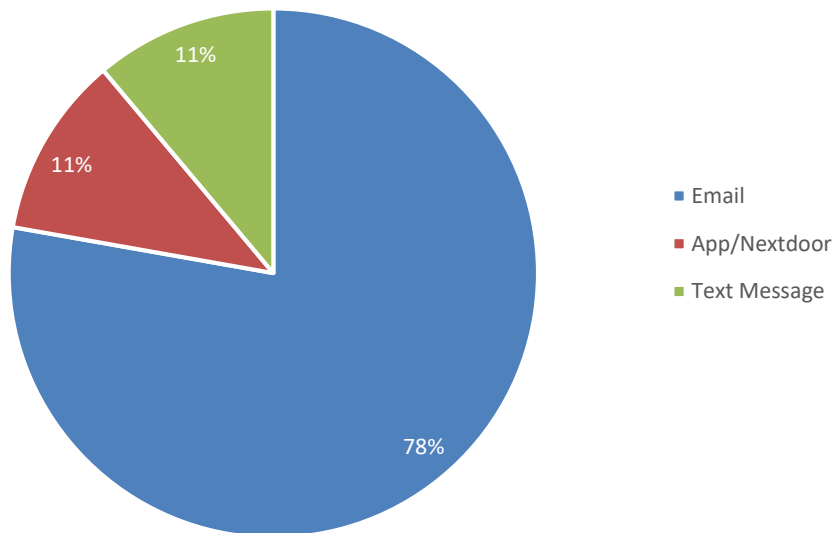


Appendix B: Public Survey Results

12. A. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

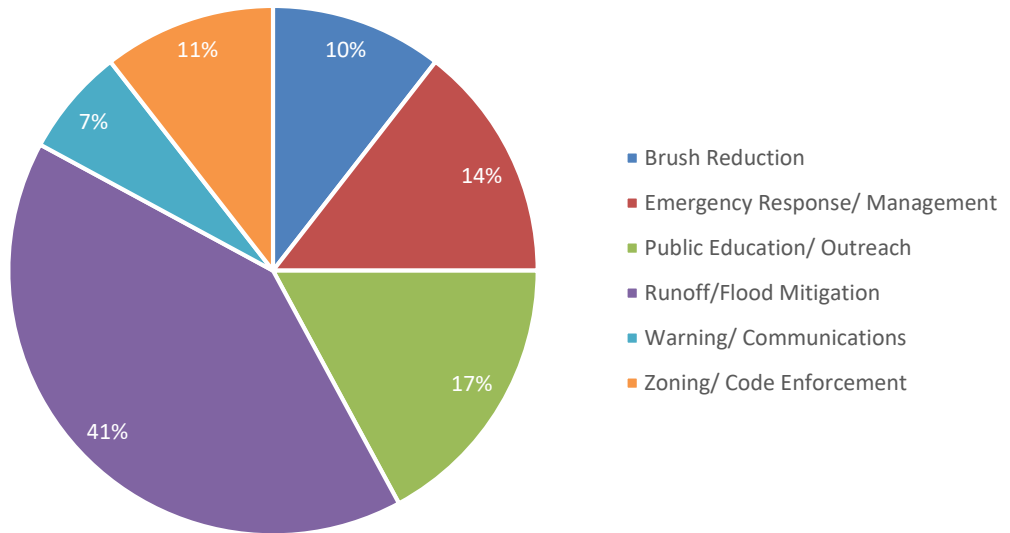


12. B. If other, please specify.

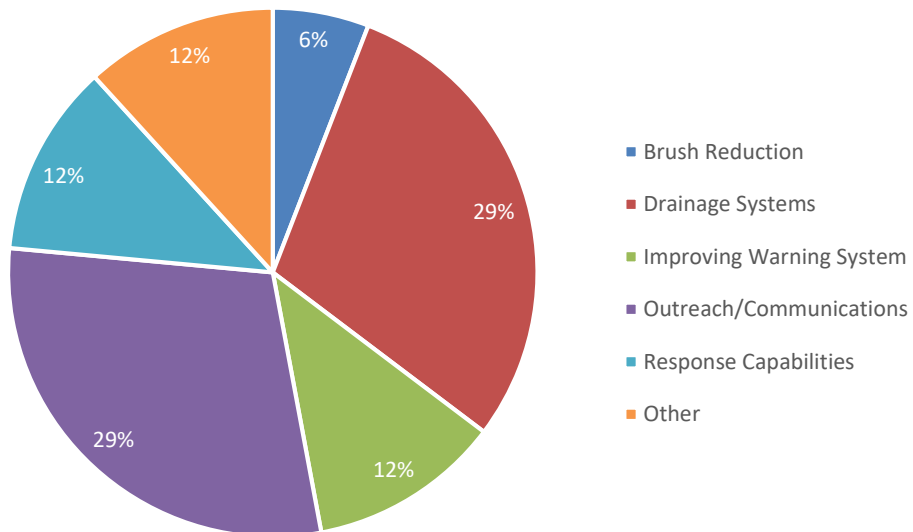


Appendix B: Public Survey Results

13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

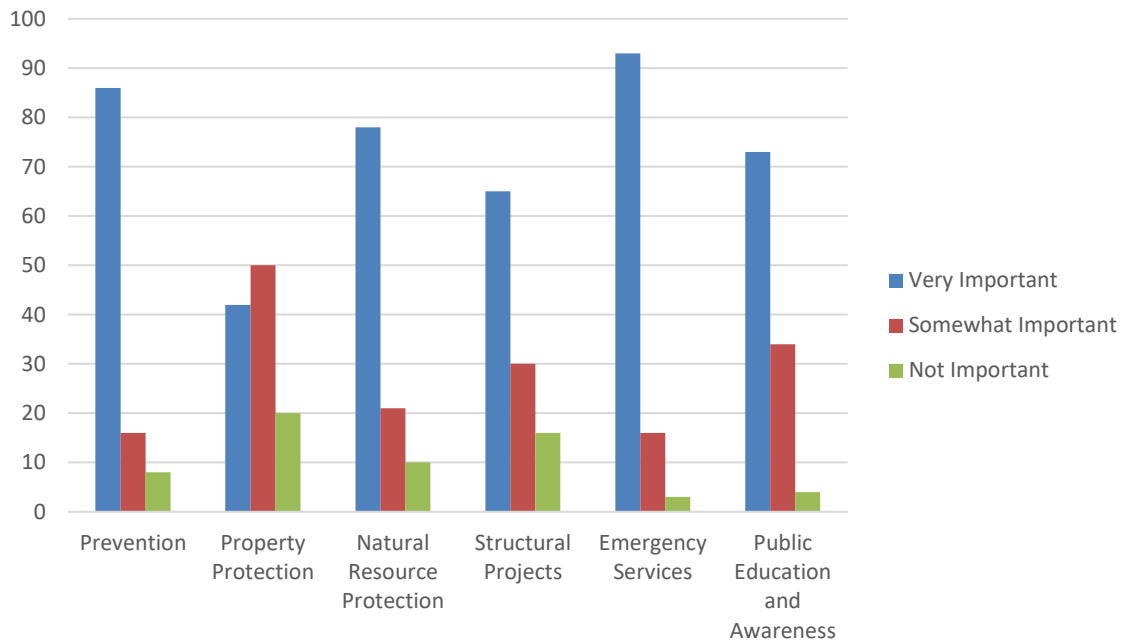


14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?



Appendix B: Public Survey Results

15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.



Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

Natural Resource Protection - Actions that in addition to minimizing hazard losses also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls, and storm sewers.

Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.

Appendix C: Critical Facilities

Overview 1

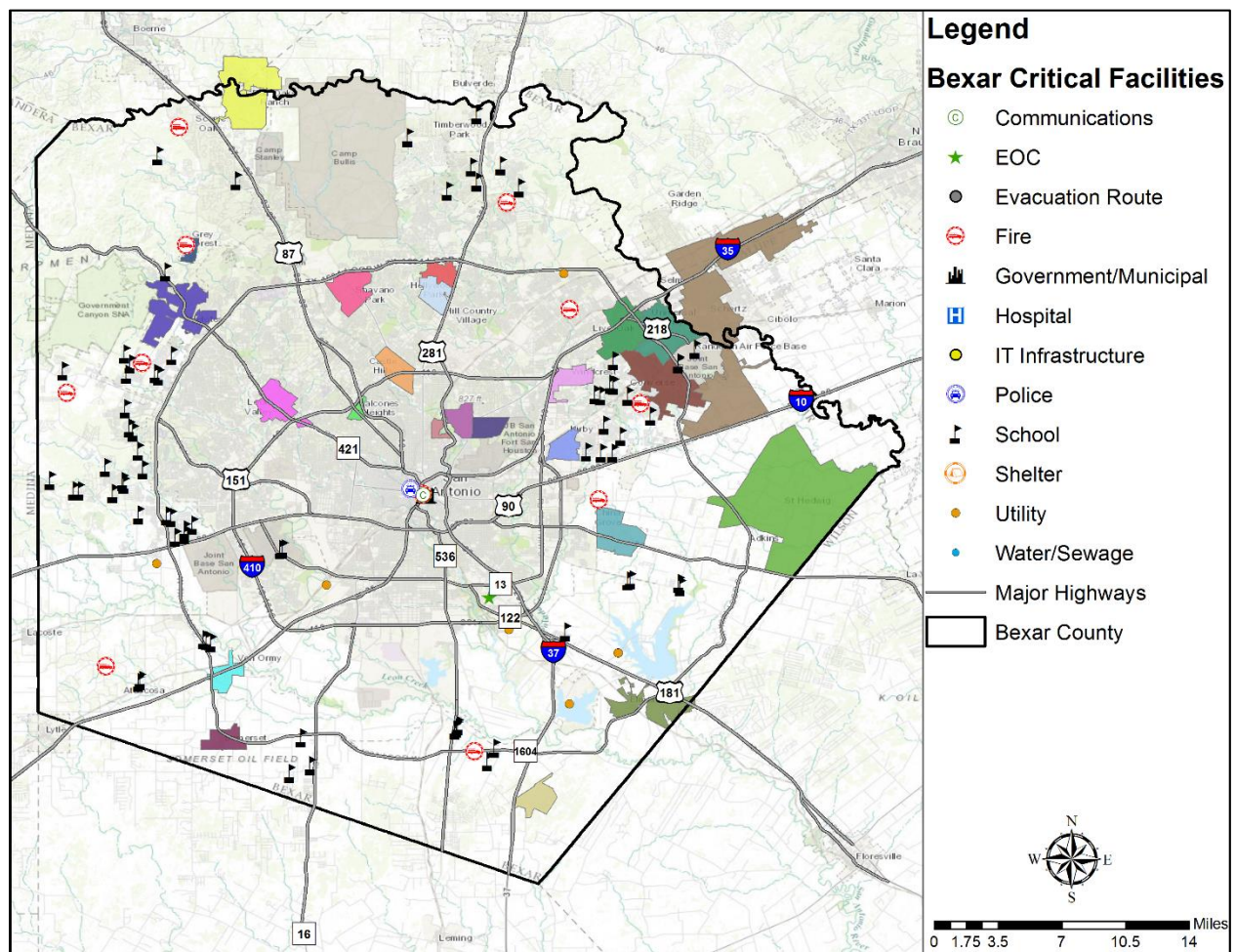
Critical Facilities 1

Overview

This Appendix is **For Official Use Only (FOUO)** and may be exempt from public release under FOIA. Figures C-1 through C-25 locates all critical facilities that were included in the risk assessment. Mapped facilities were provided by Bexar County Planning Team members. Tables C-1 through C-24 note the critical facilities by type.

Critical Facilities

Figure C-1. Critical Facilities in Bexar County



Appendix C: Critical Facilities

Table C-1. Critical Facilities in Bexar County

TYPE	NUMBER
County Office	1
Court	2
Public Safety	3
School	71
Fire	11
Public Works/Utility	7

Appendix C: Critical Facilities

Figure C-2. Critical Facilities in Alamo Heights

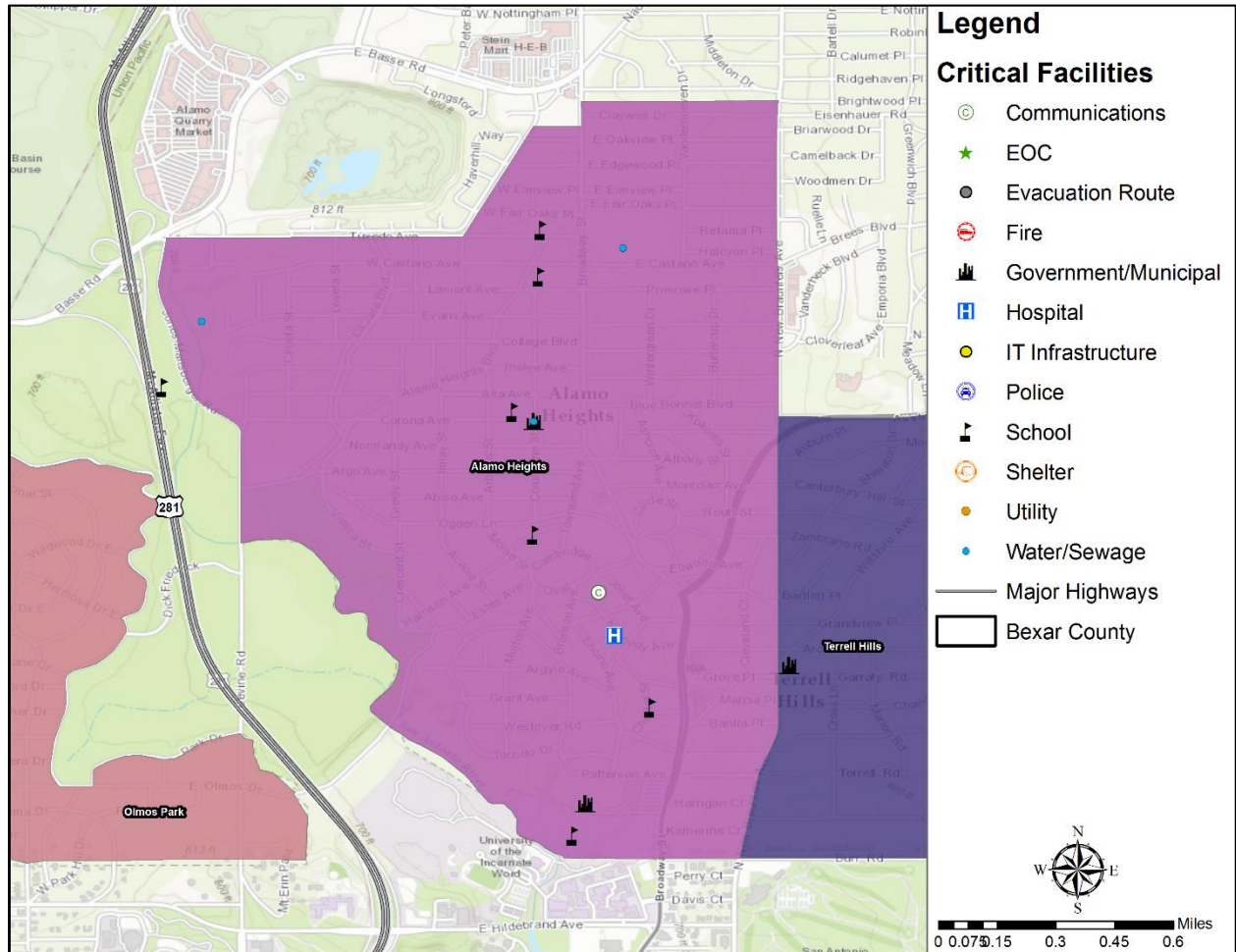


Table C-2. Critical Facilities in Alamo Heights

TYPE	NUMBER
Government/Municipal	2
Hospital	1
Communication	1
School	7
Water/Sewage	3

Appendix C: Critical Facilities

Figure C-3. Critical Facilities in Balcones Heights

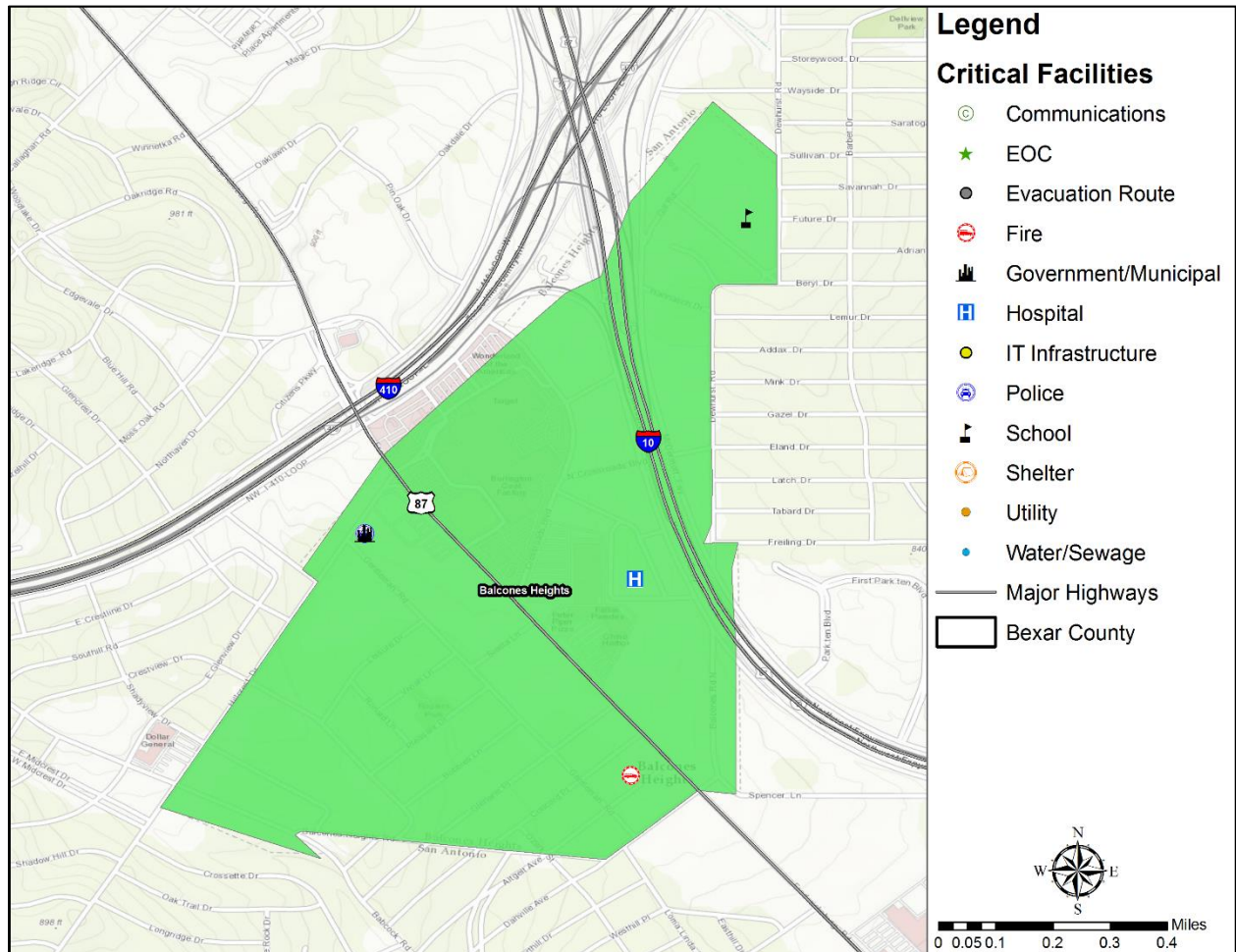


Table C-3. Critical Facilities in Balcones Heights

TYPE	NUMBER
Fire	1
Police	1
Hospital	1
Government/Municipal	1
School	1

Appendix C: Critical Facilities

Figure C-4. Critical Facilities in Castle Hills

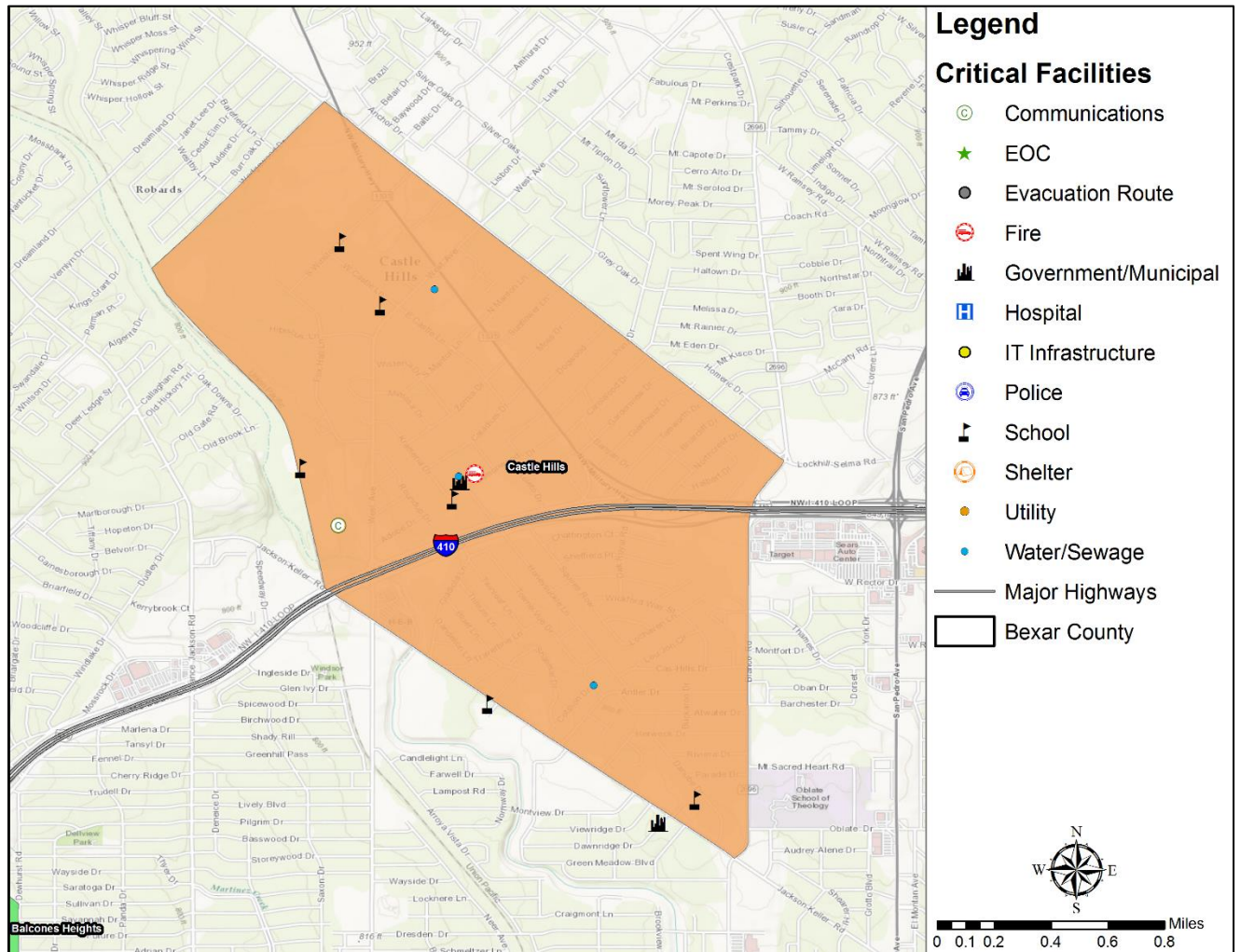


Table C-4. Critical Facilities in Castle Hills

TYPE	NUMBER
Government/Municipal	4
School	6
Communication	1
Public Works/Utility	3

Appendix C: Critical Facilities

Figure C-5. Critical Facilities in China Grove

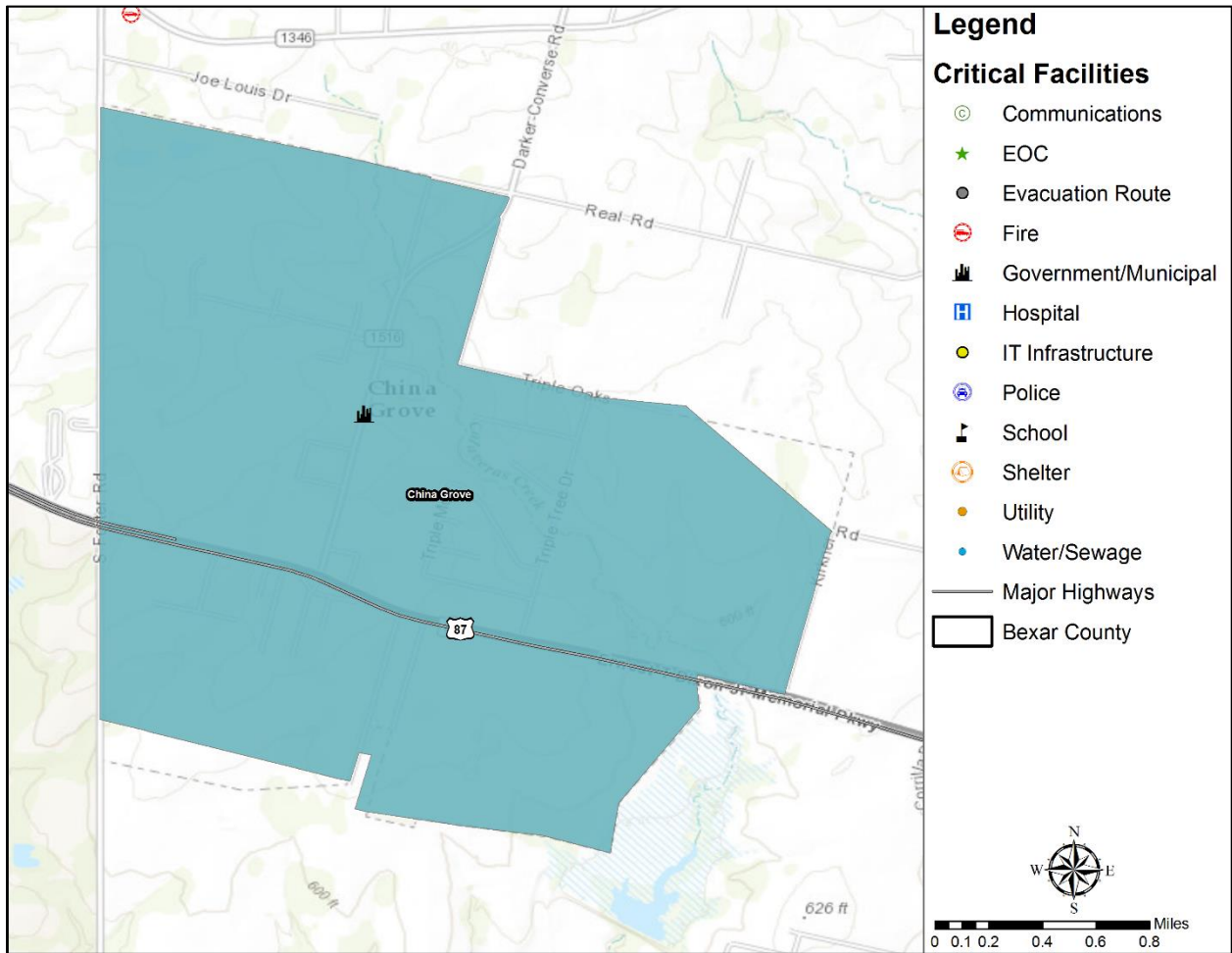


Table C-5. Critical Facilities in China Grove

TYPE	NUMBER
Government/Municipal	1
Fire	1

Appendix C: Critical Facilities

Figure C-6. Critical Facilities in Converse

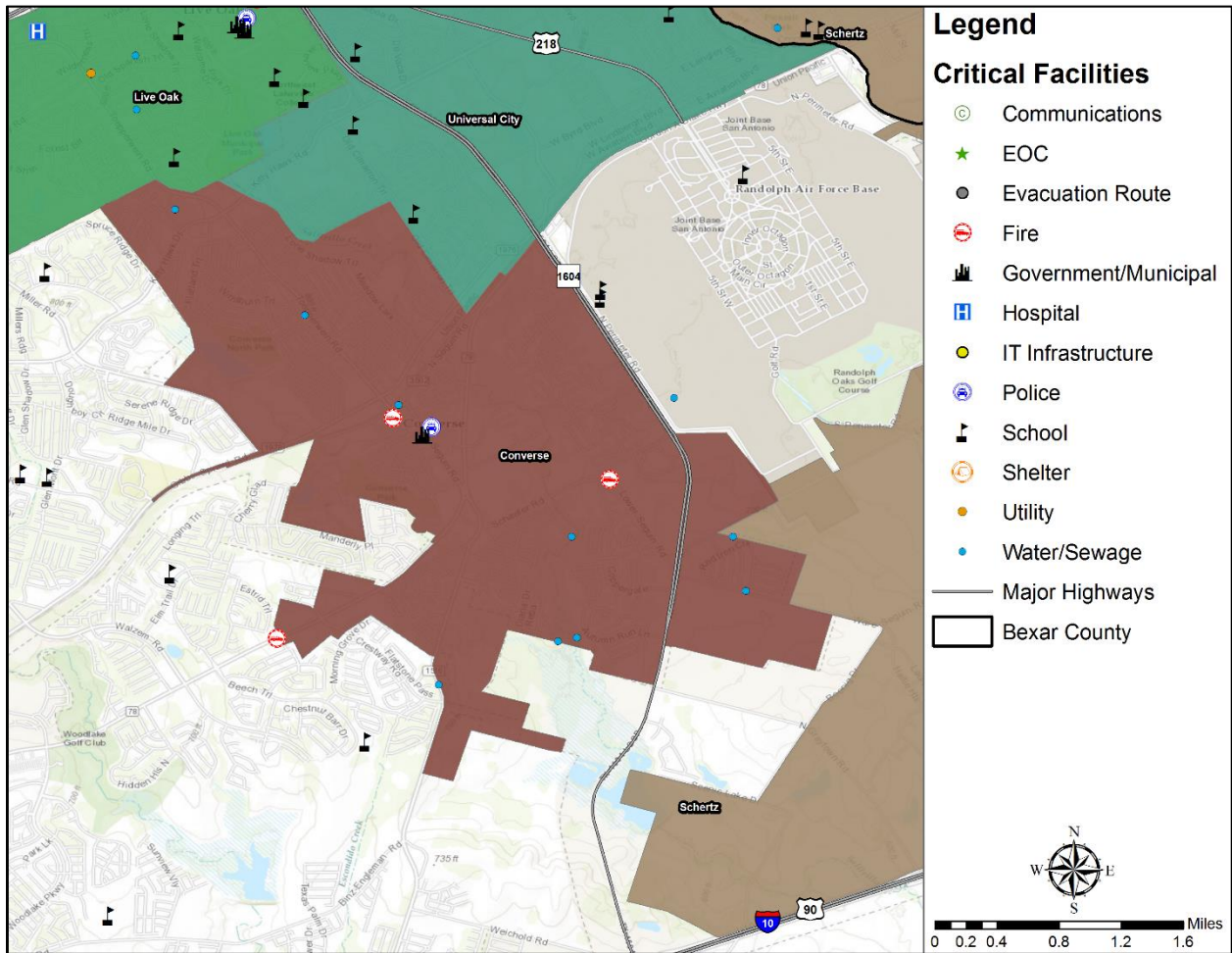


Table C-6. Critical Facilities in Converse

TYPE	NUMBER
Government/Municipal	1
Fire	2
Police	1
Public Works/Utility	9

Appendix C: Critical Facilities

Figure C-7. Critical Facilities in Elmendorf

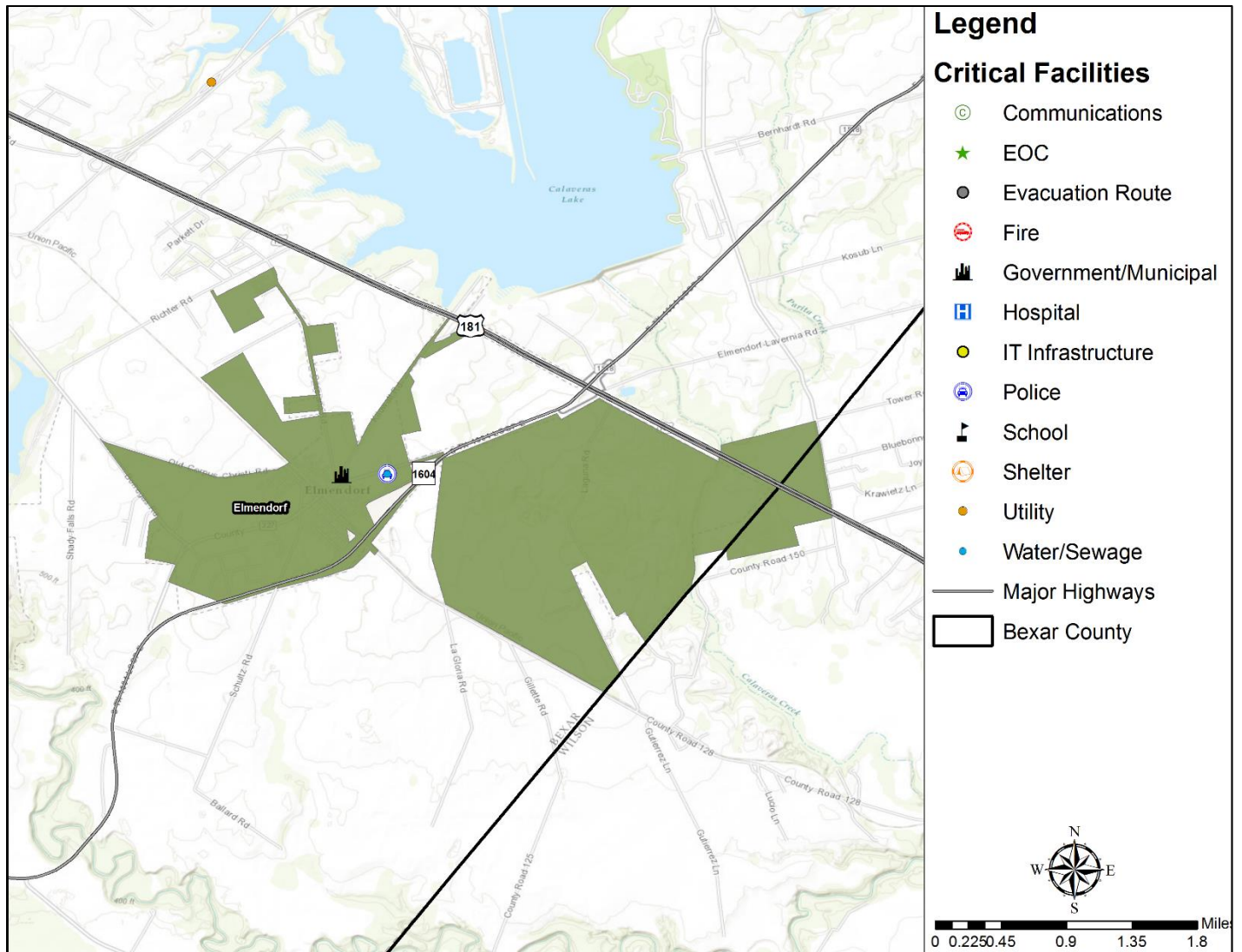


Table C-7. Critical Facilities in Elmendorf

TYPE	NUMBER
Church	1
Police	1
Public Works/Utility	1

Appendix C: Critical Facilities

Figure C-8. Critical Facilities in Fair Oaks Ranch

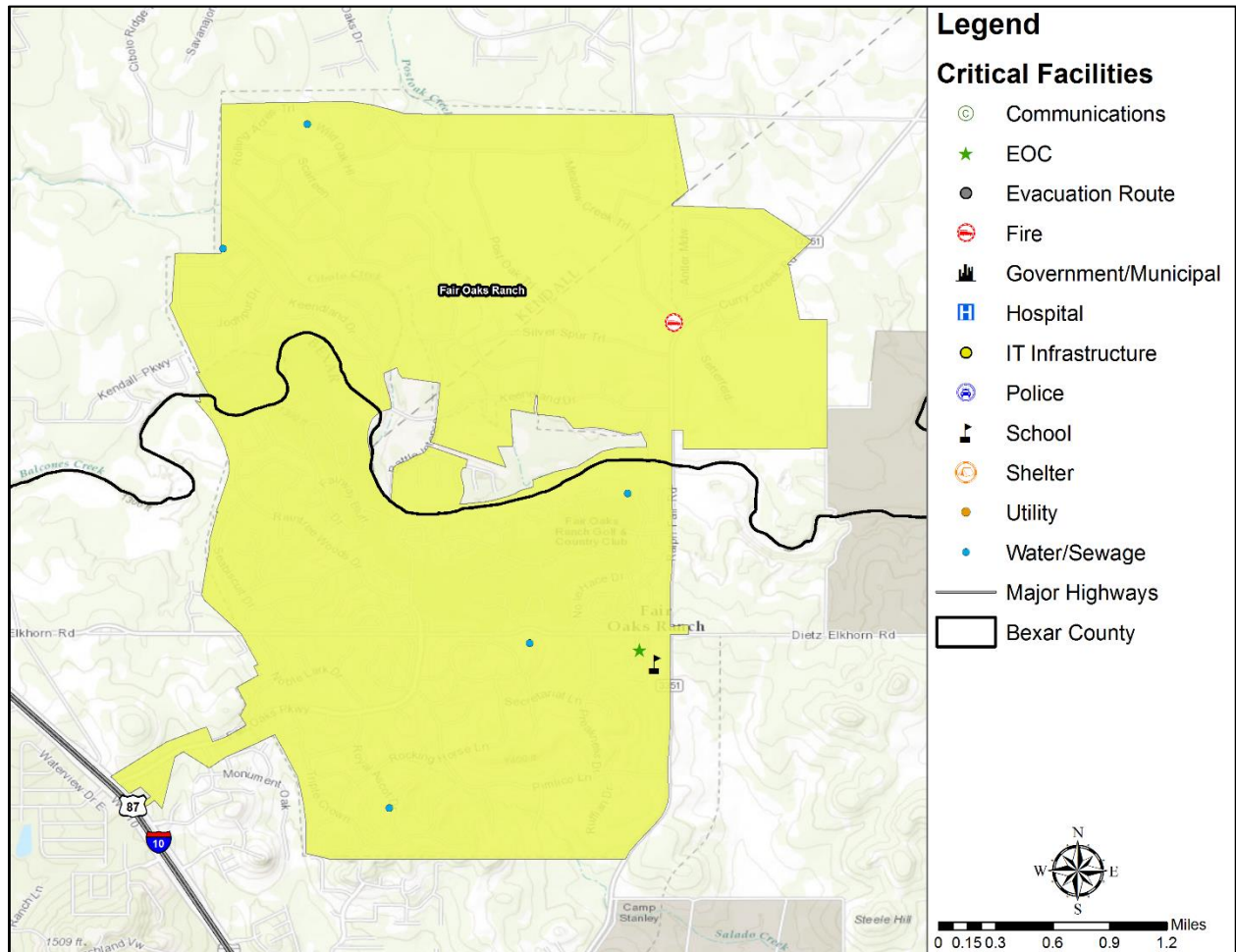


Table C-8. Critical Facilities in Fair Oaks Ranch

TYPE	NUMBER
Police/EOC	1
School	1
Fire	1
Public Works/Utility	6

Appendix C: Critical Facilities

Figure C-9. Critical Facilities in Grey Forest

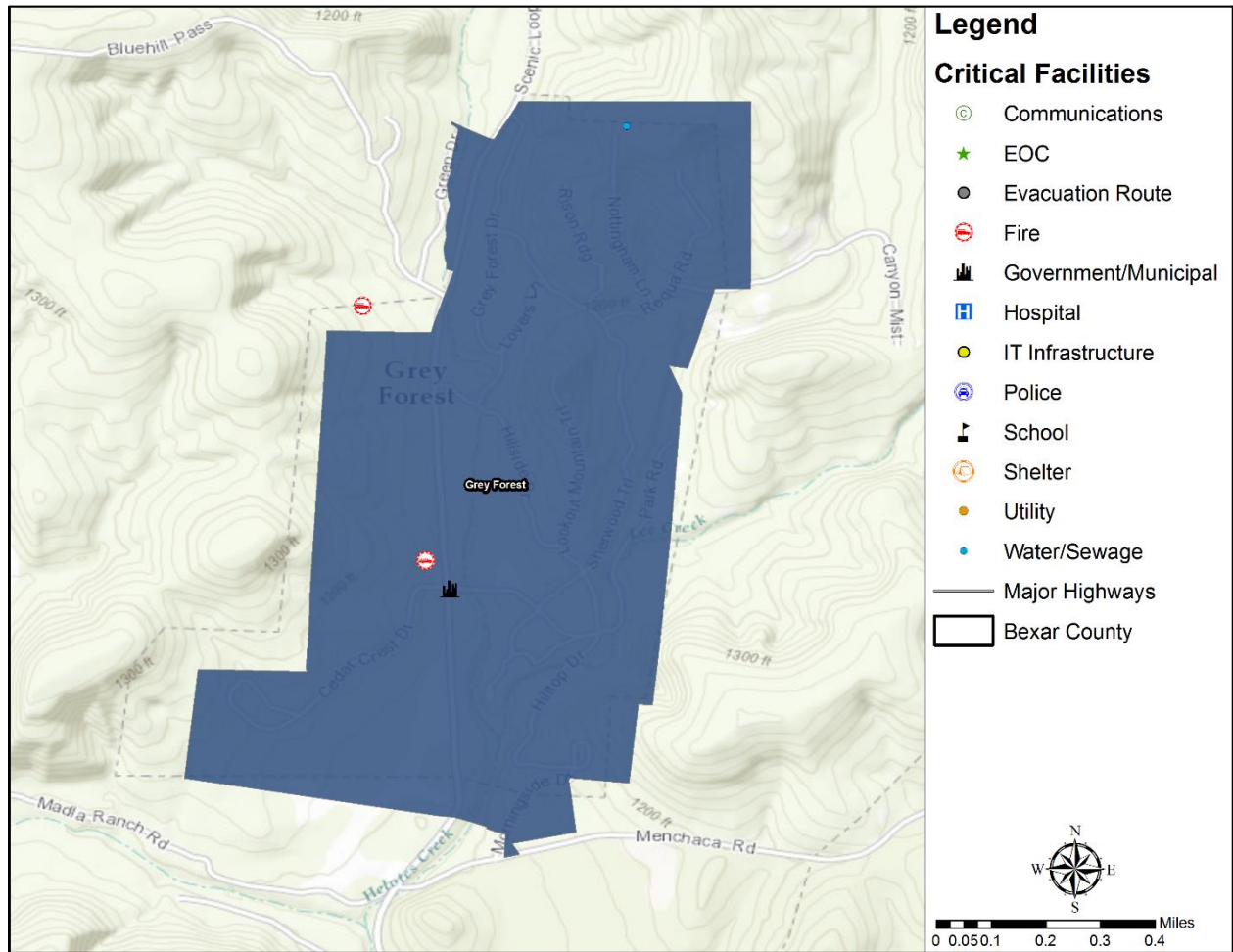


Table C-9. Critical Facilities in Grey Forest

TYPE	NUMBER
Government/Municipal	1
Fire	1
Public Works/Utility	1

Appendix C: Critical Facilities

Figure C-10. Critical Facilities in Helotes

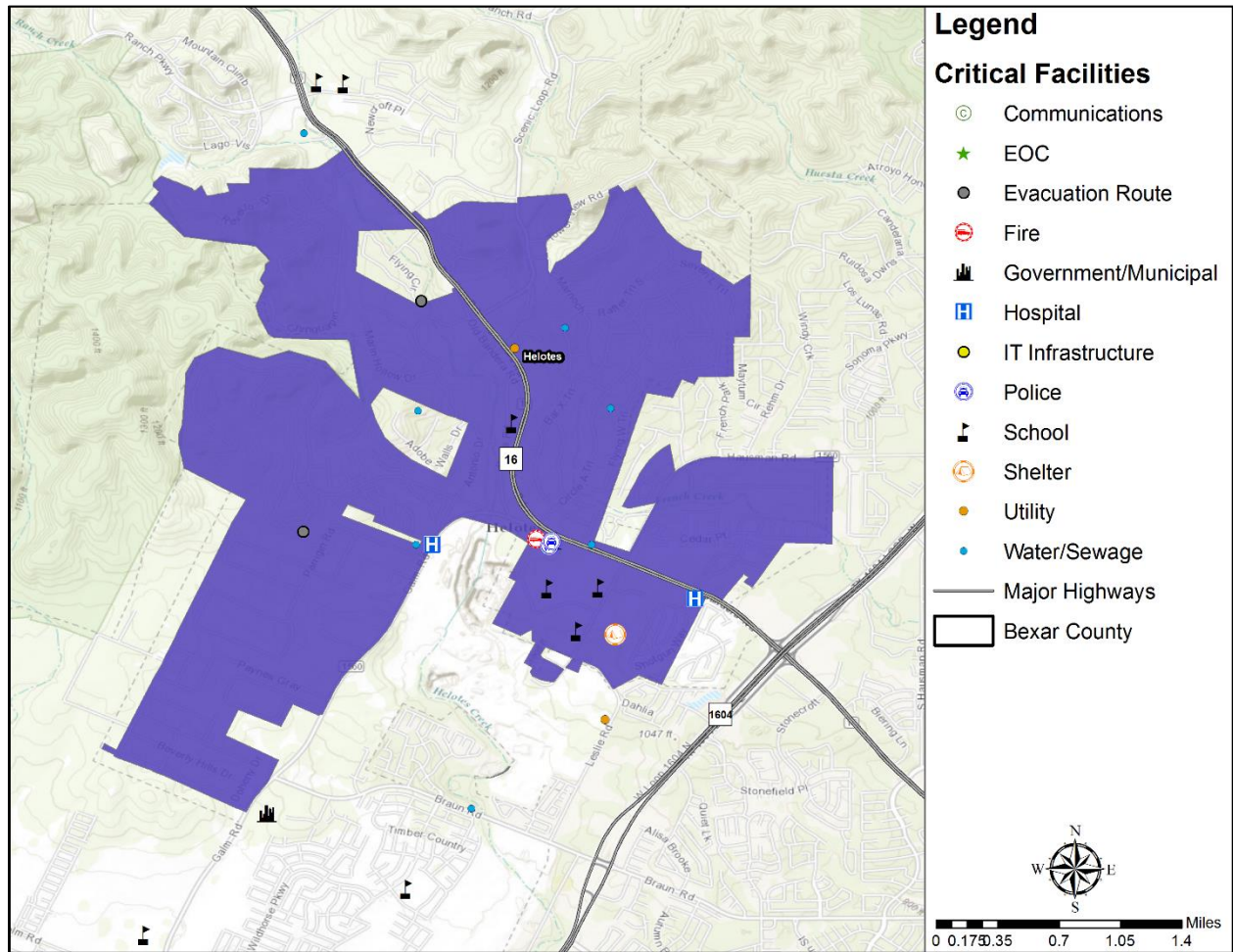
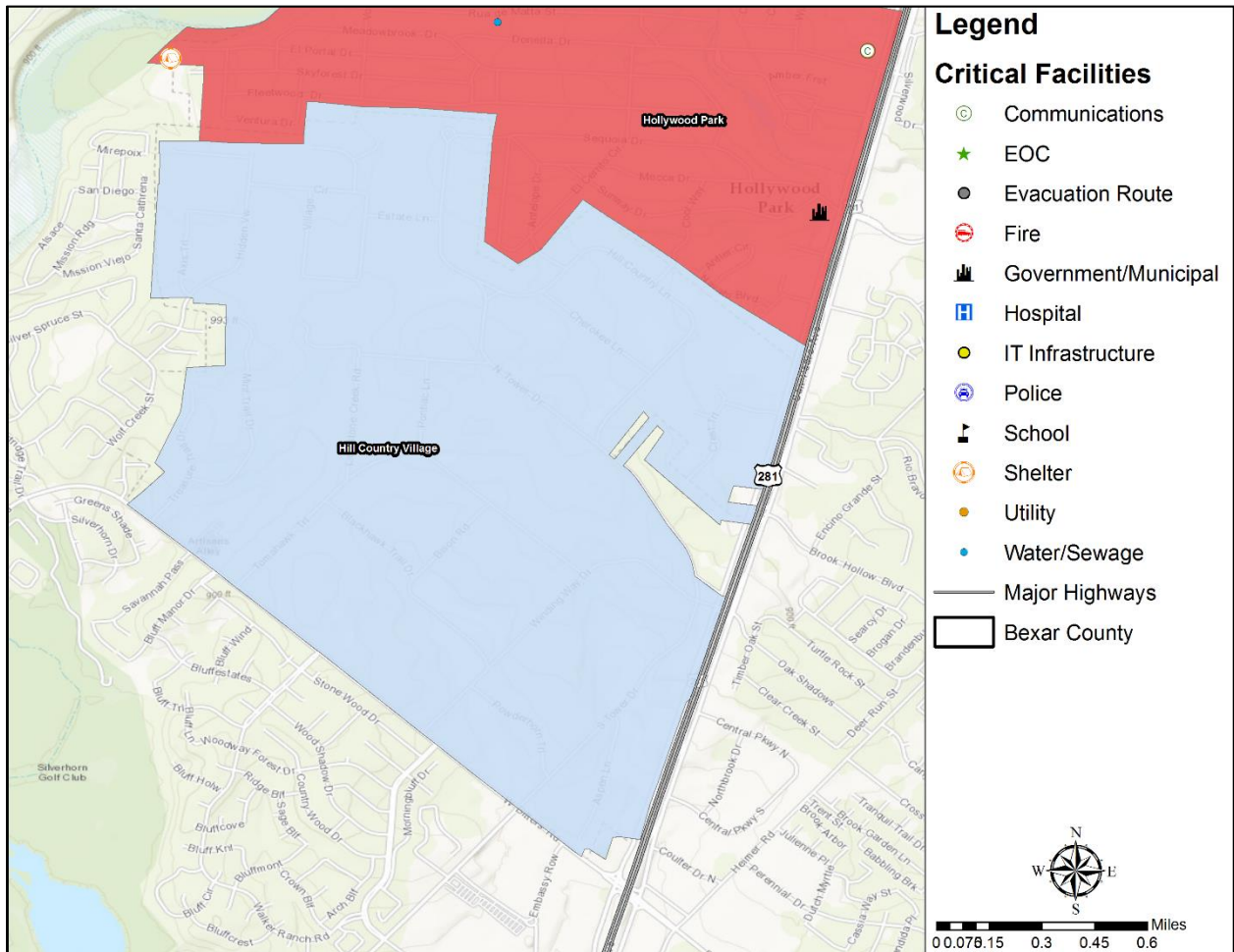


Table C-10. Critical Facilities in Helotes

TYPE	NUMBER
Government/Municipal	1
Hospitals	1
EOC	1
Communications/IT Infrastructure	1
Schools	7
Evacuation Route/Area	2
Fire Stations	1
Police	2
Public Works/Utility	5

Appendix C: Critical Facilities

Figure C-11. Critical Facilities in Hill Country Village



*Hill Country Village noted that there are no critical facilities.

Appendix C: Critical Facilities

Figure C-12. Critical Facilities in Hollywood Park

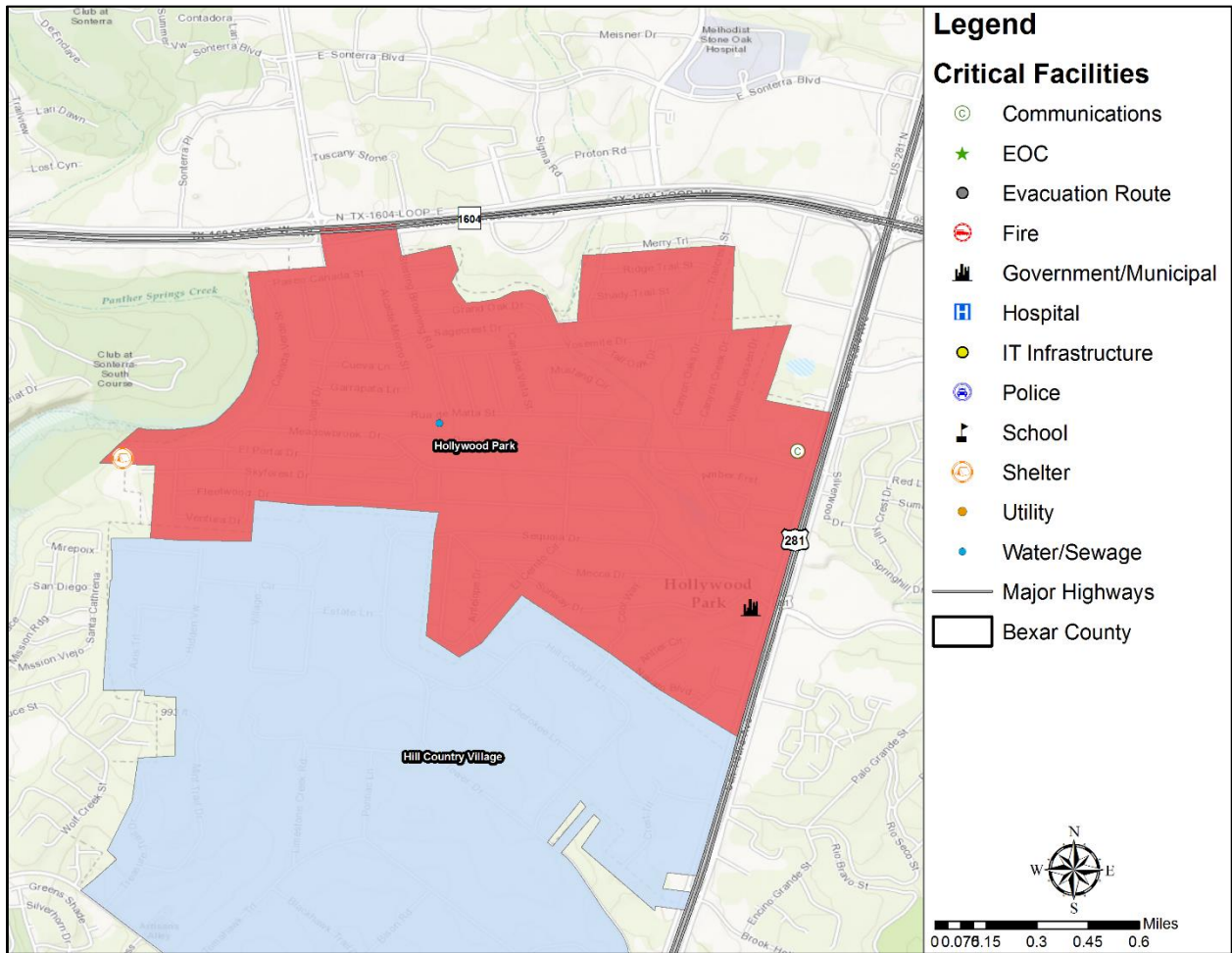


Table C-11. Critical Facilities in Hollywood Park

TYPE	NUMBER
Government/Municipal	1
Shelter/Community Center	1
Communication	1
Public Works/Utility	1

Appendix C: Critical Facilities

Figure C-13. Critical Facilities in Kirby

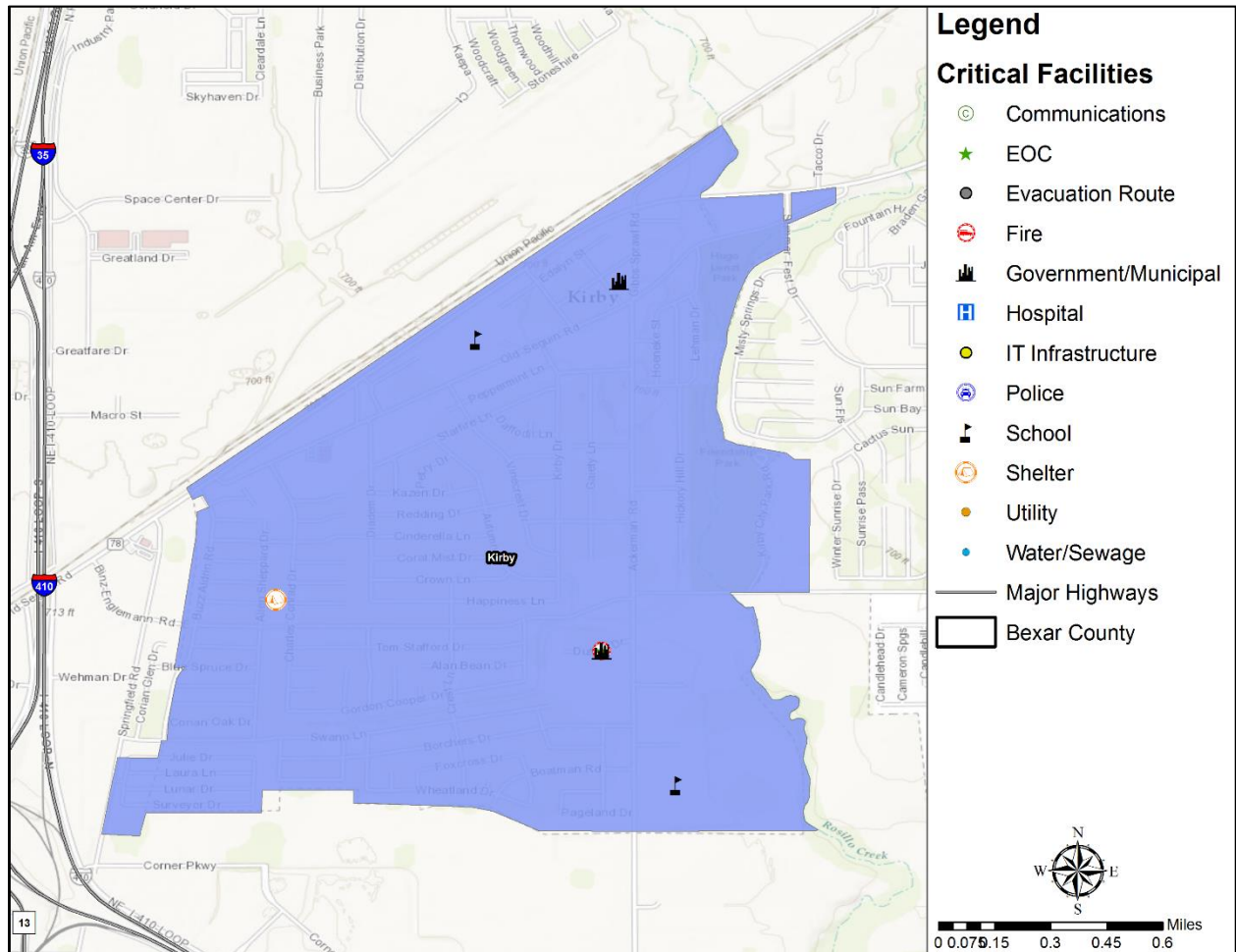


Table C-12. Critical Facilities in Kirby

TYPE	NUMBER
Government/Municipal	2
Community Center/Shelter	1
Police	1
Schools	2
Fire Station	1
Public Works/Utility	1

Appendix C: Critical Facilities

Figure C-14. Critical Facilities in Leon Valley

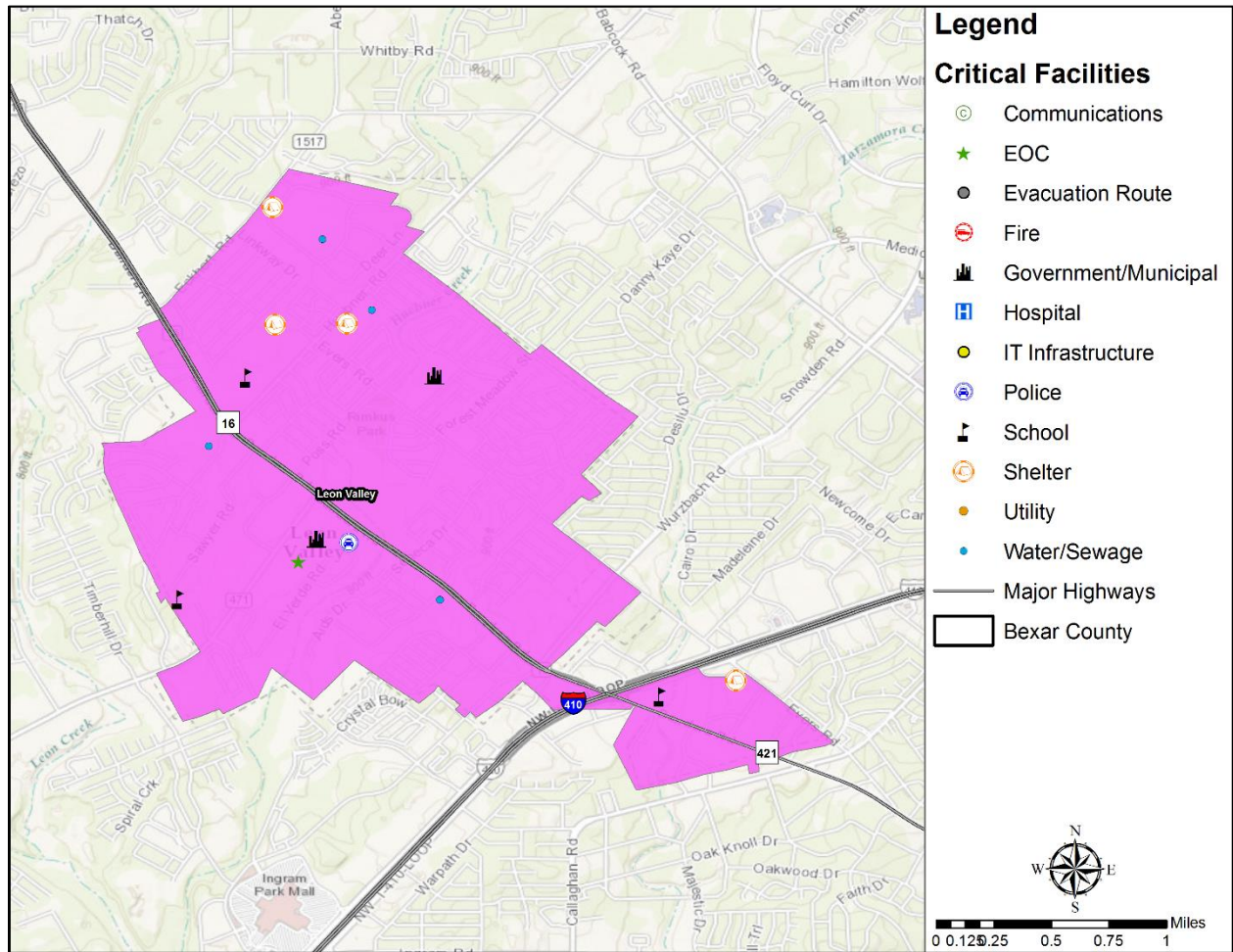


Table C-13. Critical Facilities in Leon Valley

TYPE	NUMBER
Government/Municipal	1
Police	1
Communication	1
Schools	3
Fire Stations	1
Public Works/Utility	7
Shelter	4

Appendix C: Critical Facilities

Figure C-15. Critical Facilities in Live Oak

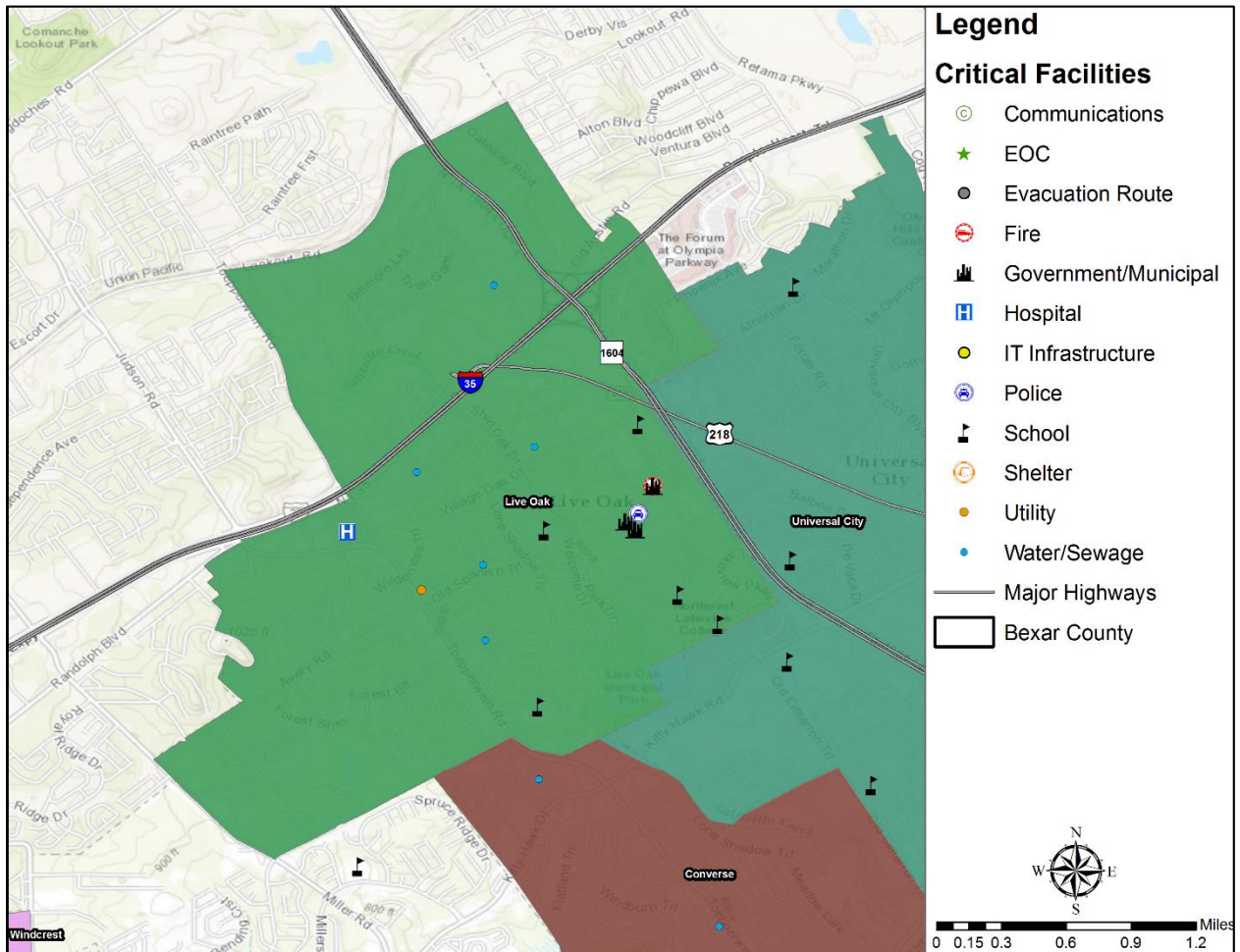


Table C-14. Critical Facilities in Live Oak

TYPE	NUMBER
Government/Municipal	1
Hospitals	1
Schools	7
Police	1
Fire Stations	1
Public Works/Utility	7

Appendix C: Critical Facilities

Figure C-16. Critical Facilities in Olmos Park

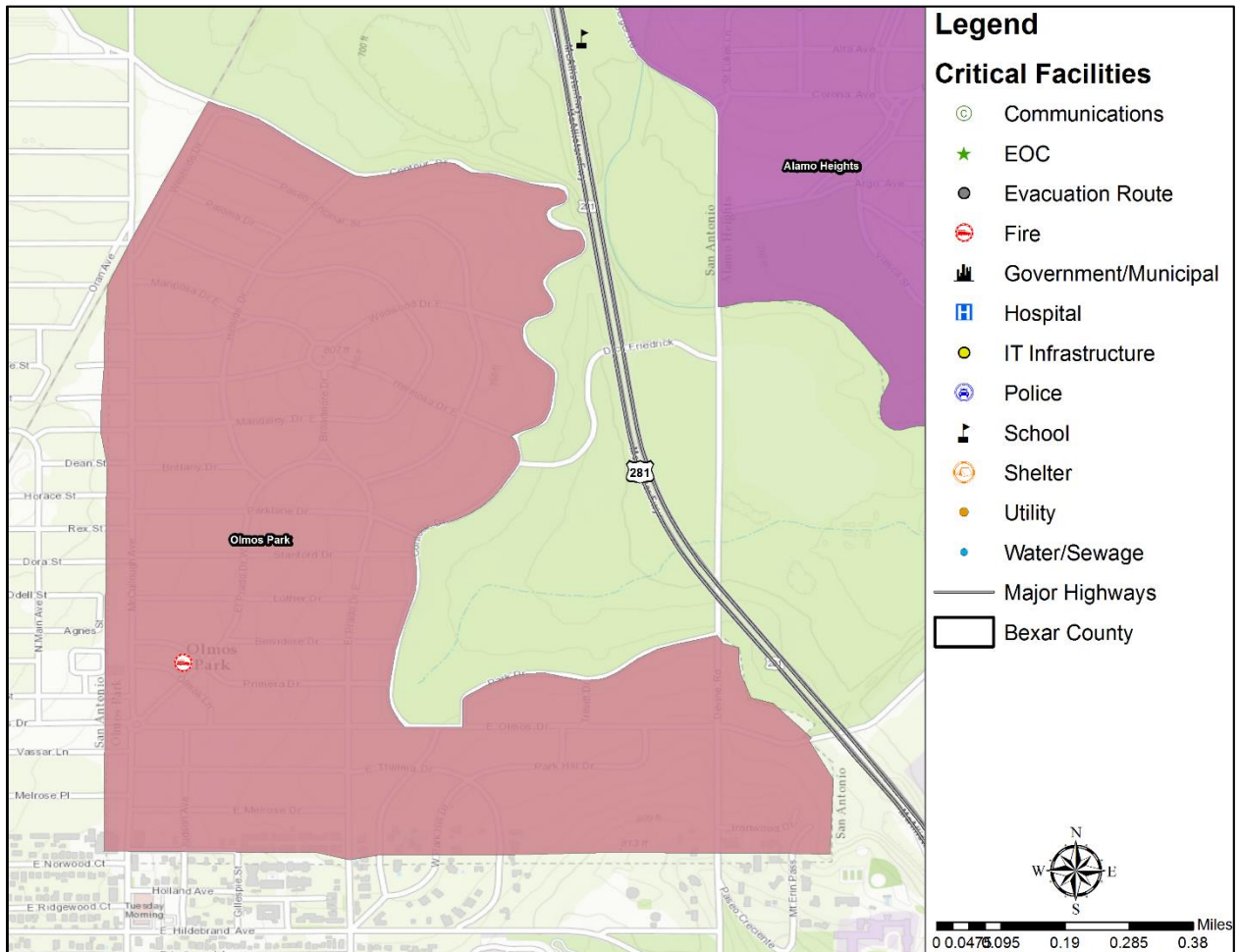


Table C-15. Critical Facilities in Olmos Park

TYPE	NUMBER
Fire	1

Appendix C: Critical Facilities

Figure C-17. Critical Facilities in Saint Hedwig

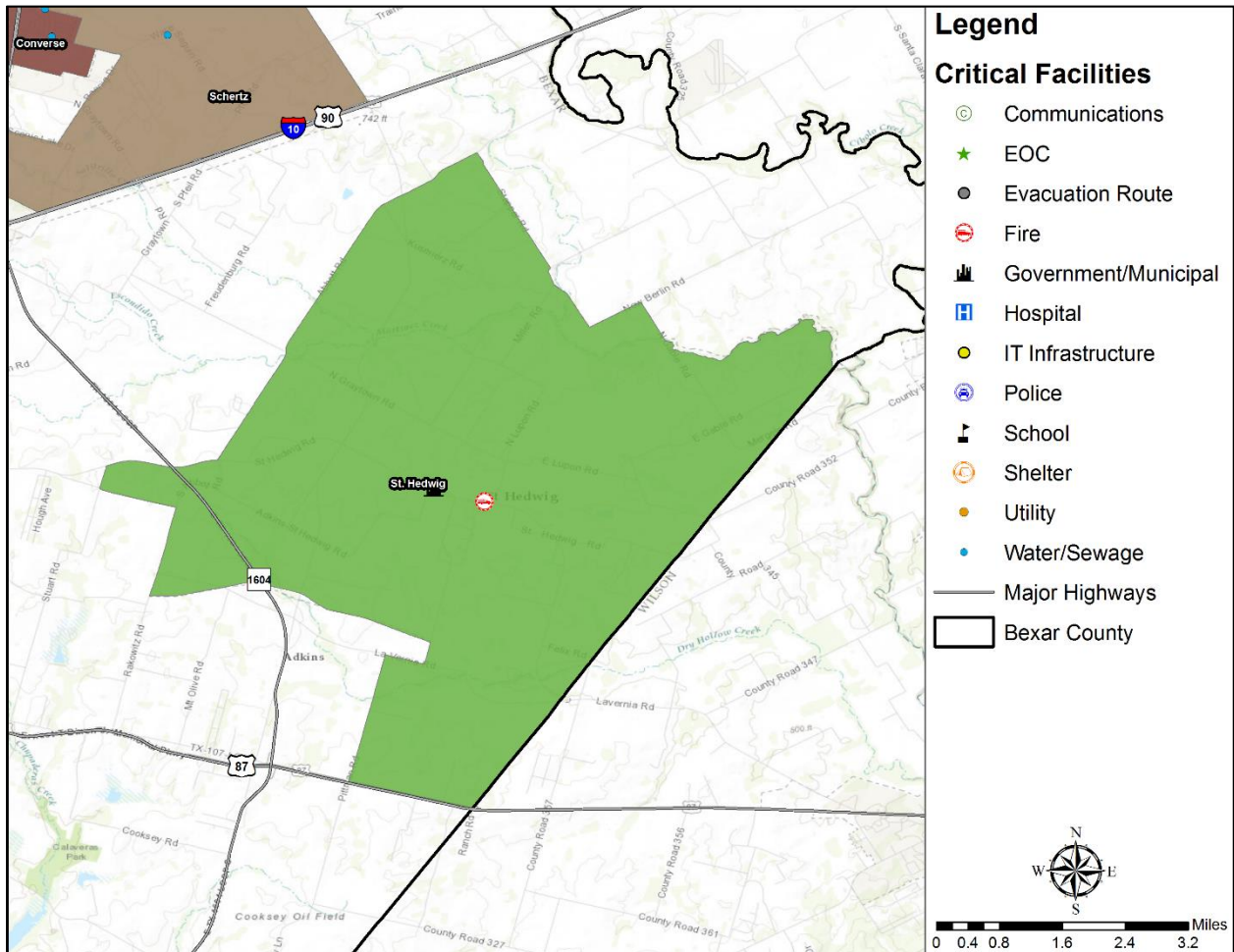


Table C-16. Critical Facilities in Saint Hedwig

TYPE	NUMBER
Government/Municipal	1
Fire	1

Appendix C: Critical Facilities

Figure C-18. Critical Facilities in Sandy Oaks

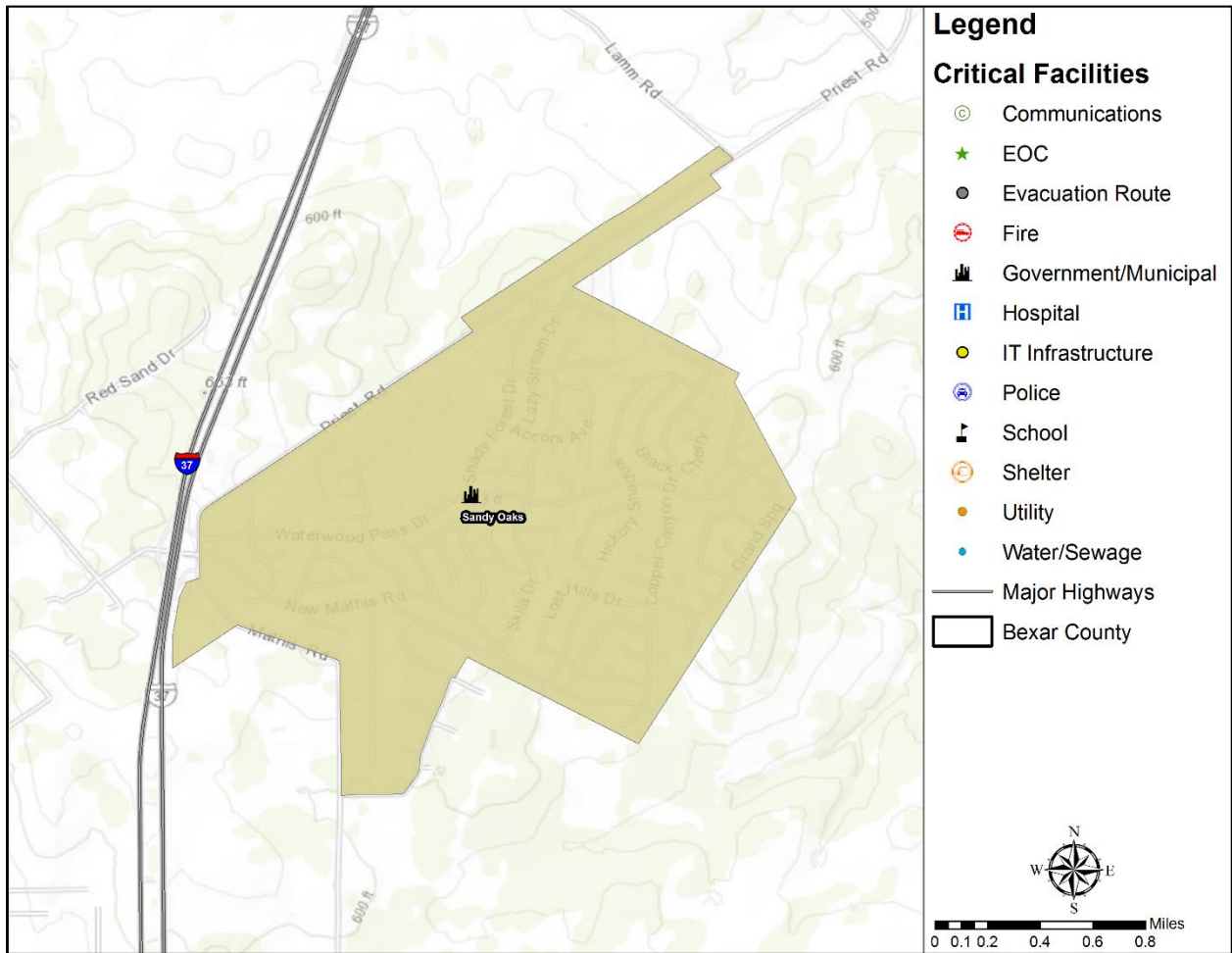


Table C-17. Critical Facilities in Sandy Oaks

TYPE	NUMBER
Government/Municipal	1

Appendix C: Critical Facilities

Figure C-19. Critical Facilities in Schertz

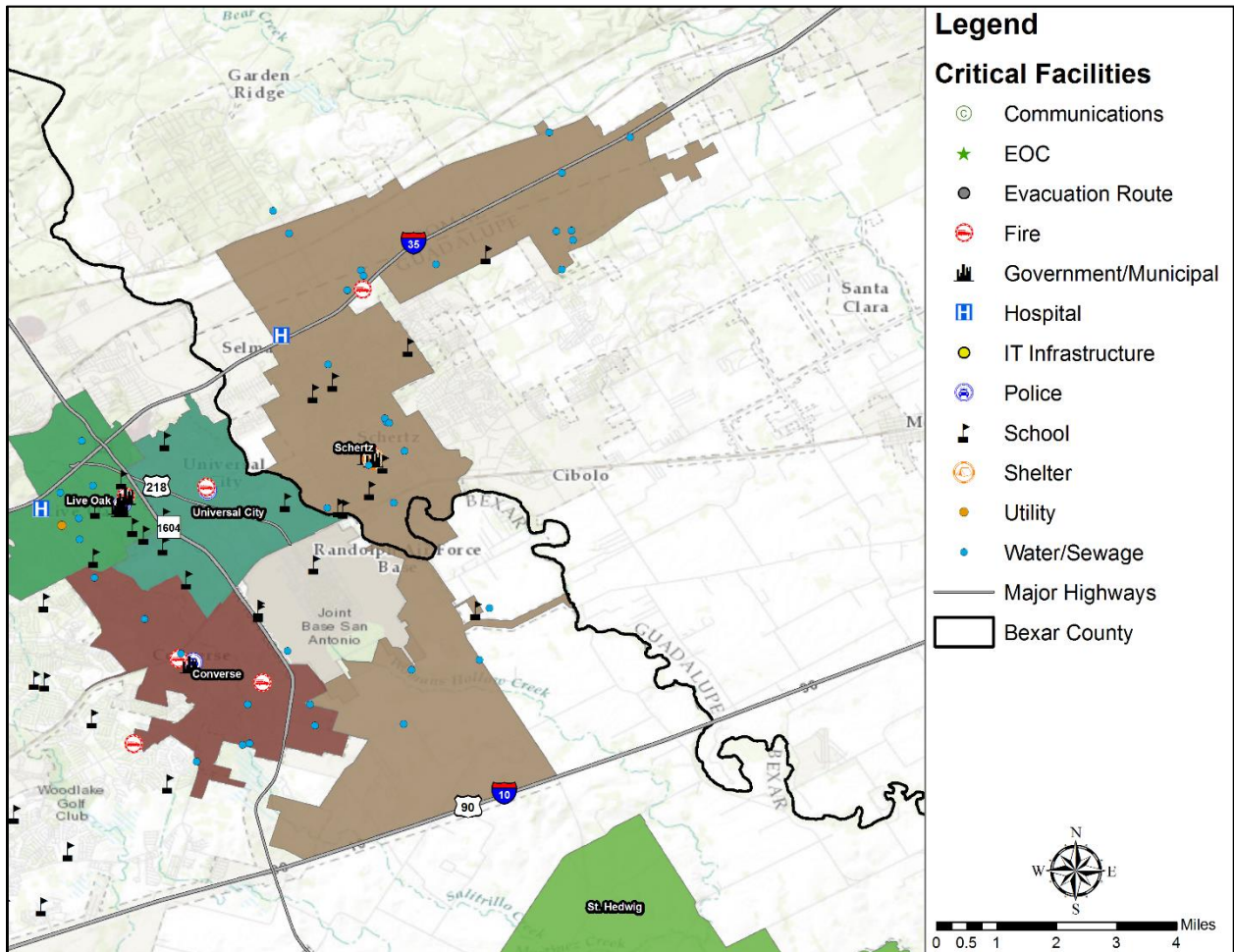


Table C-18. Critical Facilities in Schertz

TYPE	NUMBER
Government/Municipal	1
Hospital	1
Community Center/ Shelter	2
School	9
Fire	2
Police	1
Public Works/Utility	27

Appendix C: Critical Facilities

Figure C-20. Critical Facilities in Shavano Park

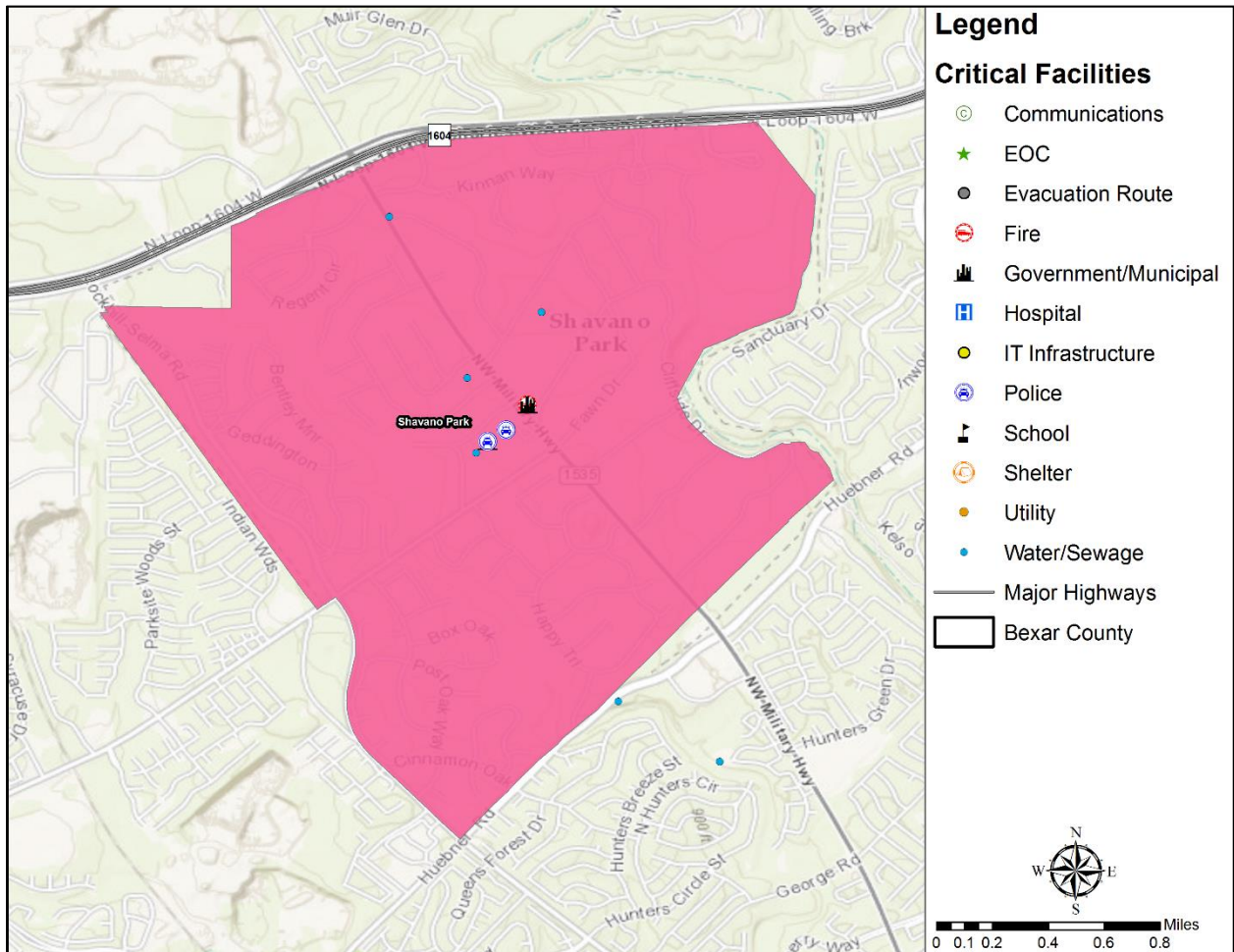


Table C-19. Critical Facilities in Shavano Park

TYPE	NUMBER
Government/Municipal	1
Fire Stations	1
Police	2
Public Works/Utility	8

Appendix C: Critical Facilities

Figure C-21. Critical Facilities in Somerset

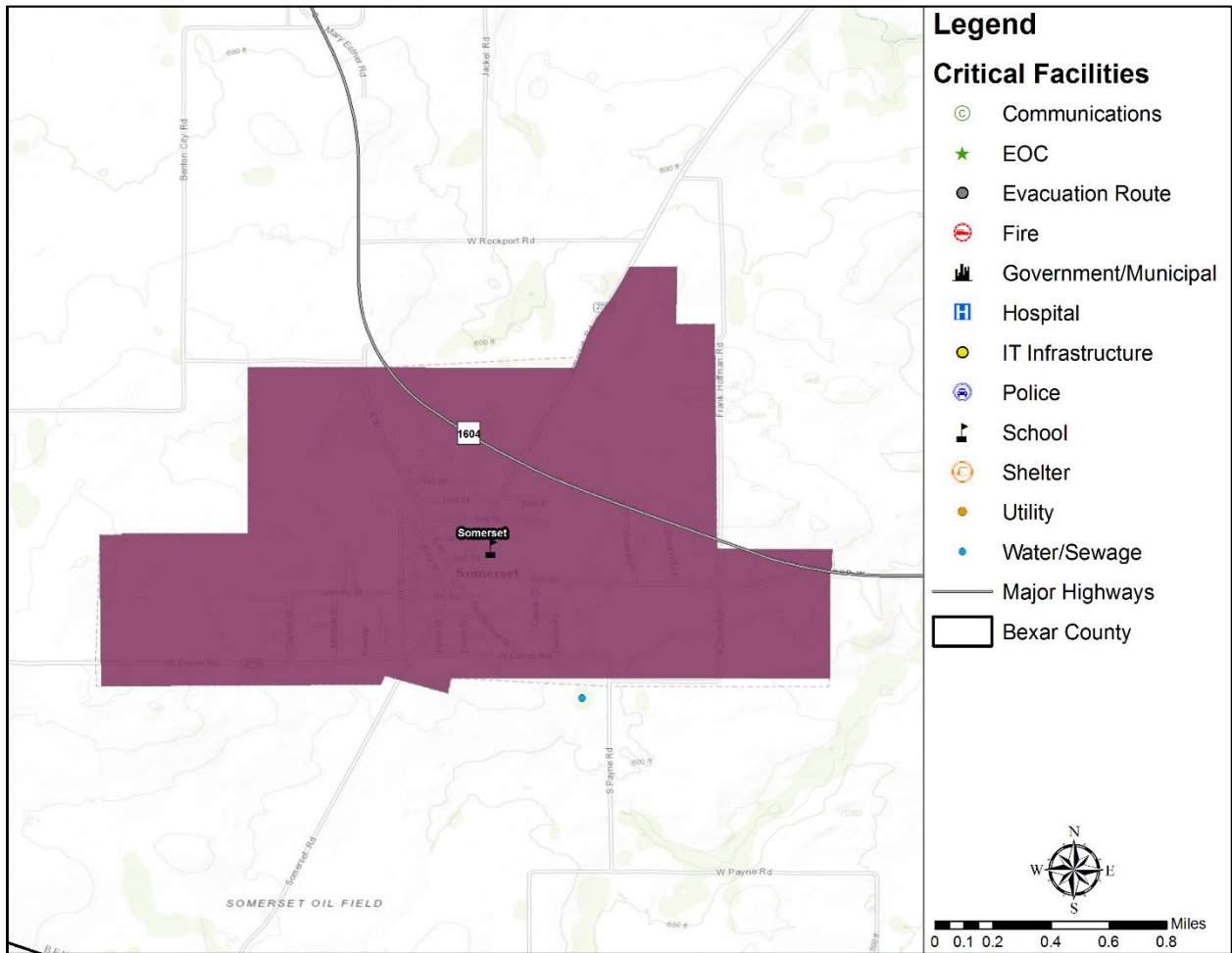


Table C-20. Critical Facilities in Somerset

TYPE	NUMBER
School	5
Public Works/Utility	1

Appendix C: Critical Facilities

Figure C-22. Critical Facilities in Terrell Hills

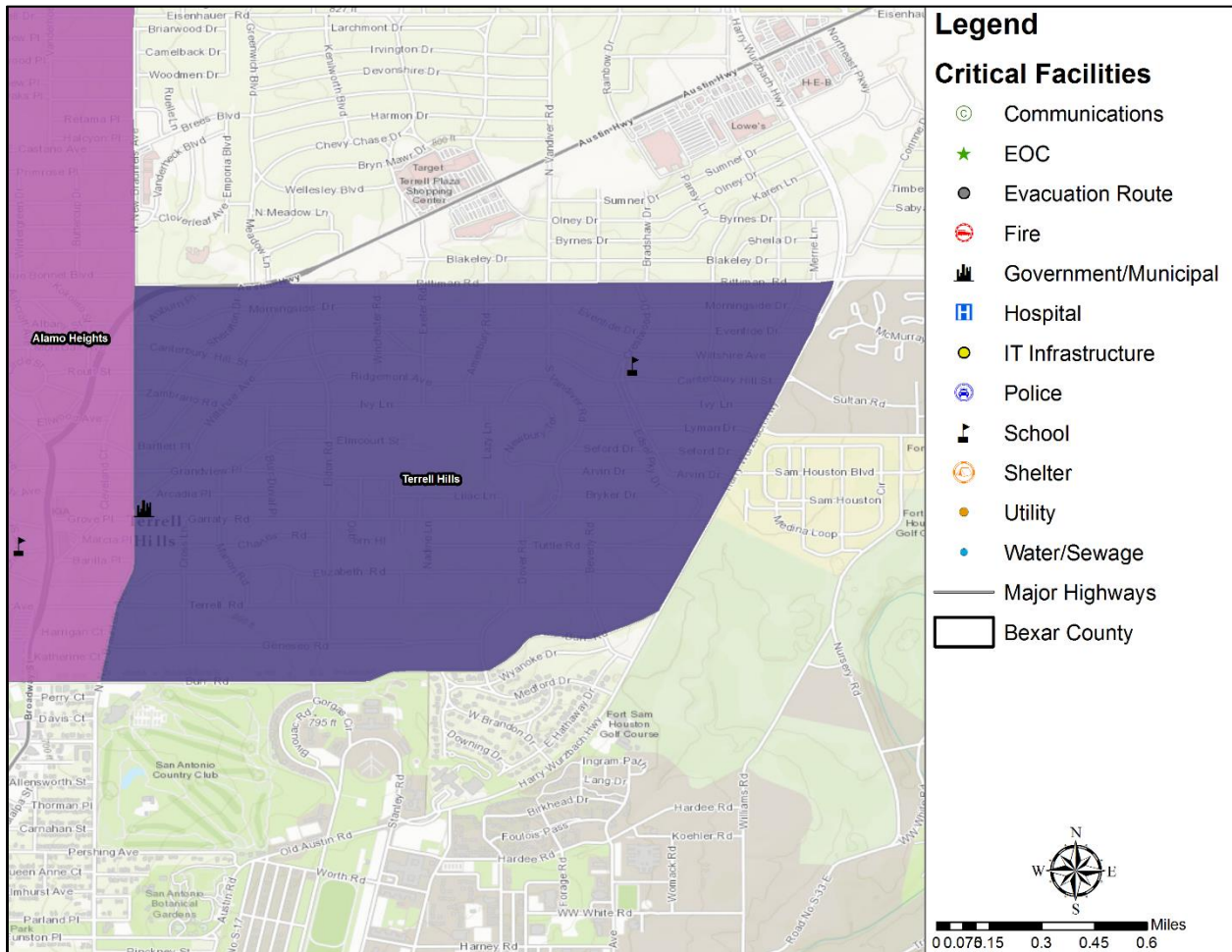


Table C-21. Critical Facilities in Terrell Hills

TYPE	NUMBER
Government/Municipal	1
Schools	1

Appendix C: Critical Facilities

Figure C-23. Critical Facilities in Universal City

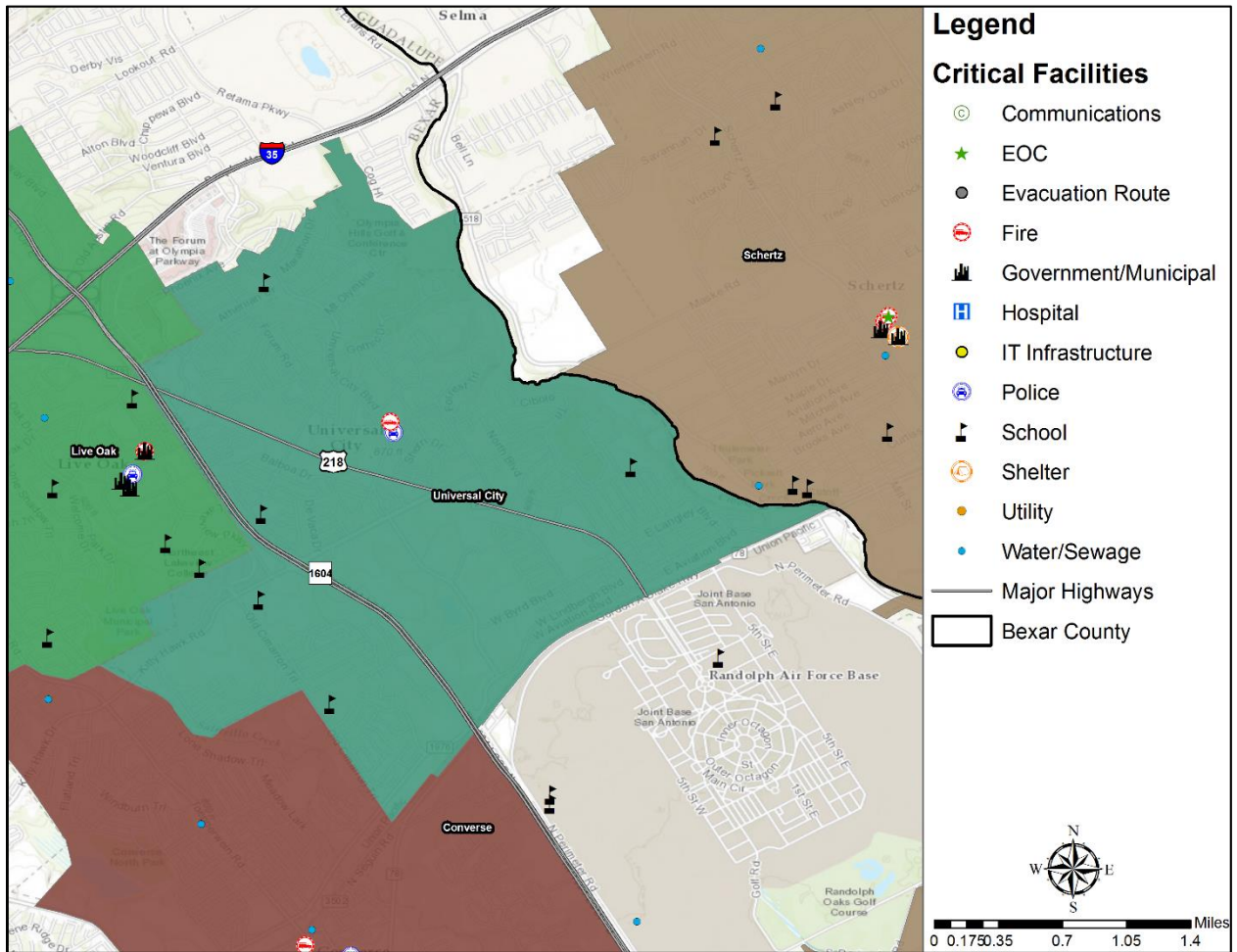


Table C-22. Critical Facilities in Universal City

TYPE	NUMBER
Schools	5
Fire	1
Police	1

Appendix C: Critical Facilities

Figure C-24. Critical Facilities in Von Ormy

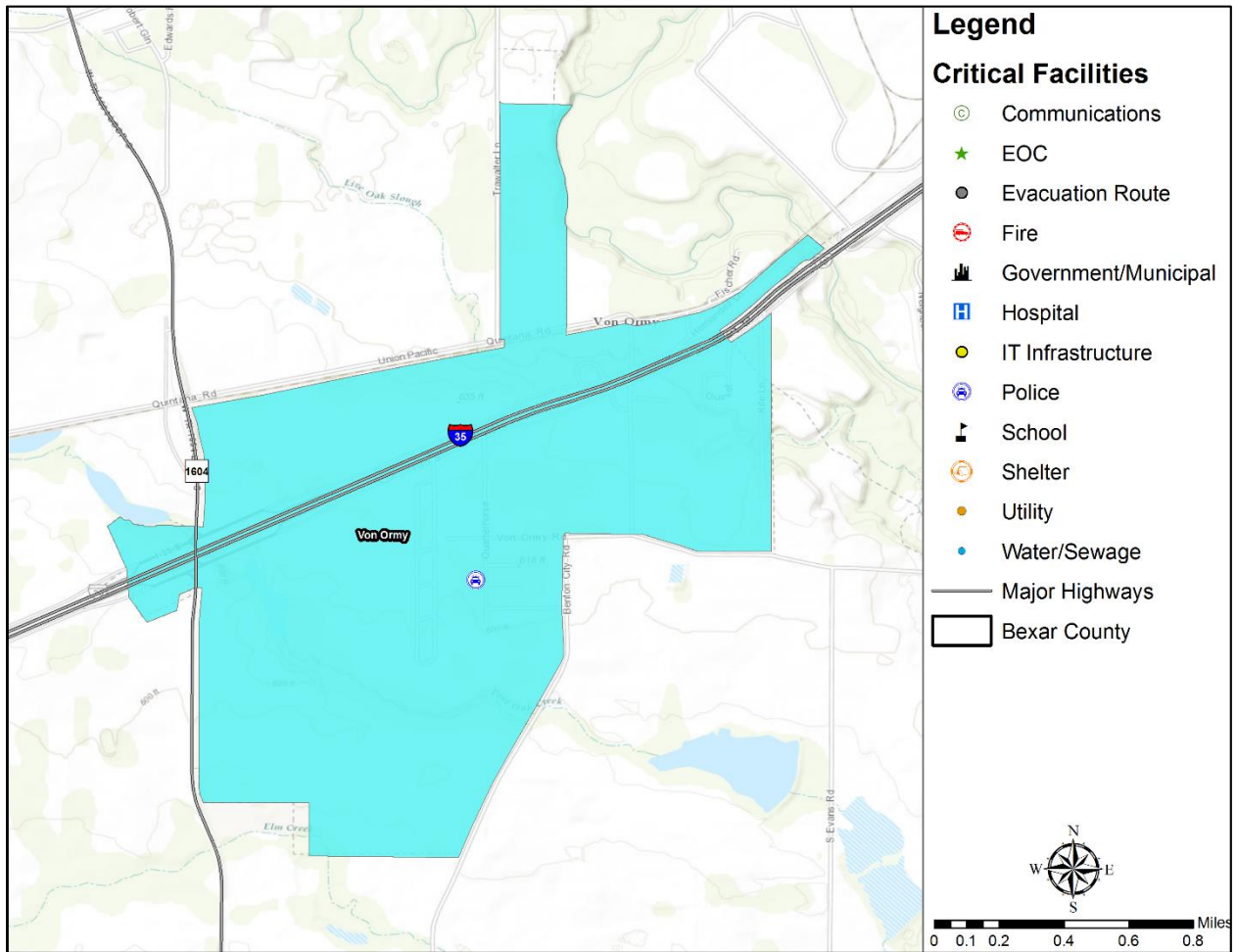


Table C-23. Critical Facilities in Von Ormy

TYPE	NUMBER
Police	1

Appendix C: Critical Facilities

Figure C-25. Critical Facilities in Windcrest

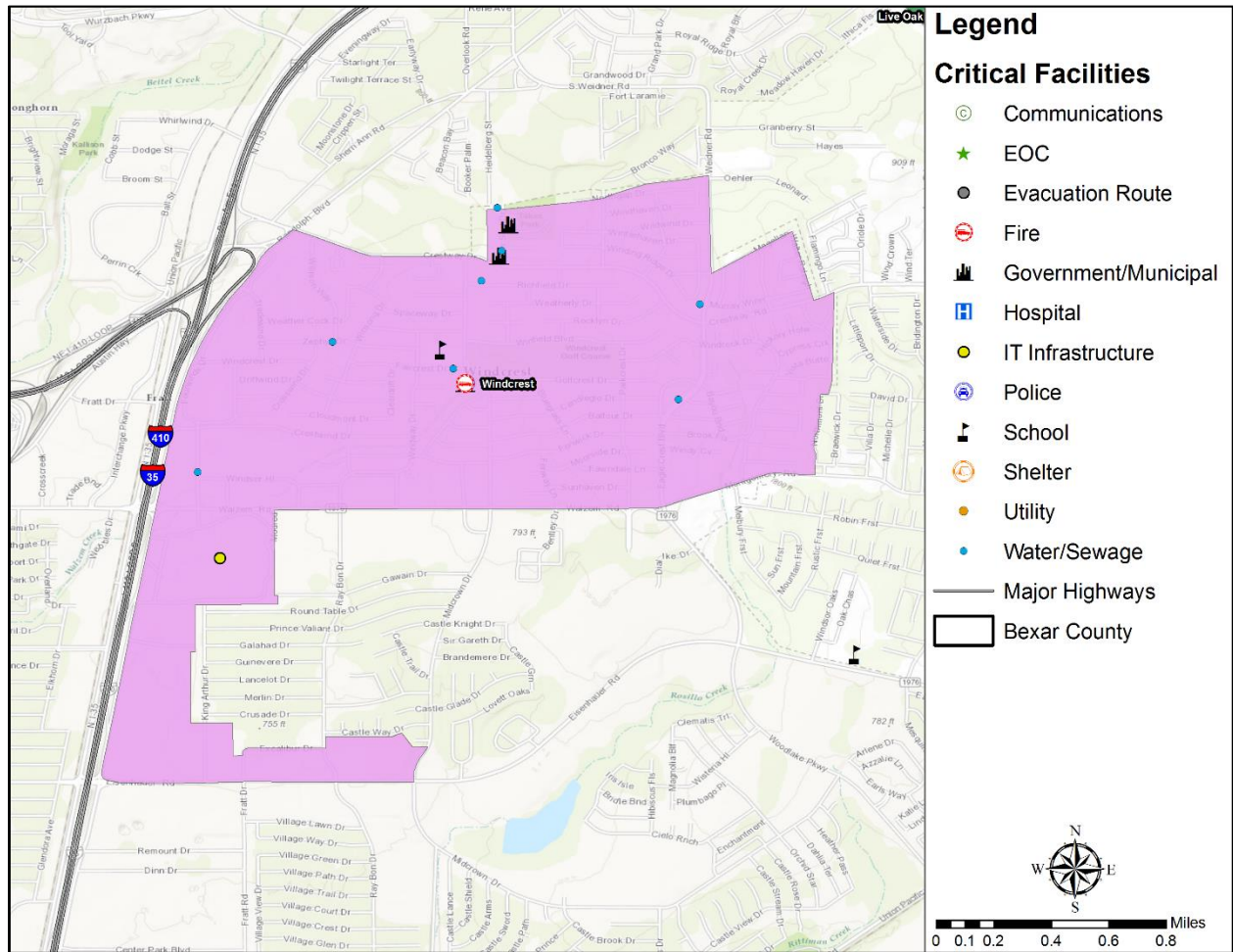


Table C-24. Critical Facilities in Windcrest

TYPE	NUMBER
Government/Municipal	2
IT Infrastructure	1
Schools	1
Fire	1
Police	1
Public Works/Utility	9

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Overview

Appendix D is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Dam Locations

Table D-1 below reflects all dams that are located in Bexar County. This list includes High, Significant, and Low Hazard Dams. Section 14 of the Plan Update profiles only “high” hazard type dams, as required by FEMA.

Table D-1. Listing of Bexar County Dam Locations and Storage Capacities

JURISDICTION	LATITUDE	LONGITUDE	HEIGHT (Feet)	STORAGE (Acre Feet)
SAN ANTONIO	29.44952	-98.53067	20	460
BEXAR	29.46099	-98.33322	27	1085
BEXAR	29.38486	-98.28112	34	1403
BEXAR	29.24609	-98.36447	76	32324
BEXAR	29.52019	-98.32858	36	1632
BEXAR	29.47127	-98.32823	38	3509
BEXAR	29.5401	-98.33025	40	1922
SAN ANTONIO	29.42503	-98.53705	10	105
BEXAR	29.47845	-98.2903	40	1922
BEXAR	29.38056	-98.29259	43	3768
BEXAR	29.30434	-98.28396	41	2825
BEXAR	29.37001	-98.33233	41	3298
BEXAR	29.27851	-98.30536	79	97441
BEXAR	29.35944	-98.27156	27	1413
SAN ANTONIO	29.66344	-98.57924	55	4317
SAN ANTONIO	29.62448	-98.52156	57	3957

Appendix D: Dam Locations

JURISDICTION	LATITUDE	LONGITUDE	HEIGHT (Feet)	STORAGE (Acre Feet)
HOLLYWOOD PARK	29.63897	-98.51303	57	5807
SAN ANTONIO	29.60489	-98.39561	42	3053
SAN ANTONIO	29.56139	-98.50396	47	6864
SAN ANTONIO	29.6058	-98.41428	46	1898
SAN ANTONIO	29.54909	-98.38996	5	78
HELOTES	29.59403	-98.71642	40	462
SAN ANTONIO	29.62718	-98.46906	50	2612
SAN ANTONIO	29.59041	-98.50905	62	2830
SAN ANTONIO	29.62528	-98.38859	71	7837
SAN ANTONIO	29.4735	-98.47414	58	21970
SAN ANTONIO	29.59486	-98.43922	65	4063
SAN ANTONIO	29.65856	-98.59704	75	8675
SAN ANTONIO	29.51026	-98.55841	20	19.1
SAN ANTONIO	29.55025	-98.45066	49	8741
SAN ANTONIO	29.43326	-98.48564	13.5	27.6
SAN ANTONIO	29.64805	-98.4755	61	7100
BEXAR	29.45819	-98.29264	30	1622
BEXAR	29.65473	-98.75826	40.6	420
SAN ANTONIO	29.60307	-98.43267	64	6318
SAN ANTONIO	29.48287	-98.38136	15	78
BEXAR	29.16988	-98.50495	14	114
SAN ANTONIO	29.3849	-98.42839	32.2	145
BEXAR	29.30644	-98.63384	32	520
BEXAR	29.33981	-98.76007	14	140
BEXAR	29.29718	-98.50756	19	730
BEXAR	29.34842	-98.28908	28	2085
SAN ANTONIO	29.34696	-98.46472	12	120

Appendix D: Dam Locations

JURISDICTION	LATITUDE	LONGITUDE	HEIGHT (Feet)	STORAGE (Acre Feet)
BEXAR	29.30145	-98.58579	13	520
BEXAR	29.65905	-98.77649	21	220
BEXAR	29.30281	-98.45371	24	580
BEXAR	29.36725	-98.72116	13	180
BEXAR	29.29965	-98.63757	14	210
BEXAR	29.27152	-98.48826	10	5000
BEXAR	29.26857	-98.64016	14	312
BEXAR	29.30081	-98.68542	15	300
BEXAR	29.25571	-98.43117	10	1600
BEXAR	29.25663	-98.708	17	190
BEXAR	29.3455	-98.27729	28	907
BEXAR	29.25872	-98.759	19	190
BEXAR	29.32712	-98.32359	17	238
LEON SPRINGS	29.71427	-98.67225	19	53
BEXAR	29.26201	-98.63602	10	140
BEXAR	29.31826	-98.36345	18	94
UNIVERSAL CITY	29.58453	-98.34912	18	80
BEXAR	29.2643	-98.71257	14	56
HELOTES	29.64538	-98.71427	33	198
BEXAR	29.6764	-98.61605	25	46
UNIVERSAL CITY	29.57622	-98.34325	18	80
SAN ANTONIO	29.66632	-98.7574	16	130
BEXAR	0	0	20	No Information
BEXAR	29.31343	-98.51096	14	450

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Workshop Documentation

Appendix E is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Bexar County held a series of Planning Team workshops: a Kickoff Workshop on May 4, 2016, a Risk Assessment Workshop on August 31, 2016, and a Mitigation Workshop on November 1, 2016. At each of these workshops members of the Planning Team were informed of the planning process, expressed opinions, and volunteered information. Bexar County hosted three public meetings (following each workshop). The sign-in sheets for each workshop and public meeting are included below. For more details on the workshops and planning process, see Section 2.

Figure E-1. Bexar County Kickoff Workshop, 05.04.16

Hazard Mitigation Plan Kick-Off Meeting May 4, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Patrick Lewis	UNIVERSAL CITY	210-880-7136	FINERESUNILLET@ CLETX.GOV	YES
William Hilburn	KIRBY	210-661-2612	WHilburn@cityof KIRBY.ORG	YES
Darrell Dowle	CASTLE HILLS	210-342-2341	DDowle@ CityofCastleHills.com	YES
John Perry	Scheetz	216-619-1300	jperry@scheetz.com	YES
CHRISTOPHER Meek	Scheetz	210-619-1300	cmeek@scheetz.com	YES
Tim Zelenak	HOLLYWOOD PARK	210-389-5721	tzelenak@hollywoodparktx.gov	YES
JOHN BUTRICO	HOLLYWOOD PARK	210 389 4149	jbutrico@hollywoodparktx.gov	YES
FRANK MORALES	HILL COUNTRY	2104943671	FMORALCS@HCU.ORG	YES
Scott Rubin	Fair Oaks Ranch	210 698-0990	SRubin@FairOaksRanchTX.org	Yes
Richard Davis	Fair Oaks Ranch	(210)698-0990	5578107@FairOaksRanchTX.org	NO second

Appendix E: Meeting Documentation

Hazard Mitigation Plan Kick-Off Meeting May 4, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Raymond Christian	Converse FID	210-658-8900	Edwstchrie@converse.net	yes
Rex Rheiner	CONVERSE PD	210-658-2322	ASSTCHIEF@CONVERSEPD.NET	NO
Jesse Gutierrez	SANDY OAKS MARSHAL	210-970-8053	MARSHAL@SANDYOAKS.COM	YES
William Knupp	CITY OF TERRELL HILLS FID	210-824-7401	bknap@terrell-hills.com	Yes
Dee Grimm	CITY OF Saint Hedwig	210-518-8615	STHEHWIGMAYOR@ATT.NET	Yes
Joshua Meier	City of Helotes	210-695-5909	JMeier@helotes-tx.gov	NO
Rick Wall	City of Helotes	210-695-3572	rwall@helotes-tx.gov	Yes
Billy Lawson	CITY OF Leon Valley	210-684-3219	blawson@leonvalleytexas.gov	Yes
Trina Reyes	Von Army	210-859-6145	trreya5@comcast.net	Yes

Hazard Mitigation Plan Kick-Off Meeting May 4, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Douglas Tomasini	Sandy Oaks	210-442-9277	dtomasini@cityofsandyoak.com	Yes

Appendix E: Meeting Documentation

Hazard Mitigation Plan Kick-Off Meeting May 4, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Justin R. Seibert	City of Terrell Hill Fire Dept.	210-824-7401	jseibert@terrell-hill.com	YES

Hazard Mitigation Plan Kick-Off Meeting May 4, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Lloyd K. Perrin	City of OLMOS PARK	210-824-3281	LPerrin@olmosPark.org	YES.
David Bejar	City of Grey Forest	210695-3261	dbejar@greyforest-tx.gov	Yes
Matt Malone	City of Live Oak	2109451732	mmaloned@liveoaktx.net	Yes

Appendix E: Meeting Documentation

Figure E-2. Bexar County Risk Assessment Workshop, 08.31.16

Hazard Mitigation Plan Risk Assessment Meeting August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
JOHN BURRICO	HOLLYWOOD PARK	210 494 3411 x232	jburri@hollywoodpark.tx.gov	YES
TIM ZELENKA	HOLLYWOOD PARK	210-494-3111x230	tzeleanka@hollywoodpark.tx.gov	No
BILLY KNUPP	TERRELL HILLS	210 824 7401	bknupp@terrell-hills.com	Yes
JUSTIN R. SEIBERT	TERRELL HILLS	210-824-7401	jseibert@terrell-hills.com	YES
JESSE GUTIERREZ	SANDY SPRINGS MUNICIPAL	210-690-9700 8053	mgarcia@cityofsandysprings.com	YES
MARK CHADWICK	BEXAR COUNTY	210-206-8762	Mark.Chadwick@bexar.org	No
RICK WALL	HELOTES	210 695-3572	rwall@helotes.tx.gov	Yes
JOSHUA MAUR	HELOTES	210 695-5909	Jmaur@helotes-Tx.gov	
DARRELL DAVIS	CASTLE HILLS	210-986-2156	ddavis@cityofcastlehills.com	
DEE GRIMM	SAINT HEDWIG	910-518-8615	sthedwigmayor@att.net	yes

Hazard Mitigation Plan Risk Assessment Meeting August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
JOHN BURRICO	HOLLYWOOD PARK	210 494 3411 x232	jburri@hollywoodpark.tx.gov	YES
TIM ZELENKA	HOLLYWOOD PARK	210-494-3111x230	tzeleanka@hollywoodpark.tx.gov	No
BILLY KNUPP	TERRELL HILLS	210 824 7401	bknupp@terrell-hills.com	Yes
JUSTIN R. SEIBERT	TERRELL HILLS	210-824-7401	jseibert@terrell-hills.com	YES
JESSE GUTIERREZ	SANDY SPRINGS MUNICIPAL	210-690-9700 8053	mgarcia@cityofsandysprings.com	YES
MARK CHADWICK	BEXAR COUNTY	210-206-8762	Mark.Chadwick@bexar.org	No
RICK WALL	HELOTES	210 695-3572	rwall@helotes.tx.gov	Yes
JOSHUA MAUR	HELOTES	210 695-5909	Jmaur@helotes-Tx.gov	
DARRELL DAVIS	CASTLE HILLS	210-986-2156	ddavis@cityofcastlehills.com	
DEE GRIMM	SAINT HEDWIG	910-518-8615	sthedwigmayor@att.net	yes

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Hazard Mitigation Plan Risk Assessment Meeting				
August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
JOHN WATZEL	UNIVERSAL CITY FD	210 659-0333 EXT 955	SIRE.MWASHAL@ UCPX.GOV	YES
Raymond Christian	CONVERSE F.D	210-658-8900	fdasstchier@converse.net	YES
REX RHEINER	CONVERSE PD	(210) 658-2327	ASSTCHIEF@CONVERSE.PX.NET	YES
LLOYD K PERRIN	OLMOS PARK	(210) 824-3281	CAPTAIN EMC	YES.
Jane Masset	Alamo Heights 1281	210 834	jane@alamoheights.tx.gov	YES
Michael Gdovin	Alamo Heights FD	210 832 2241	mgdovin@alamoheights.tx.gov	YES
Mary Ann Hopik	Chene Grove	210 648 4772	mmayor@ mcheneheights.com	
Miguel Cantu	City of Somerset	890 701-4100	city.administrator @somersettx.gov	yes
Greg Woodruff	City of Shevono Park	(210) 492-1111	gwoodruff@ shevanopark.org	yes
Eddie Ortega	Bexar County	310 335-3421	Eddie.Ortega@bexar.org	

Hazard Mitigation Plan Risk Assessment Meeting				
August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
TOO PRAAM	BEXAR COUNTY	335-6696	tp@bexar.gov	
Satt Rubin	Fair Oaks Ranch PD	698-0990	srubin@fairoaksranch.tx.org	
Adrian Garcia	Fair Oaks Ranch	698-0900	agarcia@fairoaksranch.tx.org	N
Fred Reyna	BEXAR COUNTY DEM	210- 206-8752	Fred.Reyna@Bexar.org	No
Tony Gross	TDEM	210 559 3496	tony.gross@dps.texas.gov	No
KRIND GOSLEY	BEXAR COUNTY PW	210 335-6784	KRIND.GOSLEY@BEXAR.ORG	NO

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Hazard Mitigation Plan Risk Assessment Meeting August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
William Hilburn	CITY OF KIRBY	(210) 912-8207	WHilburn@CityofKirby.org	YES
Rhonda Murphy	H2O PARTNERS	(214) 707-0056	Rmurphy@H2OPARTNERSUSA.COM	N/A
Jerry Riedel	Castle Hills	(510) 342-2341	jriedel@cityofcastlehills.com	YES

Hazard Mitigation Plan Risk Assessment Meeting August 31, 2016				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Manuel Pena	Elmendorf PD	210-564-7412	mpena@elmendorf-tx.com	Yes

Appendix E: Meeting Documentation

Figure E-3. Bexar County Mitigation Actions Workshop, 11.1.16

Hazard Mitigation Plan Mitigation Strategy Workshop				
November 1, 2016 - Emergency Operations Center, San Antonio, TX				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
ASSIST EM Scott Lampright	BCOEM	206-8530	slampright@bexar.org	Yes
Charlie Brown	Chairman zoning Von Ormy	210/379-5022	cbg200@gmail.com	Yes
John Perry	Fire Marshal/ASST EM SCHOLTZ	210-619-1300	jperry@scholtz.com	Yes
Asst Fire Chief Raymond Christian	Converse	210-658-8900	rdchristie@converse.net	Yes
FIRE CHIEF Billy Knupp	TERRELL HILLS	210-824-7401	bknupp@terrell-hills.com	Yes
DEPUTY CHIEF Jana Massey	Universal City	210-659-0333	janamassey@ucity.gov	Yes
Patricia Lewis Lt.	Universal City	210-880-7136	PLewis@ucity.gov	Yes
SCOTT PAUL	BCOEM	210-884-0643	Scott.Paul@bexar.org	NO
Andy Winter	DIRECTOR BCE ENVIR SERV	210 837 9617	AWINTER@BEXAR.ORG	NO
Stan Jordan	BC Environmental Deputy Investigator	210 385-6741	SSORDAN@bexar.org	NO

Hazard Mitigation Plan Mitigation Strategy Workshop				
November 1, 2016 - Emergency Operations Center, San Antonio, TX				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
CHIEF OF POLICE FRANK MORALES	HILL COUNTY VILLAGE	210 494 3671	FMORALES@HCV-ORG	YES
Elliot Rodriguez	Grey Forest P.D.	210-818-5923	eir5794ad@aol.com	Yes
CAPT. EM. CHRISTOPHER MEET	SCHOLTZ FIRE	210-619-1322	cmeet@scholtz.com	Yes
Brock Ward	Dalton's Heights	210-827-3819	bward@bhtx.gov	Yes.
FIRE CHIEF JOHN BUTRICO EMC	HOLLYWOOD PARK	210 389 4149	jbutrico@hollywoodpark-tx.gov	YES
FIRE MARSHAL John Hatze	UNIVERSAL CITY	210 659-0333	JHATZE@UCITY.GOV	Yes
Asst. Fire Chief JUSTIN Seibert	Terrell Hills	210 824 7401	jseibert@terrell-hills.com	YES
CAPTAIN LLOYD K. Perrin	OLMOS PARK	210 824-3281	LPerrin@olmospark.org	YES
Mark Chadwick	BCOEM	210-206-8762	markchadwick@bexar.org	Yes
Rick Wall EMC	Helotes	210-695-3572	rwall@helotes-tx.gov	Yes

Appendix E: Meeting Documentation

Hazard Mitigation Plan Mitigation Strategy Workshop				
November 1, 2016 - Emergency Operations Center, San Antonio, TX				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Joshua Mair <i>Public Works</i>	Helotes	210-695-5909	smair@helotes-tx.gov	YES
Lt. Matt Melone <i>CAPTAIN (EMC)</i>	Live Oak PD	210-945-1732	mmelone@liveoaktx.net	YES
William Hilborn	CITY OF KIRBY	(210)912-8207	whilborn@cityofkirby.org	YES
LT. SPEC OPS CMDR MARK WILLIAMS <i>OPS PROJECT COORDINATOR</i>	WINDCREST	210-655-2666	MWILLIAMS@WINDCREST-TX.GOV	YES
KEVIN CONLEY	BC PUBLIC WORKS	210 335 6784	KCONLEY@BCPUBLICWORKS.ORG	NO
Tony Gross	Tx Div of Emerg Mgmt	210 559 3496	tony.gross@dps.texas.gov	NO
Greg Woodruff	Shavano Park	210 442-1111	gwoodruff@shavanopark.org	YES No

Hazard Mitigation Plan Mitigation Strategy Workshop				
November 1, 2016 - Emergency Operations Center, San Antonio, TX				
Name (Please Print)	Jurisdiction and Organization	Telephone #	E-Mail Address	Are You The POC For Your Jurisdiction?
Tina Neely-Lopez <i>CONORAL</i>	BCOEM	210-206-8688	cheely@bcgov.org	NO
FRANK LARA	LIVE OAK PD <i>MAYOR</i>	210-945-1700	FLARA@LIVEOAKTX.NET	YES
MaryAnn HASEK	CHINA GROVE	210 648 4772	Maryann@mahasek.com	No
Billy Lawson <i>ASST. Fire chief</i>	Leon Valley Fire Dept.	210-684-3219	blawson@leonvalleytexas.gov	also send info to Yes bowade@
Dee Grimm	CITY OF SAINT Hedwig	210 518 8615	stheodwigmayor@att.net dgrimm@bcf	YES
Adrian Garcia	City of Fair Oaks Ranch	210-698-0900	agarcia@fairoaksranchtx.org	No
Ryan Pena	BCOEM	210-258-4847	ryan.tx.chief@gmail.com	No

Appendix E: Meeting Documentation

Public Meeting Documentation

As discussed in Section 2, a series of three public meetings were held in conjunction with each of the Bexar County workshops. Survey respondents were asked if they wanted to be informed about public meetings, and these respondents were invited to the public meetings. Documentation in the form of sign-in sheets for each of the meetings follows.

Figure E-4. Bexar County Public Kickoff Workshop Public Meeting, 05.04.16

Hazard Mitigation Plan Public Meeting
May 4, 2016

Name (Please Print)	Address	Telephone #	E-Mail Address
Mark Chadwick	6018 Bear Cyn S.A., TX 78252	210- 360-9231	mark.chadwick@bexar.org
Sam Lampright	15738 Kowalec, Ct San Antonio TX 78247 Converse, TX 78109	210 489-0282	slampright@bexar.org
Raymond Christian	107 Station St. Converse, TX 78109	210-658-8910	glasstehiere.converse@net
Fred Reyna	Bexar County OEM	210-501 8236	Fred.Reyna@bexar.org
Ryle Coleman	" " "	210-669-8733	RColeman@Bexar.org
John WATZEL	UNIVERSAL City Fire Dept	210-679-0333 EXT 788	Firminsh@kautx.gov
Rick Wall	12951 Bandera Helotes TX 78023	210 695-3572	rwall@helotes-tx.gov
Heidi Watson	1120 PARTNERS	512 568 2259	heidi@h2opartnersusa.com

Hazard Mitigation Plan Public Meeting
May 4, 2016

Name (Please Print)	Address	Telephone #	E-Mail Address
Raymond Christian	107 Station St. Converse TX 78109	210 658 8910	glasstehiere.converse@net
Donovan Rodriguez	4522 Friedricksburg Rd SAT 78201	210 733 1004	donovan.rodriguez@concrete-tx.gov
Rick Wall	12951 Bandera Helotes TX	210-695-3572	rwall@helotes-tx.gov

Appendix E: Meeting Documentation

Figure E-5. Bexar County Public Risk Assessment Workshop Public Meeting, 08.31.16

Hazard Mitigation Plan Public Meeting
August 31, 2016

Name (Please Print)	Address	Telephone #	E-Mail Address
Paul Morado	8609 Wood Peak SA TX 78251	210 542-0939	PaulMorado@gmail.com
Scott Lampright	15738 Kwoilciff San Antonio, TX 78247	210 499-0286	lampright42@att.net
Kyle Coleman	EOC	210-669-8733	KColeman@BFRM.OIS
John MacKenzie	240 Sherwood Dr S.A. TX 78201	210-275-6154	john@mackenzie restoration.com
Matt Chadwick	6018 Bear Canyon S.A., TX 78252	210-206-8762	matt.chadwick@bexar.org
WALTON DAUGHERTY	12951 BANDEPA RD HELOTES, TX 78023	210 695-3572	wdaugherty@helotes-tx.gov

Appendix E: Meeting Documentation

Figure E-6. Bexar County Mitigation Actions Workshop Public Meeting, 11.1.16

Hazard Mitigation Plan Public Meeting

November 1, 2016 - Emergency Operations Center, San Antonio, TX

Name / Title (Please Print)	Address	Telephone #	E-Mail Address
Steve Lampright AEMC	15738 Knollcreek San Antonio, TX 78247	449-0286	lampright4@aatt.net
Anthony Simon	9319 Mercedes Circle	(210) 609-1531	
Mark Chadwick	622 Doloresa S.A., Tx 78207	(210) 206-8762	mark.chadwick@bexar.org
Kate Coleman	11344 Fano Rd San Antonio, TX 78217	210 665-4733	KColeman@Bexar.org
Amanda Bucher, TCEQ	14250 Judson Rd., San Antonio, Tx 78233	210-403-4056	amanda.bucher@ tceq.texas.gov
Guillermo Sanchez	6432 San Pedro St	210 237 22 23	guillermo.sanchez@nbcuni.com

Hazard Mitigation Plan Public Meeting

November 1, 2016 - Emergency Operations Center, San Antonio, TX

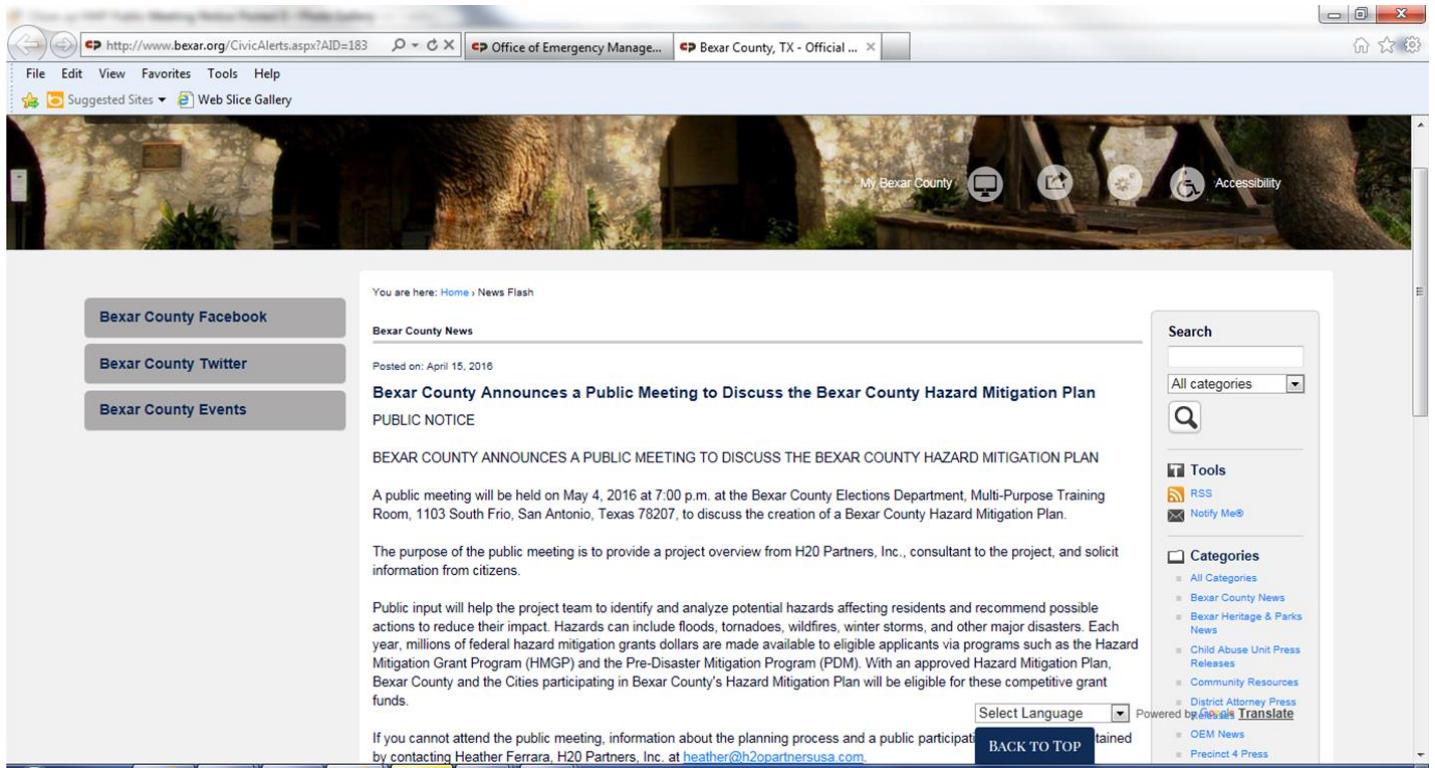
Name / Title (Please Print)	Address	Telephone #	E-Mail Address
Rachel Andrews/ Mitigation Specialist	260 Addie Roy Austin, TX 78746	512-983-0092	rachel@h2opartnersusa.com
Heidi Watson Mitigation Specialist	260 Addie Roy Austin TX 78746	512-568-2259	heidi@h2opartnersusa.com
Samantha Kalb Environmental Investigator	14250 Judson Rd San Antonio TX	210 32 403-4062	samantha.kalb@ tceq.texas.gov

Appendix E: Meeting Documentation

Public Notices

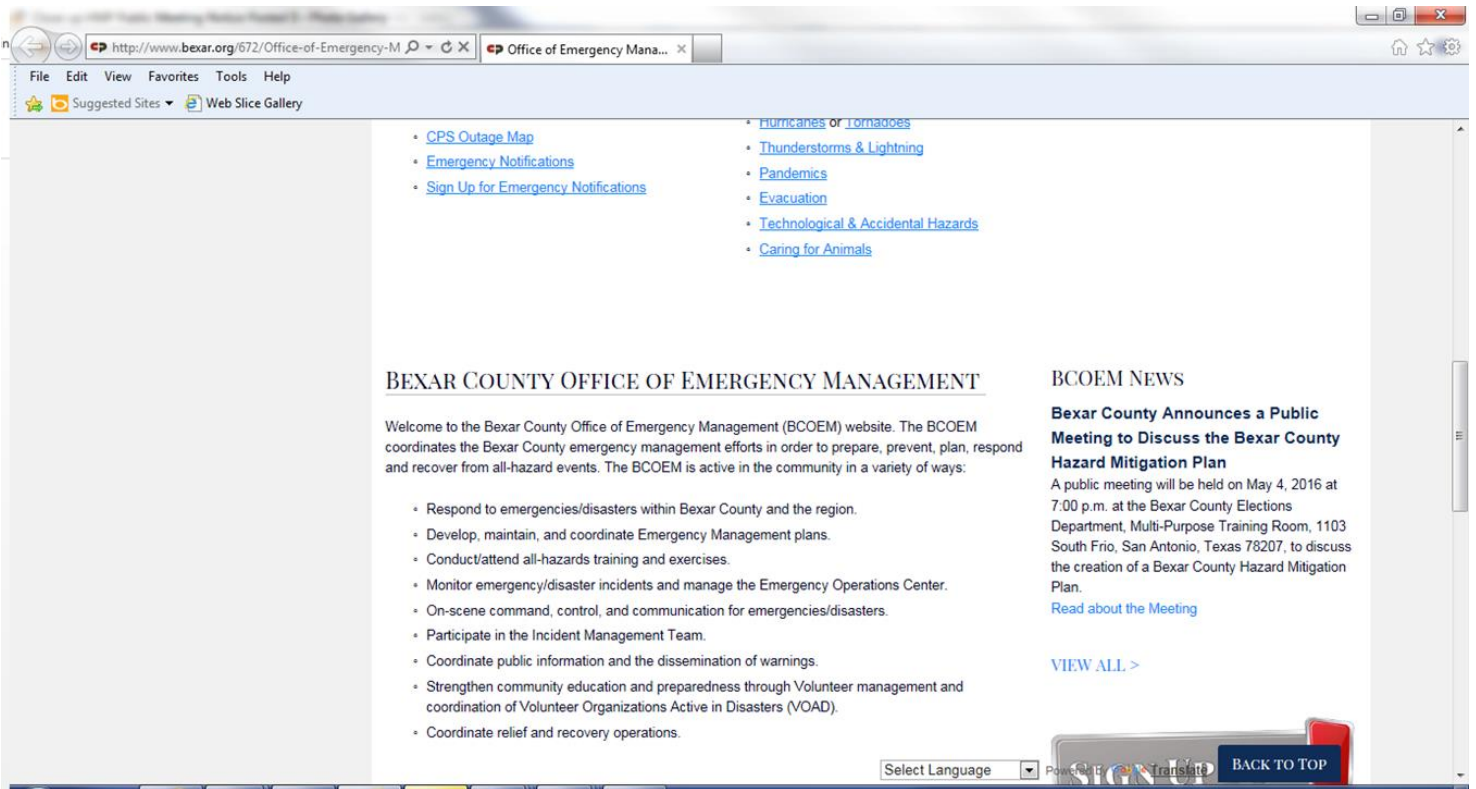
Public notices to announce Bexar County's participation in the Plan Update development process were posted on various websites, outside of community offices, and Facebook (including participating jurisdictions within the County) as shown in Figures E-7 through E-17. Additionally, as seen in Figures E-14 through E-17, the County and participating jurisdictions invited the public to participate in the survey.

Figure E-7. Public Notice, Bexar County Web Page, 05.04.16 Public Meeting



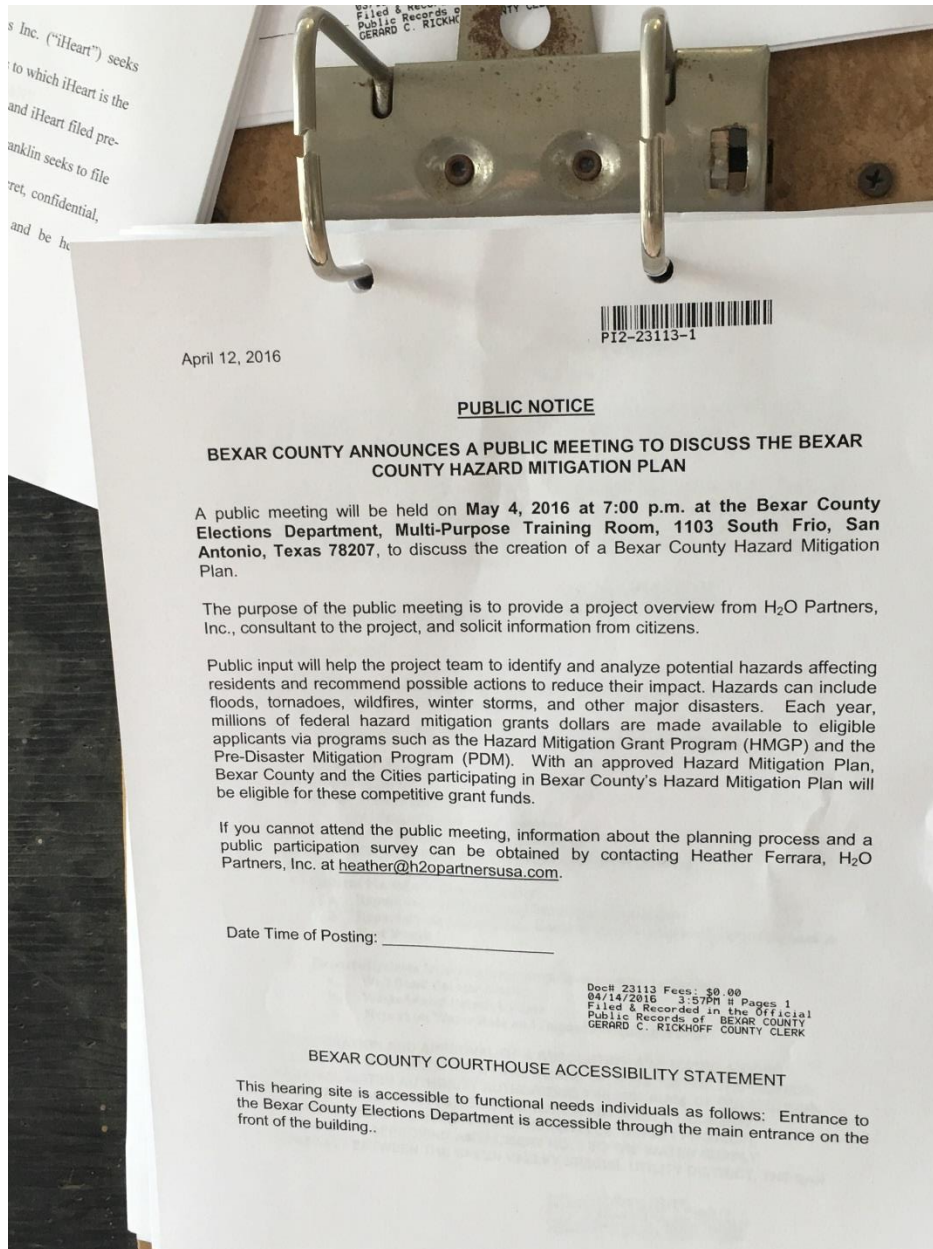
Appendix E: Meeting Documentation

Figure E-8. Public Notice, Bexar County Emergency Management Web Page, 05.04.16 Public Meeting

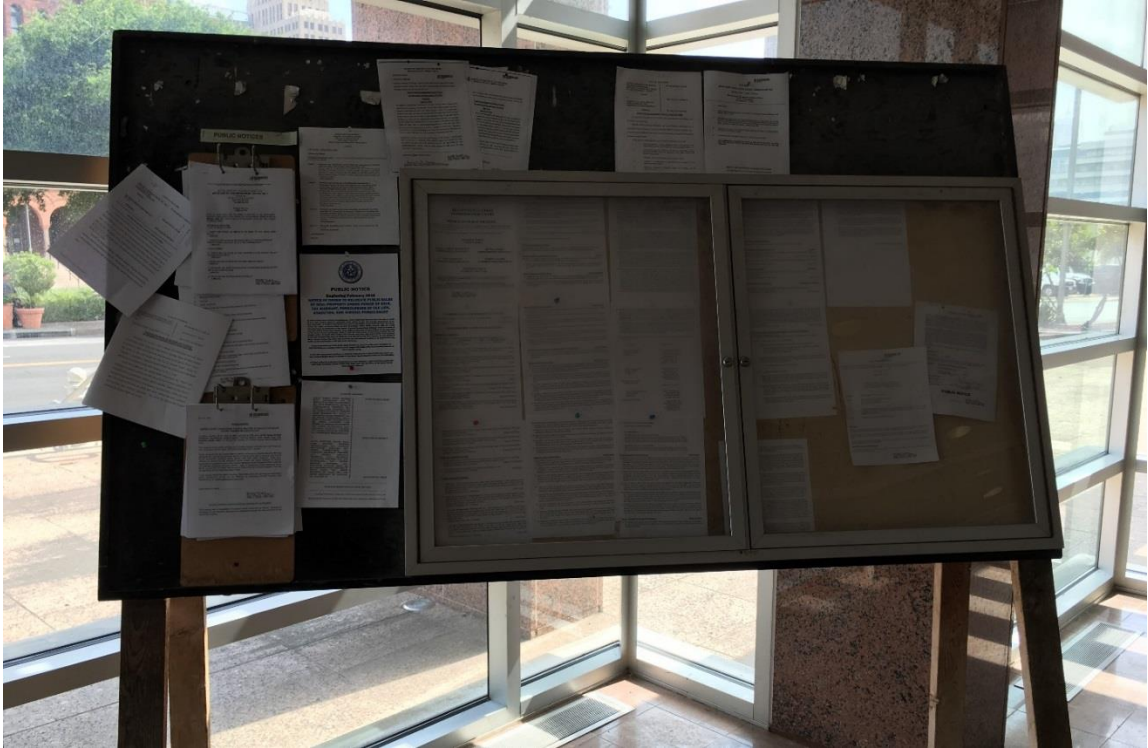


Appendix E: Meeting Documentation

**Figure E-9. Public Notice, Bexar County Offices (Photo showing posting location and address), 05.04.16
Public Meeting**

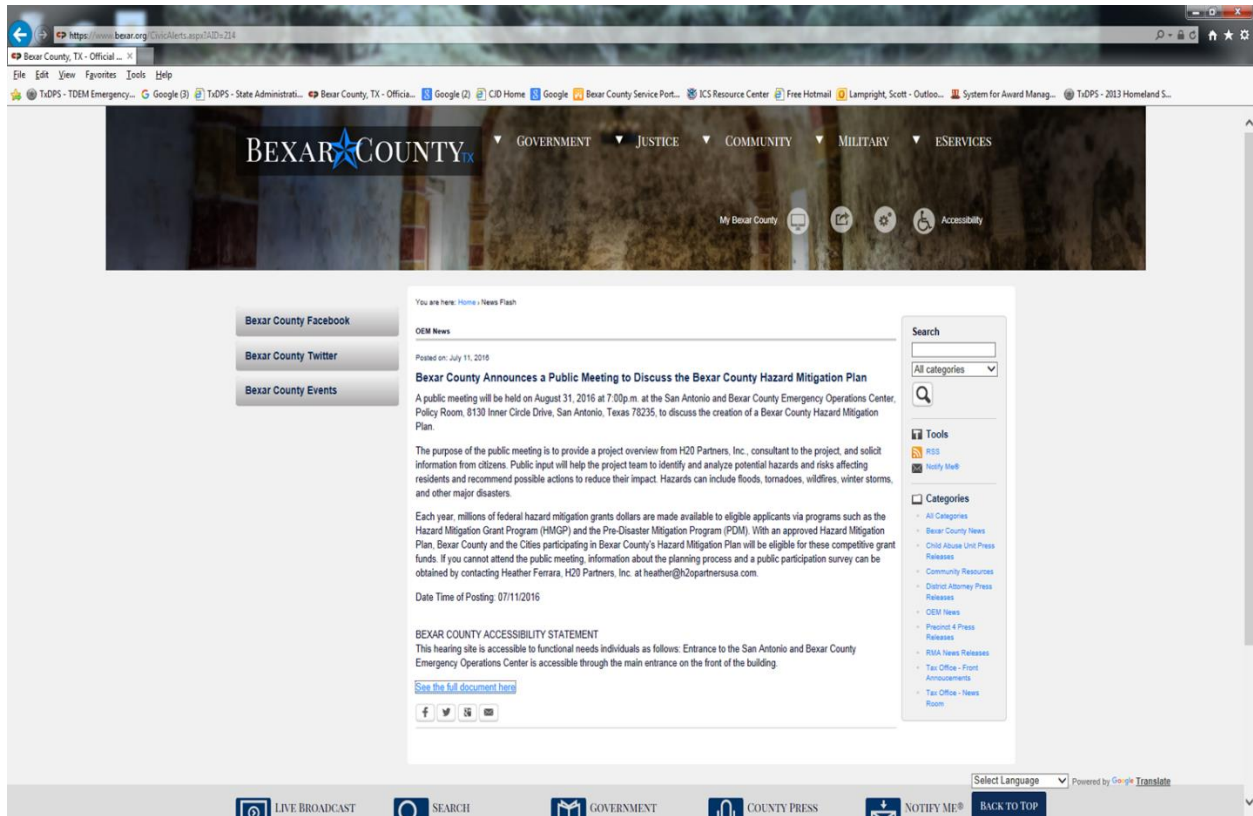


Appendix E: Meeting Documentation



Appendix E: Meeting Documentation

Figure E-10. Public Notice, Bexar County Web Page, 08.31.16 Public Meeting



Appendix E: Meeting Documentation

Figure E-11. Public Notice, Bexar County Public Records, 08.31.16 Public Meeting

July 8, 2016



PUBLIC NOTICE

BEXAR COUNTY ANNOUNCES A PUBLIC MEETING TO DISCUSS THE BEXAR COUNTY HAZARD MITIGATION PLAN

A public meeting will be held on **August 31, 2016 at 7:00 p.m. at the San Antonio and Bexar County Emergency Operations Center, Policy Room, 8130 Inner Circle Drive, San Antonio, Texas 78235**, to discuss the creation of a Bexar County Hazard Mitigation Plan.

The purpose of the public meeting is to provide a project overview from H₂O Partners, Inc., consultant to the project, and solicit information from citizens.

Public input will help the project team to identify and analyze potential hazards and risks affecting residents and recommend possible actions to reduce their impact. Hazards can include floods, tornadoes, wildfires, winter storms, and other major disasters. Each year, millions of federal hazard mitigation grants dollars are made available to eligible applicants via programs such as the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation Program (PDM). With an approved Hazard Mitigation Plan, Bexar County and the Cities participating in Bexar County's Hazard Mitigation Plan will be eligible for these competitive grant funds.

If you cannot attend the public meeting, information about the planning process and a public participation survey can be obtained by contacting Heather Ferrara, H₂O Partners, Inc. at heather@h2opartnersusa.com.

Date Time of Posting: _____

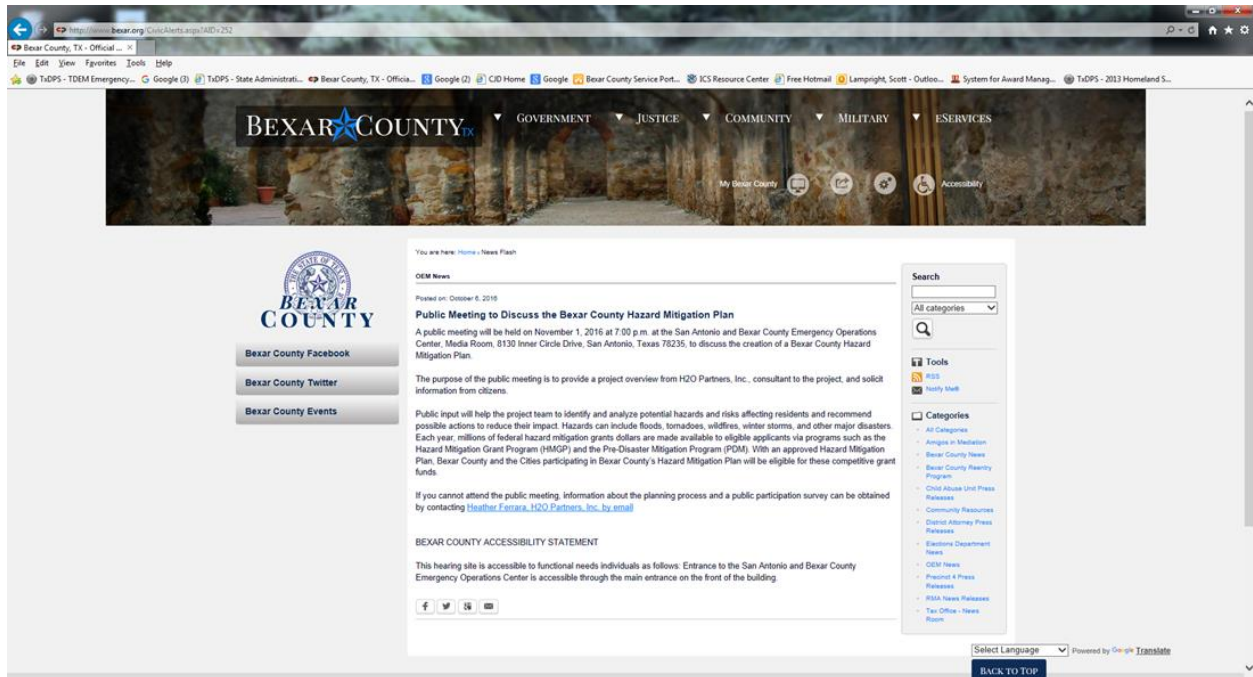
BEXAR COUNTY ACCESSIBILITY STATEMENT

This hearing site is accessible to functional needs individuals as follows: Entrance to the San Antonio and Bexar County Emergency Operations Center is accessible through the main entrance on the front of the building.

Doc# 23362 Fees: \$0.00
07/08/2016 3:21PM # Pages 1
Filed & Recorded in the Official
Public Records of BEXAR COUNTY
GERARD C. RICKHOFF COUNTY CLERK

Appendix E: Meeting Documentation

Figure E-12. Public Notice, Bexar County Web Page, 11.01.16 Public Meeting



Appendix E: Meeting Documentation

Figure E-13. Public Notice, Bexar County Public Records, 11.01.16 Public Meeting

October 5, 2016



PUBLIC NOTICE

BEXAR COUNTY ANNOUNCES A PUBLIC MEETING TO DISCUSS THE BEXAR COUNTY HAZARD MITIGATION PLAN November 1, 2016

A public meeting will be held on **November 1, 2016 at 7:00 p.m. at the San Antonio and Bexar County Emergency Operations Center, Media Room, 8130 Inner Circle Drive, San Antonio, Texas 78235**, to discuss the creation of a Bexar County Hazard Mitigation Plan.

The purpose of the public meeting is to provide a project overview from H₂O Partners, Inc., consultant to the project, and solicit information from citizens.

Public input will help the project team to identify and analyze potential hazards and risks affecting residents and recommend possible actions to reduce their impact. Hazards can include floods, tornadoes, wildfires, winter storms, and other major disasters. Each year, millions of federal hazard mitigation grants dollars are made available to eligible applicants via programs such as the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation Program (PDM). With an approved Hazard Mitigation Plan, Bexar County and the Cities participating in Bexar County's Hazard Mitigation Plan will be eligible for these competitive grant funds.

If you cannot attend the public meeting, information about the planning process and a public participation survey can be obtained by contacting Heather Ferrara, H₂O Partners, Inc. by email at heather@h2opartnersusa.com.

Date Time of Posting: 10/6/16 3:25 PM

BEXAR COUNTY ACCESSIBILITY STATEMENT

This hearing site is accessible to functional needs individuals as follows: Entrance to the San Antonio and Bexar County Emergency Operations Center is accessible through the main entrance on the front of the building.

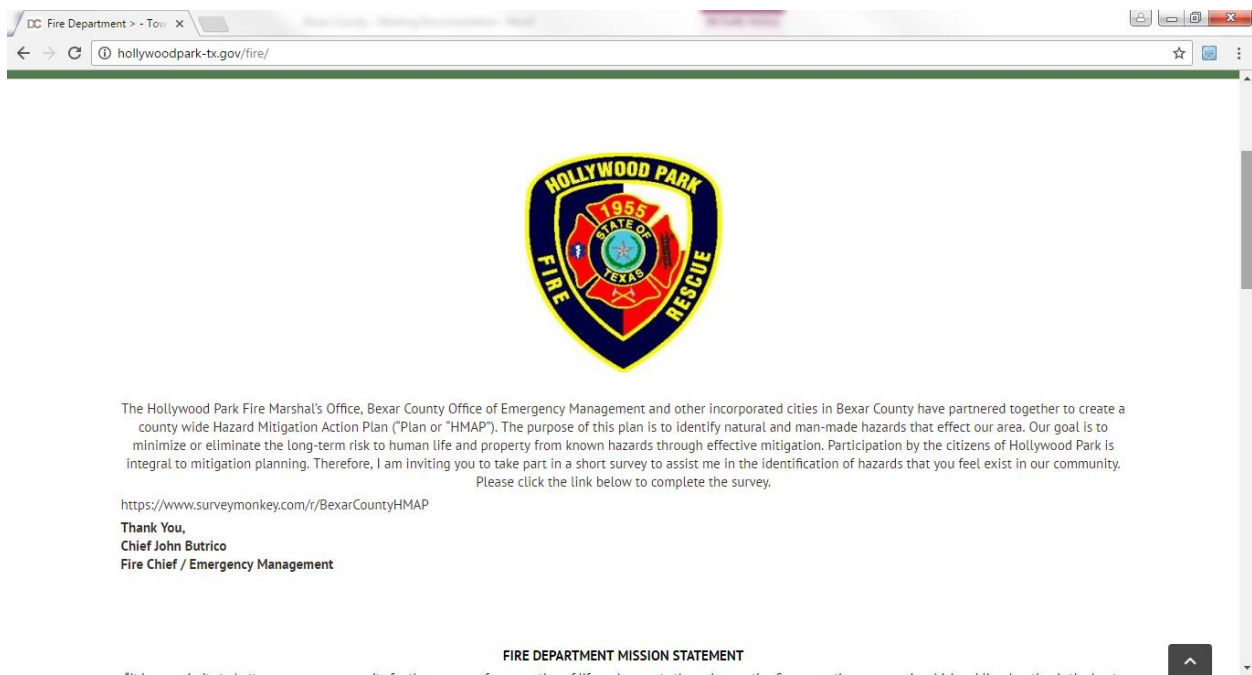
Doc# 23638 Fees: \$0.00
10/06/2016 3:25PM # Pages 1
Filed & Recorded in the Official
Public Records of BEXAR COUNTY
GERARD C. RICKHOFF COUNTY CLERK

Appendix E: Meeting Documentation

Figure E-14. Public Notice, City of Terrell Hills Web Page, Survey Invitation



Figure E-15. Public Notice, Town of Hollywood Park Web Page, Survey Invitation



Appendix E: Meeting Documentation

Figure E-16. Public Notice, City of Leon Valley Facebook Page, Survey Invitation

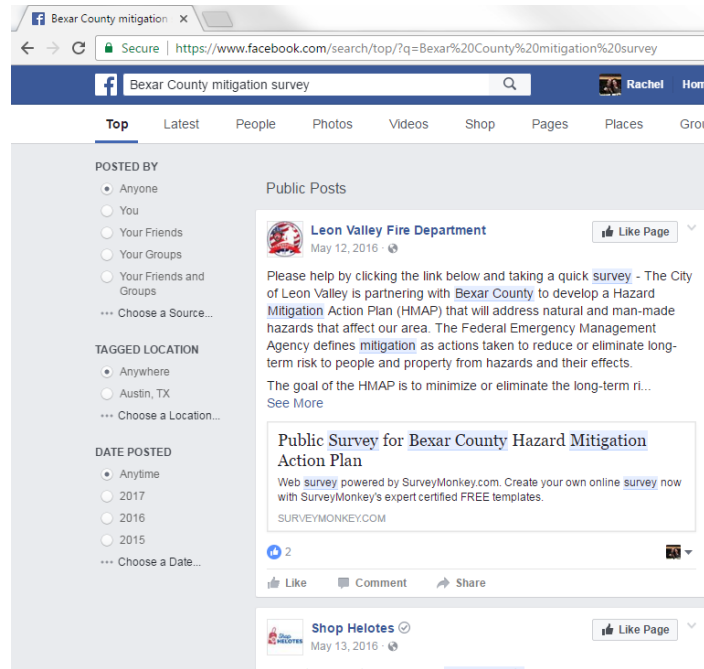
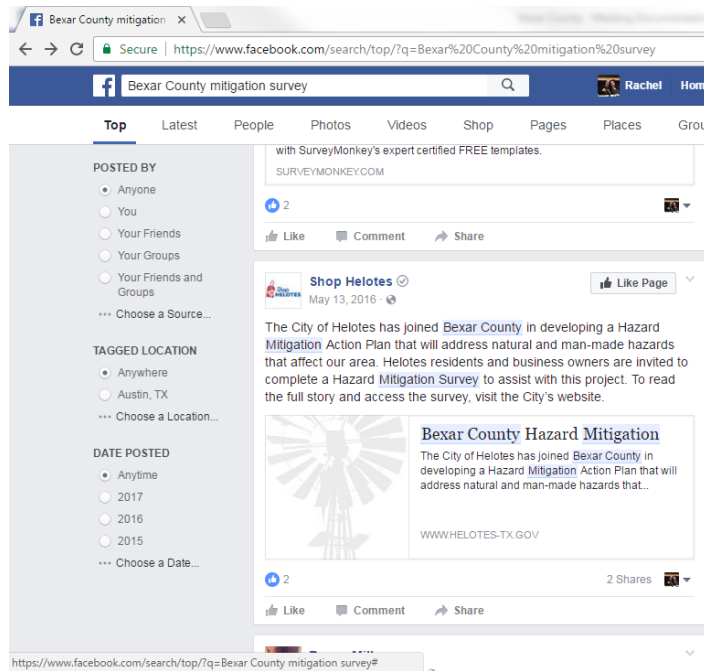


Figure E-17. Public Notice, City of Helotes Facebook Page, Survey Invitation



Appendix F: Capability Assessment

Overview	1
Community Capability Assessments	2

Overview

A Community Capability Assessment is an integral component of the Hazard Mitigation Planning Process. It is an invaluable tool in assessing a community’s existing planning and regulatory capabilities to support implementation of mitigation strategy objectives.

Beginning on Page 2, a completed Capability Assessment Checklist provides information on existing policies, plans, and regulations in place for Planning Team members at the local level or that may be provided by the County on an as-needed basis. ***Participation is denoted with an “x” on the Checklist.***

Appendix F: Capability Assessment

Community Capability Assessments

COMMUNITY CAPABILITY CHECKLIST	<i>Bexar County</i>	<i>City of Alamo Heights</i>	<i>City of Balcones Heights</i>	<i>City of Castle Hills</i>	<i>City of China Grove</i>	<i>City of Converse</i>	<i>City of Elmendorf</i>	<i>City of Fair Oaks Ranch</i>	<i>City of Grey Forest</i>	<i>City of Helotes</i>
Plans										
Capital Improvements Plan	x	x	x	x		x		x		x
Master or Comprehensive Plan		x				x	x		x	x
Emergency Operations Plan	x	x		x		x		x	x	x
Hazard Mitigation Plan	x	x				x	x	x		x
Post-disaster Recovery Plan	x	x		x				x		x
Policies/Ordinances										
Building Codes	x	x	x	x	x	x	x	x	x	x
Zoning Ordinance/Land Use Restrictions		x	x	x	x	x	x		x	x
Watershed Ordinance				x			x			x
Stormwater Ordinance	x	x		x		x	x			x
Site Plan Review Requirements	x	x	x	x	x	x	x	x	x	x
Real Estate Disclosure Requirements		x								
Programs										
National Flood Insurance Program Participant	x	x	x	x	x	x	x	x	x	x
NFIP Community Rating System Participant										
Property Acquisition Program	x									
Public Education/Awareness Programs	x	x	x	x			x	x	x	x
Stream Maintenance Program	x			x					x	x
Storm Drainage Systems Maintenance Program	x	x		x		x	x	x	x	x
Staff/Departments										
Planner	x	x						x	x	x
Building Code Official	x	x	x	x		x	x	x	x	x
GIS and/or HAZUS Specialist	x	x		x		x		x		x
Emergency Manager	x	x	x	x		x	x	x	x	x
Engineer/Public Works Official	x	x		x				x	x	x

Appendix F: Capability Assessment

COMMUNITY CAPABILITY CHECKLIST	<i>Bexar County</i>	<i>City of Alamo Heights</i>	<i>City of Balcones Heights</i>	<i>City of Castle Hills</i>	<i>City of China Grove</i>	<i>City of Converse</i>	<i>City of Elmendorf</i>	<i>City of Fair Oaks Ranch</i>	<i>City of Grey Forest</i>	<i>City of Helotes</i>
Floodplain Administrator	x	x	x	x	x	x	x	x	x	x

COMMUNITY CAPABILITY CHECKLIST	<i>City of Hill Country Village</i>	<i>Town of Hollywood Park</i>	<i>City of Kirby</i>	<i>City of Leon Valley</i>	<i>City of Live Oak</i>	<i>City of Olmos Park</i>	<i>City of St. Hedwig</i>	<i>City of Sandy Oaks</i>	<i>City of Schertz</i>	<i>City of Shavano Park</i>
Plans										
Capital Improvements Plan	x	x		x		x			x	x
Master or Comprehensive Plan	x			x		x	x		x	x
Emergency Operations Plan	x	x	x	x		x	x			x
Hazard Mitigation Plan		x				x				x
Post-disaster Recovery Plan		x		x		x				x
Policies/Ordinances										
Building Codes	x	x		x		x	x	x	x	x
Zoning Ordinance/Land Use Restrictions	x	x		x		x	x	x	x	x
Watershed Ordinance		x		x		x				
Stormwater Ordinance	x	x		x		x			x	x
Site Plan Review Requirements	x	x		x		x	x		x	x
Real Estate Disclosure Requirements						x	x			
Programs										
National Flood Insurance Program Participant	x	x	x	x	x	x	x		x	x
NFIP Community Rating System Participant					x					
Property Acquisition Program	x	x				x			x	
Public Education/Awareness Programs		x				x				x
Stream Maintenance Program		x			x					

Appendix F: Capability Assessment

COMMUNITY CAPABILITY CHECKLIST	<i>City of Hill Country Village</i>	<i>Town of Hollywood Park</i>	<i>City of Kirby</i>	<i>City of Leon Valley</i>	<i>City of Live Oak</i>	<i>City of Olmos Park</i>	<i>City of St. Hedwig</i>	<i>City of Sandy Oaks</i>	<i>City of Schertz</i>	<i>City of Shavano Park</i>
Storm Drainage Systems Maintenance Program		x			x	x			x	x
Staff/Departments										
Planner		x			x	x		x	x	x
Building Code Official	x	x			x	x	x	x	x	
GIS and/or HAZUS Specialist									x	
Emergency Manager	x	x	x		x	x	x	x	x	x
Engineer/Public Works Official	x	x	x		x	x	x	x	x	
Floodplain Administrator	x	x	x	x	x	x	x	N/A	x	x

COMMUNITY CAPABILITY CHECKLIST	<i>City of Somerset</i>	<i>City of Terrell Hills</i>	<i>City of Universal City</i>	<i>City of Von Ormy</i>	<i>City of Windcrest</i>
Plans					
Capital Improvements Plan		x	x	x	x
Master or Comprehensive Plan	x	x	x	x	x
Emergency Operations Plan		x	x		x
Hazard Mitigation Plan	x	x	x		x
Post-disaster Recovery Plan		x			x
Policies/Ordinances					
Building Codes	x	x	x	x	x
Zoning Ordinance/Land Use Restrictions	x	x	x		x
Watershed Ordinance		x	x		x
Stormwater Ordinance		x	x		x
Site Plan Review Requirements	x	x	x		x
Real Estate Disclosure Requirements			x		x

Appendix F: Capability Assessment

COMMUNITY CAPABILITY CHECKLIST	<i>City of Somerset</i>	<i>City of Terrell Hills</i>	<i>City of Universal City</i>	<i>City of Von Ormy</i>	<i>City of Windcrest</i>
Programs					
National Flood Insurance Program Participant	x	x	x	x	x
NFIP Community Rating System Participant					
Property Acquisition Program					x
Public Education/Awareness Programs		x	x		x
Stream Maintenance Program					
Storm Drainage Systems Maintenance Program		x	x		x
Staff/Departments					
Planner	x		x		x
Building Code Official	x	x	x		x
GIS and/or HAZUS Specialist			x		x
Emergency Manager	x	x	x		x
Engineer/Public Works Official	x		x	x	x
Floodplain Administrator	x	x	x	x	x