

CAMERON COUNTY HAZARD MITIGATION PLAN

PLANNING PARTNER: CITY OF HARLINGEN



*Preparing for a Sustainable Future for
Human Life and Property*

APPROVED: MAY, 2015



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TABLE OF CONTENTS

Section 1 - Introduction

Background	1-1
Scope	1-2
Purpose	1-3
Authority	1-3
Summary of Sections.....	1-4

Section 2 – Planning Process

Plan Preparation and Development	2-1
Review and Incorporation of Existing Plans.....	2-5
Public and Stakeholder Involvement	2-8

Section 3 – County Profile

Overview	3-1
Population and Demographics.....	3-2
Future Development	3-3

Section 4 – Risk Overview

Hazards Identification	4-1
Natural Hazards and Climate Change	4-3
Overview of Hazard Analysis	4-4
Building Values	4-5

Section 5 – Flood

Hazard Description.....	5-1
Location	5-4
Extent	5-8
Historical Occurrences	5-11
Probability of Future Events	5-15
Vulnerability and Impact	5-15
NFIP Participation	5-16

TABLE OF CONTENTS

Flood Risk Reduction and Education	5-17
Prioritizing Mitigation Actions	5-18
Repetitive Loss	5-18

Section 6 – Drought

Hazard Description	6-1
Location	6-2
Extent	6-2
Historical Occurrences	6-3
Probability of Future Events	6-5
Vulnerability and Impact	6-6

Section 7 – Extreme Heat

Hazard Description	7-1
Location	7-1
Extent	7-1
Historical Occurrences	7-4
Probability of Future Events	7-7
Vulnerability and Impact	7-7

Section 8 – Hurricane Wind

Hazard Description	8-1
Location	8-1
Extent	8-2
Historical Occurrences	8-3
Probability of Future Events	8-8
Vulnerability and Impact	8-10

TABLE OF CONTENTS

Section 9 – Tornado

Hazard Description	9-1
Location	9-2
Extent	9-3
Historical Occurrences	9-5
Probability of Future Events	9-10
Vulnerability and Impact	9-10

Section 10 – Severe Thunderstorm

Hazard Description	10-1
Location.....	10-1
Extent	10-1
Historical Occurrences.....	10-3
Probability of Future Events	10-6
Vulnerability and Impact	10-6

Section 11 – Hail

Hazard Description	11-1
Location.....	11-1
Extent	11-2
Historical Occurrences	11-2
Probability of Future Events	11-5
Vulnerability and Impact	11-5

Section 12 – Wildfire

Hazard Description	12-1
Location and Historical Occurrences	12-1
Extent	12-5
Probability of Future Events	12-8
Vulnerability and Impact	12-8

TABLE OF CONTENTS

Section 13 – Dam Failure

Hazard Description	13-1
Location	13-2
Extent	13-5
Historical Occurrences	13-10
Probability of Future Events	13-10
Vulnerability and Impact	13-11

Section 14 – Mitigation Strategy

Mitigation Goals	14-1
Goal 1	14-1
Goal 2	14-1
Goal 3	14-2
Goal 4	14-2
Goal 5	14-3

Section 15 – Mitigation Actions

Summary	15-1
Cameron County	15-3
City of Harlingen	15-17
County-Wide	15-115

Section 16 – Previous Actions

Summary	16-1
Cameron County	16-1
City of Harlingen	16-3

Section 17 – Plan Maintenance

Plan Maintenance Procedures	17-1
Monitoring and Evaluation	17-1
Updating	17-2

TABLE OF CONTENTS

Continued Public Involvement 17-5

Appendix A – Planning Team

Appendix B – Public Survey Results

Appendix C – Critical Facilities

Appendix D – Dam Locations

Appendix E – Meeting Documentation

Appendix F – Capability Assessment

SECTION 1: INTRODUCTION

Background	1
Scope.....	2
Purpose.....	3
Authority	3
Summary of Sections.....	4

Background

Cameron County is the southernmost county of Texas located in the Rio Grande Plains region of South Texas. The county, named for the Mier expedition member Captain Ewen Cameron, is bordered on the north by Willacy County, on the west by Hidalgo County, on the east by the Gulf of Mexico, and on the south by Mexico. The county's largest City and county seat is Brownsville. The Hazard Mitigation Plan described here, and referred to as the *Plan*, includes unincorporated Cameron County and the City of Harlingen.

Cameron County's history dates back to more than 10,000 years ago as suggested by artifacts dating back to the Archaic Period. Many battles have been fought on Cameron County's soil as this area was sought out by both the Mexican and United States Government. On February 12, 1848, the Texas legislature decreed the existence/founding of Cameron County. With the signing of the Treaty of Guadalupe-Hidalgo on July 4th, the area officially became part of the United States. The new county encompassed 3,308 square miles, including parts of the future Hidalgo, Willacy, Kenedy, and Brooks counties.



The Federal Emergency Management Agency (FEMA) defines mitigation as “any action taken to reduce or eliminate the long term risk to human life and property from natural hazards.¹” Mitigation differs from emergency preparedness and protective measures, which focus on activities designed to make communities more ready to take appropriate action in a disaster with emergency response and equipment. Mitigation activities involve alteration of physical environments to reduce risks and vulnerabilities to hazards and make it more cost-effective to respond to and recover from disasters.

Cameron County and its communities are susceptible to a wide range of natural hazards, including drought, hurricane wind, and flooding. 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 a hazard event from occurring, the impact of hazards can be lessened in terms of their effect on people and property through effective hazard mitigation planning and

¹ www.fema.gov

SECTION 1: INTRODUCTION

implementation. This Plan provides an opportunity for the Cameron County and the City of Harlingen to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

Figure 1-1. Overview of the Planning Area

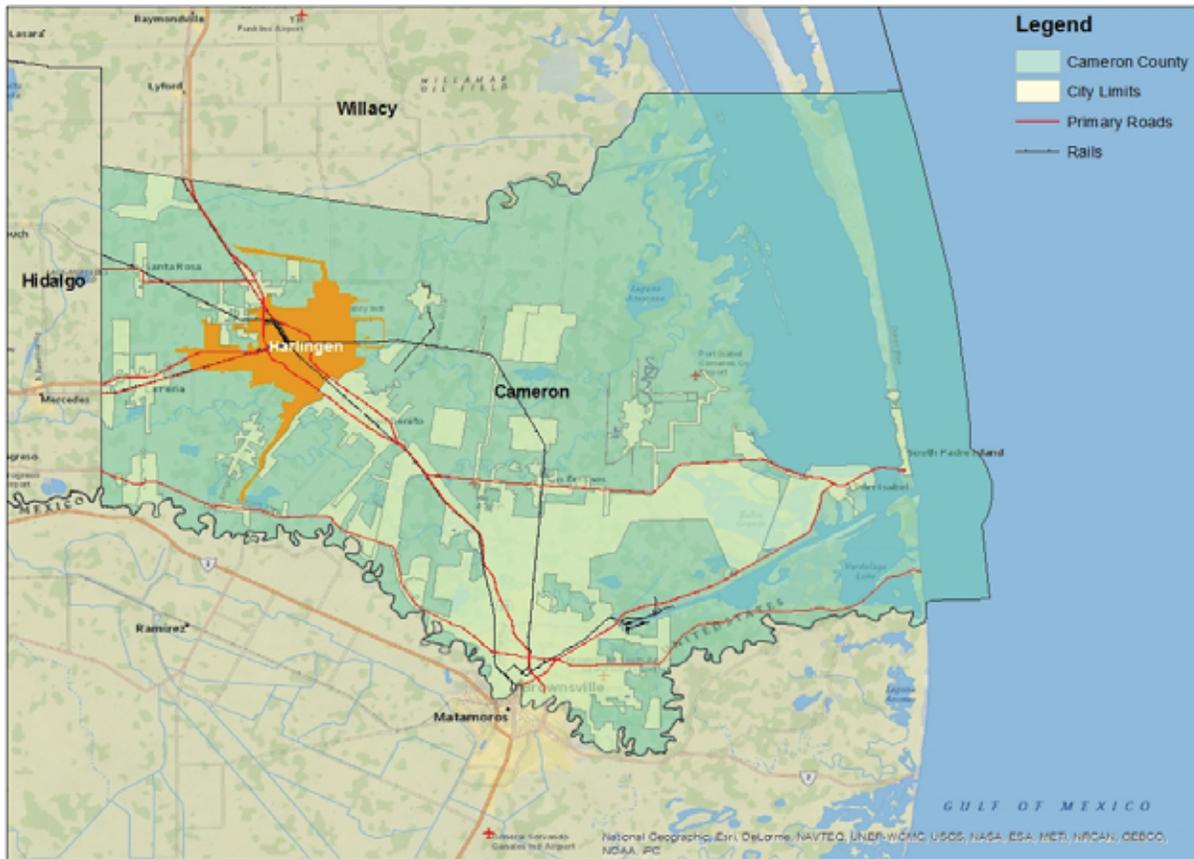


Table 1-1. Jurisdictions Participating in the Plan and Executive Planning Team

ENTITY	TITLE
Cameron County	Deputy Emergency Management Coordinator
Cameron County	Planner
City of Harlingen	Assistant City Manager
City of Harlingen	Engineer-in-Training

Scope

The focus of the Plan is to mitigate hazards that pose a risk to the planning area as determined through a detailed hazard risk assessment conducted for Cameron County and the City of Harlingen. This enables Cameron County and the City of Harlingen to prioritize mitigation actions based on hazards which are understood to present the greatest risk to lives and property.

SECTION 1: INTRODUCTION

Purpose

This Plan was prepared by Cameron County and H2O Partners, Inc. It is an opportunity for Cameron County and the City of Harlingen to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

In developing the Plan, Cameron County and the City of Harlingen identified nine natural hazards to be addressed. 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 mitigation actions. *Mitigation* is defined by FEMA as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects*. Therefore, the purpose of the Plan is to continue developing successful mitigation projects to bring together cities and other entities in order to reduce future risk of loss of life or damage to property in Cameron County.

Through this process, Cameron County and the City of Harlingen seek to:

- Assess any previous mitigation projects and develop unique mitigation strategies to meet future development and risks;
- Encourage improvements in floodplain management, participation in the National Flood Insurance Program (NFIP), and qualifying for FEMA's Community Rating System, thereby reducing flood insurance premiums for citizens;
- Devise solutions to strengthen emergency management by addressing moderate and high risk natural hazards; and
- Develop and implement a comprehensive Hazard Mitigation Action Plan for Cameron County.

Authority



The Plan will comply 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). It will also comply with FEMA's February 26, 2002 Interim Final Rule ("the Rule") at 44 CFR Part 201, which specifies the criteria for approval of mitigation plans required in Section 322 of the DMA 2000. Standards found in FEMA's "Local Mitigation Planning Handbook" (released March, 2013), and the Local Mitigation Plan Review Guide (October, 2011) served as additional resources.

SECTION 1: INTRODUCTION

Summary of Sections

Sections 1 and 2 of the Plan outline the purpose of the Plan and the process of development. Section 3 profiles the county, while Section 4 provides an overview of the people and property at risk and hazards facing the area, including the process of identification and risk assessment methodologies utilized.

Sections 5 through 13 present information on individual hazards. For each hazard, the plan presents a description of the hazard, the hazard extent, a history of historical hazard events, the probability of future occurrences, and the results of the vulnerability and risk assessment process.

Section 14 presents mitigation goals and objectives while Section 15 contains all of the newly developed mitigation actions for the Plan. Section 16 identifies previous mitigation actions relevant to the new Plan, and Section 17 addresses maintenance procedures including Plan incorporation and implementation.

Appendix A contains a list of the planning team and stakeholders. Public survey results are analyzed in Appendix B. A detailed list of critical facilities is located in Appendix C, and Appendix D contains a list of dam locations. Appendix E contains documentation of meetings in the form of sign-in sheets. The capabilities assessment of the County is located in Appendix F.

SECTION 2: PLANNING PROCESS

- Plan Preparation and Development 1
 - Overview of the Planning Process 2
 - Planning Team 2
 - Planning Process 3
 - Kickoff Workshop 3
 - Hazard Identification 4
 - Risk Assessment 4
 - Mitigation Review and Development 4
- Review and Incorporation of Existing Plans 5
 - Review 5
 - Incorporation of Existing Plans 6
 - Future Planning Mechanisms Aligned With Mitigation Goals 6
- Public and Stakeholder Involvement 8
 - Public Participation 9
 - First Series of Public Meetings 8
 - Second Series of Public Meetings 9
 - Third Series of Public Meetings 9
 - Fourth Series of Public Meetings 10
 - Public Participation Survey 10
 - Stakeholder Involvement 10
 - County-wide Community Contribution 10

Plan Preparation and Development

Mitigation planning involves bringing together multiple components and players to create more disaster-resistant communities. This section provides an overview of the planning process, highlighting key steps as well as providing a detailed description of how Stakeholders and the public were involved.

SECTION 2: PLANNING PROCESS

Overview of the Planning Process

Cameron County received funding under the Hazard Mitigation Grant Program (HMGP) to develop a FEMA-approved Hazard Mitigation Action Plan, also referred to as the *Plan*. Cameron County solicited bids and hired the consultant team, H2O Partners, Inc., to provide technical support and oversee the development of the Plan. In developing the Plan, the consultants used the October 1, 2011 FEMA Hazard Mitigation Planning Review Guide to create the Plan in accordance with the process as shown in Figure 2-1 below.



Cameron County, the City of Harlingen, and the consultant team met in April 2013 to begin organizing resources by identifying Planning Team Members and conducting a capability assessment.

Planning Team

Some of the responsibilities of the Planning Team included: completing capability assessment surveys, providing input regarding the identification of hazards, ranking hazards, identifying mitigation goals and developing new mitigation strategies.

Planning Team members, by Title, were asked to attend all workshops during the planning process. If the key contact for a participating entity or jurisdiction was unable to attend, H2O Partners or the County Emergency Management office contacted each Planning Team member by phone or email to discuss the following elements required in the Capability Assessment and for input into the planning process:

- Whether the goals of the Plan address current and expected conditions;
- Whether the nature/magnitude of risks have changed;
- Whether there are current resources appropriate for implementing the Plan;
- Whether implementation problems, such as technical, political, legal or coordination issues hinder development;

SECTION 2: PLANNING PROCESS

- Whether outcomes have occurred as expected; and
- How communities, agencies and partners participated in the implementation process.

Based on results of completed Capability Assessments, Cameron County and the City of Harlingen also described methods for achieving mitigation in the future by expanding on their existing capabilities. For example, colleges and universities may have a plan in place for evacuating students during a disaster, but no shelter-in-place in the event of a hurricane disaster. Input by participating colleges centered largely on mitigating future risk to tornadoes and hurricane wind by building safe shelters on campuses. The county and City of Harlingen developed mitigation actions for mitigating risk from potential flooding and levee failure of upstream flood control facilities owned by the Corps of Engineers. Sample mitigation actions developed with similar hazard risk by other jurisdictions 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.

In an effort to expand on their capability to achieve mitigation in the future, the county and City of Harlingen have included a county-wide action for upgrading their respective building codes and ordinances to require additional freeboard for new construction located in the potential inundation areas of the upstream flood control facilities in the event of levee breach. Both entities also addressed mitigating future drought by utilizing proposed detention ponds as a secondary water source in the event of an extreme drought period.

Planning Process

The process used to prepare this Plan included following the four major steps included in 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, the result of which was provided at the Risk Assessment Workshop. Based on Cameron County vulnerabilities, as well as their Planning Partner the City of Harlingen, specific mitigation strategies were discussed and created at the Mitigation Workshop. Finally, plan maintenance and implementation procedures were developed and are included with this Plan at Section 17. Documentation for participation at each workshop is found in Appendix E.

Kickoff Workshop

The Planning Team Kickoff Workshop was held in the City of Brownsville on May 7, 2013. The afternoon meeting was followed by a public meeting in the evening. An overview of the project was provided at a public meeting addressing the Cameron County Commissioner's Court on May 8. The initial meeting provided an opportunity to inform city and county officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities, and also to involve stakeholder groups, such as school districts and area businesses. 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

SECTION 2: PLANNING PROCESS

- Capability assessment survey for completion.

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team pertaining to various risks from a list of natural hazards affecting the planning area. Participants ranked hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The assessments were also used to set priorities for mitigation, based on potential dollar losses and loss of lives.

Hazard Identification

At the close of the Kickoff Meeting, and through a series of email and phone correspondences, the Planning Team identified hazards for inclusion in the Plan. The group reviewed and considered a full range of natural hazards for inclusion then narrowed the list to significant hazards by reviewing hazards affecting the area as a whole, the State of Texas Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the team identified a total of nine natural hazards that could affect the area.

Risk Assessment

An initial risk assessment for Cameron County was completed in August 2013 and the results were presented to Plan participants via webinar on August 28, 2013. The webinar link was provided to Cameron County and the City of Harlingen to post on their websites.

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 on 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.

A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 5 through 13 in this Plan.

Mitigation Review and Development

The mitigation strategy development for the Plan involved creating mitigation goals and new mitigation actions. Previous mitigation actions from the regional "Cover the Border" plan were also reviewed as a baseline for new actions, goals, and objectives for future mitigation planning.

A Mitigation Workshop was held on October 9, 2013 at the Cameron County Courthouse in Brownsville. As with the Risk Assessment Workshop, stakeholder groups were invited.

An inclusive and structured process was used to develop and prioritize new mitigation actions for this Plan, including the following steps:

- A "menu" of optional mitigation actions was developed based on plan reviews, studies, and interviews with federal, state, and local officials. The participants reviewed the optional mitigation actions, and narrowed the list down to those that were most applicable to their area of responsibility, most cost-

SECTION 2: PLANNING PROCESS

effective in reducing risk, could be implemented easily, and would be most likely to receive institutional and community support.

- The participants inventoried federal and state funding sources that could potentially assist in implementing the proposed 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 benefits that would result from the mitigation actions versus the cost of those projects. Detailed cost-benefit analyses were beyond the scope of this plan. However, economic evaluation was one factor that helped Planning Team Members select one mitigation action from competing actions.
- Planning Team Members then selected and prioritized mitigation actions.

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 of this exercise, an overall priority was assigned to each mitigation action by each Planning Team Member. The overall priority of each action is reflected in the mitigation actions found in Section 15.

Planning Team Members 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.

Mitigation actions identified in the process were made available to the Planning Team for review. In addition, the Plan will be made available for review and comment on both Cameron County and the City of Harlingen's website.

Review and Incorporation of Existing Plans

Review

A variety of existing studies, plans, reports, and technical information were reviewed as part of the planning process. Sources of the information included FEMA, the United States Army Corps of Engineers (USACE), the Texas Forest Service, National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the State Comptroller, the Texas State Data Center, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans.

Section 4 and the hazard-specific sections of the Plan summarize the findings from these information sources. Some of these documents, including those from FEMA, provided information on risk, existing mitigation actions currently underway, and ideas for possible future mitigation actions. Other documents, including those from NOAA, provided histories of disasters in the area. The USACE studies were reviewed for their assessment of risk and potential projects in the county. State Data Center documents were used to obtain population projections. Materials from FEMA and TDEM were reviewed for guidance on plan development

SECTION 2: PLANNING PROCESS

requirements. Jurisdictions included actions from the previous hazard mitigation action plan, and other plans. Review of the regional Drainage Study, Floodplain Management Plan, Storm Water Management Plan, and Wildfire Management Plans provided essential data for developing actions to implement and incorporate into the HMAP.

Incorporation of Existing Plans

Current projects and studies were utilized as a starting point for discussing mitigation actions among Planning Team Members. This information was also developed into a table for review by the Planning Team for an assessment on Cameron County and the City of Harlingen's capability. Previous hazard events, occurrences, and descriptions were identified through NOAA's National Climatic Data Center (NCDC). Results of past hazard events were found through searching the NCDC and included in Section 4 of this Plan. The City of Harlingen was instrumental in providing detailed historical analysis of past storm events. The preliminary results were also presented at the Risk Assessment Workshop in order to facilitate a discussion on risk to help participants appropriately rank hazards for their jurisdiction. Furthermore, these studies were used as a starting point for suggesting grant and mitigation activities based on flood-related funding availability. The State Comptroller materials were reviewed for county economic projections, which were also used to fully develop 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. The State of Texas Mitigation Plan, 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 State Plan was also used as a guidance document, along with FEMA materials, in the development of the Plan.

Future Planning Mechanisms Aligned With Mitigation Goals

The City of Harlingen has adopted a Comprehensive Plan which dictates long-term public policy in terms of transportation, utilities, land use, recreation, and housing. The County's Comprehensive Plan is under development.

The flat terrain of Cameron County naturally lends itself to the potential for drainage and flooding problems not associated with hurricane risk. Therefore, both the City and County have included multiple mitigation actions to address flooding, drainage, and erosion of earthen dams and levees. The Lower Rio Grande Valley Development Council (LRGVDC) promotes cooperation among local units of government and provides forums and opportunities for them to work with economic interests and citizen groups in order to improve the region's health, safety, and general welfare and to plan for future development. State law authorizes commissions like the LRGVDC to make studies and plans to guide unified, far-reaching development of a region, eliminate duplication, and promote economy and efficiency through coordinated development. In 2009, the LRGVDC published a Regional Drainage Study that outlined structural drainage and flood control measures throughout the region. The study was updated in 2011 and calls for improvements to USIBWC Floodways and the Arroyo Colorado,

"It is greatly felt that improvements need to be made with regards to the existing USIBWC Floodways /Arroyo Colorado, specifically in the matters of (1) operation and cooperation, (2) maintenance, and (3) improvements to the physical features of the flood control works. First, as previously stated, the

SECTION 2: PLANNING PROCESS

local governmental entities can use the floodways with pipe / gate structures through the floodway's levees; however, when the USIBWC has to use the floodways to control the Rio Grande during flood events, the gates to the levee structures are closed, and the local government entities must rely on pump structures to pump the water over the levees in order to utilize the floodway for drainage. The pumps, in lieu of an actual drainage channel or ditch, are primarily used to remove the water after the actual event and are more often than- not inadequate to handle the water efficiently during the flood event. Although the USIBWC has operations and procedures that are mandated through treaty with Mexico at an international level, it is felt that improvements are needed in the operations and procedures in an effort to accommodate and incorporate the needs of the local entities. The existing operations and procedures should be reviewed at the federal level and revised. And most importantly, when a storm or major event is imminent, any storm-specific procedures should be ultimately and timely published for the public and local government entities. Second, maintenance of the physical features of the floodways and the Arroyo Colorado is imperative. Although environmentally, it may appear problematic, it is recognized that silt build-up and plant growth in the channels and outfalls diminishes hydraulic efficiency and capacity. Additionally, the mechanical and structural features, such as the dams, levees, and gate structures must also be maintained. Third, improvements to the flood control works are of a paramount necessity. During 2009 -2011, the USIBWC, with funding from the American Recovery and Reinvestment Act of 2009 as well as major contributions from Hidalgo County, made improvements to the levee system in an effort to meet levee certification requirements. Not all of these improvements have been completed for the LRGV levee systems, including Cameron County, which are part of what is known as the USIBWC Lower Rio Grande Flood Control Project. And, as of the publish date of the LRGV Regional EAP, none of the improved levees have been certified by FEMA. Failure of these and other levees not to be certified would lead to portions of the LRGV (and primarily the major urban areas as well as low-income areas) to be designated flood zone. Failure to get the levees certified by FEMA and the construction of additional improvements could lead to eventual / major economic impacts to the LRGV residents and businesses. Finally, it is recognized that funding for the USIBWC has been limited in the past (typically to approximately \$10 million per year); however, this Plan supports advising the congressional leadership that additional funding is needed to operate, maintain, and improve the existing USIBWC Floodways / Arroyo Colorado."

The latest study includes specific measures to mitigate flooding and erosion, widen channels that connect communities, and repair weirs and bridges. A county-wide action is also included to construct a regional retention facility to reduce runoff and flooding.

Upstream of Cameron County is a system of flood-protection dams and levees operated and maintained jointly by the United States and Mexico to protect residents of Hidalgo, Cameron, Willacy Counties, and the State of Tamaulipas, Mexico. Recent studies have indicated a need to raise and rehabilitate portions of the levee system in order to meet the project's flood control objectives. At the kickoff and Mitigation Strategy workshops, neighboring communities, stakeholders, and the public had the following comments and input:

- Both Harlingen and Cameron County community officials express concern regarding potential dam failure of one or more portions of this system. As a result, a county-wide mitigation action is included

SECTION 2: PLANNING PROCESS

for development of a Memorandum of Understanding with neighboring communities to require the U.S. and Mexico uphold the responsibility to maintain the flood protection system.

- The general consensus of the group was also to include a public education action for evacuating downstream residents in the event of dam failure.
- Hurricane wind and tornado took center stage as stakeholders and citizens agreed that one or more dome shelters would be supported in the community as a safe shelter.
- Upgrading and expanding transportation corridors to be used as evacuation routes were favored, especially as the Lower Rio Grande Valley area continues to grow.
- Most community officials were cognizant of the need to build a second bridge from the mainland to South Padre Island to evacuate tourists in the event of hurricane. Prohibitive cost of the project however, may reduce community support.

These strategic planning tools are aligned with both Harlingen and Cameron County's annual budget, which is a critical tool in budgeting and prioritizing implementation of mitigation actions included in the Plan. The community's fiscal objectives are then aligned with the goal of the Hazard Mitigation Action Plan – to implement cost-effective mitigation actions and to minimize the costs of disaster response and recovery. A major element of fiscal responsibility as it pertains to mitigation strategy rests in the act of budgeting. Budgeting is the process of allocating resources and prioritizing needs of a local jurisdiction, school district, or other organization. In most cases, for a governmental entity, the budget represents the legal authority to spend money, and implied set of decisions by City or County administrators that matches resources with the entity's needs. As such, the budget is a product of the planning process, including mitigation planning and reducing risk from natural hazards. The annual budget review is an important tool in controlling and executing mitigation goals and objectives, and funding identified mitigation actions. Each jurisdiction, and the identified contact within each community participating in the Cameron County Plan, will participate in their local budgetary process for tracking identified mitigation actions, recommending prioritization for grant funding, and updating and maintaining the mitigation strategy developed for the Plan.

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

Public and Stakeholder Involvement

An important component of 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 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 hazards present in their community and take steps to reduce their impact.

SECTION 2: PLANNING PROCESS

Public Participation

Public involvement in the development of the Cameron County Hazard Mitigation Action Plan was sought at three separate periods of the planning process: (1) during the beginning of the planning process, and during the hazard identification stage of the Plan; (2) during mitigation development; and (3) prior to official plan approval and adoption. Public input was sought using three methods: (1) open public meetings; (2) survey instruments; and (3) making copies of draft Plan deliverables available for public review on the Cameron County website, as well as in government offices and public libraries. Four separate public meetings were held during the development of this Plan, as described below.

Reaching the segment of the public population without access to computers or the Internet was a consideration in garnering public support. Therefore, Cameron County contacted the local Channel 12 news station to develop a news story regarding the HMAP project, and asking for public support and completion of the public survey. Notices of public meetings, and information regarding the project were posted in the Valley Morning Star, a local news publication. Information regarding the HMAP project was also distributed at local public schools in an effort to reach parents, teachers, and students. Local libraries were also emailed information on the project to print out and place in a prominent location for the public to view. Public surveys were also distributed.

First Series of Public Meetings

Following the Kickoff workshop for stakeholders, area businesses, and schools on May 7, 2013, a public survey was posted to the Cameron County website as well as the City of Harlingen's website to provide background on the Plan and garner input from the public. The first series of open public meetings was held at the Cameron County Commissioner's Court in the City of Brownsville. This meeting was scheduled on the same day as the Planning Team kickoff Workshop. The meeting continued to further seek public and stakeholder input. Topics of discussion for this first meeting included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards.

Second Series of Public Meetings

A second open public meeting was held on October 9, 2013, at the Cameron County Commissioner's Court in the City of Brownsville. The meeting was scheduled in the evening to specifically seek public and stakeholder input. The meeting was advertised through a variety of means, including flyers at meeting locations and notices on Cameron County's website as well as the City of Harlingen's website and Facebook. Invitations were sent via e-mail to community members. Topics of discussion for this meeting focused on mitigation projects that would reduce risk to residents of the County and the City from those hazards identified and prioritized for each jurisdiction.

Third Series of Public Meetings

As an additional form of public outreach, H2O Partners addressed members of the Cameron County Commissioners' Court during the public segment of the bi-monthly Commissioners' Court hearing on October 10th. H2o Partners presented an overview of the project and the planning process. The meeting engaged County Commissioners and the public in a discussion regarding possible mitigation projects to consider

SECTION 2: PLANNING PROCESS

including in the Plan. Members of the Historical Commission and other County agencies were present. The bi-monthly Commissioners' meeting is open to the public, and recorded for broadcast on local television as well as the County Commissioners' website. The public survey in hard copy form was made available to all that were present at the meeting, and the website link was promoted for viewers at home.

Fourth Series of Public Meetings

The fourth series of open public meetings was held on October 10, 2013, at the Harlingen Cultural Arts Center in the City of Harlingen. This meeting was scheduled in the evening to specifically seek public and stakeholder input. The meeting was advertised through a variety of means, including a newspaper ad, flyers at meeting locations, notices on the Cameron County website as well as the City of Harlingen's website, and invitations sent via e-mail to community members. This meeting, along with the public meeting in Brownsville, was intended to provide residents the opportunity to attend at least one of the two meeting locations closest to their residence.

Topics of discussion for this meeting focused on mitigation projects that would reduce risk to residents of the County from those hazards identified and prioritized for each jurisdiction.

Members of the general public did attend each of the public meetings. Representatives from area civic organizations were present, as well as other interested citizens. The purpose of the plan and the planning process was described as a whole and lengthy discussion regarding hazards facing the county ensued. Public survey hard copies were distributed and attendees were asked to sign in.

Documentation of participation in meetings is found in Appendix E.

Public Participation Survey

In addition to the open public meetings, Cameron County and the City of Harlingen were able to solicit input from citizens and stakeholders through the use of a public participation survey. This survey was designed to obtain data and information from the residents of Cameron County. Planning Team Member communities distributed surveys at public forums and posted the survey on their community website. Copies of the Participation Survey were distributed by local officials and at public meetings. A total of 16 responses to the survey were completed, which provided valuable input in the development of the Plan. A summary of the survey findings is provided in Appendix B.

Stakeholder Involvement

Stakeholders provide an essential service in hazard mitigation planning; therefore, throughout the planning process, members of state and federal agencies, community groups, local businesses, schools, and hospitals were invited to workshops held throughout the planning process.

County-wide Community Contribution

Two other Hazard Mitigation Plans are currently underway or proposed in the Cameron County region. The Brownsville Public Utilities Board (BPUB), along with the City of Brownsville has recently kicked off their planning effort, and a separate coalition of approximately ten communities is applying for HMGP planning

SECTION 2: PLANNING PROCESS

funds to develop an HMAP in the coming months. With Cameron County jurisdictions sharing essentially the same natural hazards, an invaluable dynamic is occurring throughout the area in terms of mitigation planning objectives, sharing of knowledge, and development of county-wide mitigation actions that benefit all county residents. Cameron County officials and numerous other community leaders recently attended one or more area mitigation workshops to offer guidance and input into the planning process, and share ideas for maximizing HMGP dollars for county-wide projects to mitigate risk. A list of stakeholders who were invited and/or attended one or more area mitigation planning meetings may be found in Table 2-1.

Table 2-1. List of Stakeholders Invited/Attending Area HMAP Meetings

- Texas Gas Service
- Railroad Commission of Texas
- Texas Commission on Environmental Quality
- Cameron County Drainage Districts
- Brownsville Independent School District
- American Electric Power of Texas
- Texas A&M University, Brownsville (attended)
- Lower Rio Grande Valley Storm Water Task Force (attended)
- City of South Padre Island (attended)
- Harlingen Water Works (attended)
- Cameron County Bridge System (attended)
- Harlingen Housing Authority
- NOAA (attended)
- Kaplan College (attended)
- Texas National Guard (attended)
- Community Development Corporation (attended)
- Building Community Workshop (PNP) (attended)
- University of Texas Brownsville (attended)

SECTION 3: COUNTY PROFILE

Overview	1
Population and Demographics.....	2
Population Growth.....	3
Future Development.....	3
Economic Impacts.....	4
Existing and Future Land Use and Development Trends	5
Building Permits.....	5
Current Residential and Commercial Development Trends.....	6
Development Changes Affecting Hazard Risk and Vulnerability.....	6

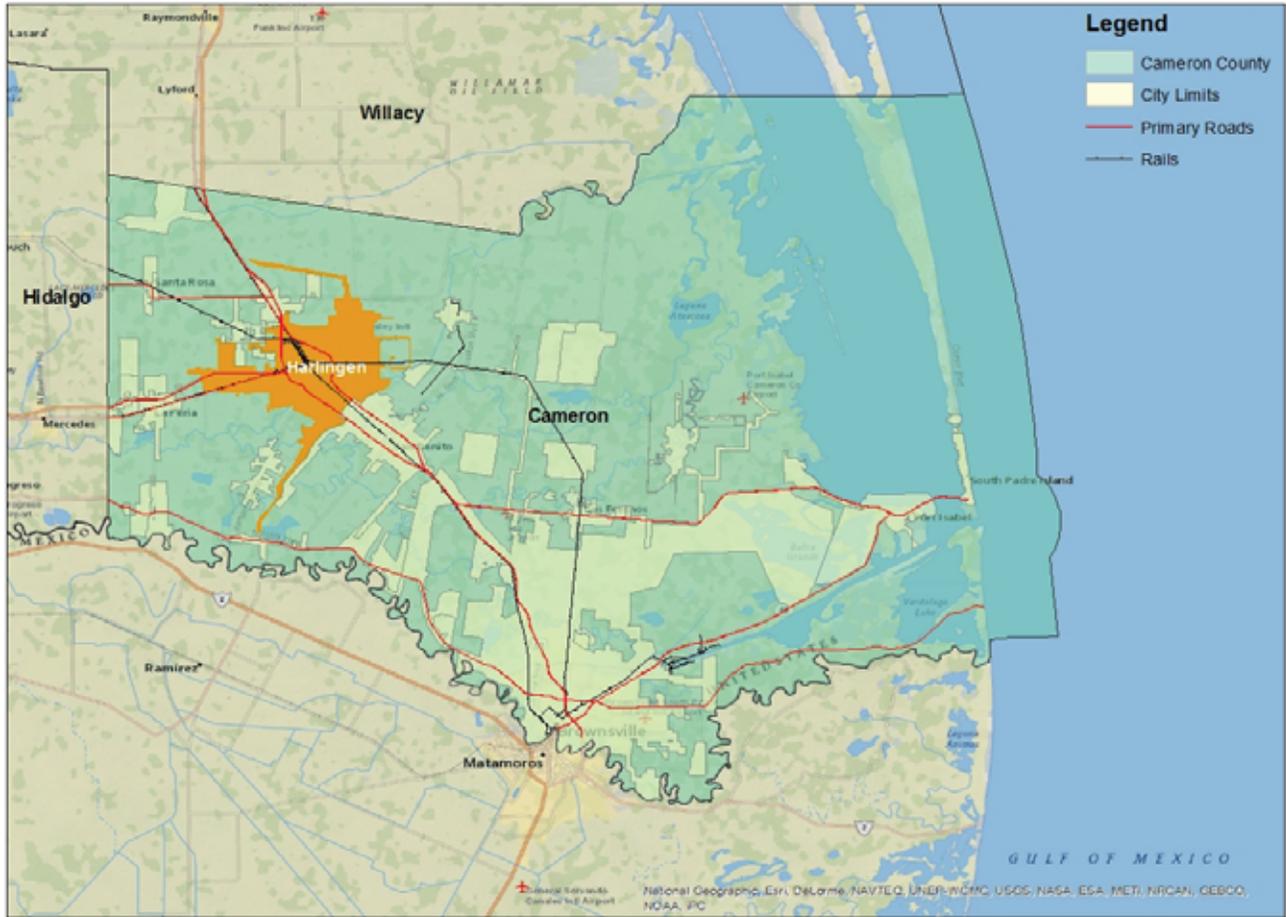
Overview

Cameron County extends over 1,276 square miles, of which 905 square miles are land area bordered by Willacy County to the north, the Gulf of Mexico to the east, Mexico to the South, and by Hidalgo County to the west. Cameron County has an aggregate population of 406,220 according to the 2010 U.S. Census Bureau. The City of Brownsville is the county seat. Cameron County includes part of the Laguna Atascosa National Wildlife Refuge, specializing in Northern Aplomado Falcons as well as other threatened and endangered species. This refuge also has programs that focus on vegetation and wetland restoration. The Lower Rio Grande Valley National Wildlife Refuge is partially located in Cameron County, which boasts numerous types of plants, vertebrates, and butterflies as well as eleven different biological communities. It is also home to Palo Alto Battlefield National Historic Site. The Battle of Palo Alto was the first major conflict in the border dispute that would eventually become the Mexican-American War.



SECTION 3: COUNTY PROFILE

Figure 3-1. Map of Cameron County Study Area



The map above, Figure 3-1, illustrates the extent of the study area that forms Cameron County. Provided in Table 3-1 below is a listing of the jurisdictions in Cameron County that participated in the Hazard Mitigation Plan.

Table 3-1. Participating Jurisdictions in the Study Area

PARTICIPATING JURISDICTIONS
Unincorporated Cameron County
City of Harlingen

Population and Demographics

Cameron County has a population of 406,220 according to the 2010 U.S. Census Bureau. The City of Harlingen is the third largest jurisdiction in Cameron County with 16.0 percent of the total population.

SECTION 3: COUNTY PROFILE

Unincorporated Cameron County makes up the second largest population with its population accounting for 24.7 percent of the County-wide population.

Table 3-2. Population Distribution by Jurisdiction

JURISDICTION	2010 POPULATION	PERCENTAGE	ESTIMATED SPECIAL NEEDS POPULATIONS	
			Elderly (Over 65)	Low Income (<= \$20,000)
City of Harlingen	64,849	16.0%	8,797	20,752
Unincorporated Cameron County	100,274	24.7%	9,207	39,465
TOTAL	165,123	40.7%	18,005	60,217

Population Growth

The jurisdiction of Harlingen exhibited a significant increase in population between 1980 and 2010 by 49.0 percent, and continued to have population growth between 2000 and 2010. Between 2000 and 2010, unincorporated Cameron County experienced a population loss of 12.1 percent.

Table 3-3. Population for Cameron County, 1980 – 2010

JURISDICTIONS	1980	1990	2000	2010	POP CHANGE 1980-2010	PERCENT OF CHANGE	POP CHANGE 2000-2010	PERCENT OF CHANGE
City of Harlingen	43,543	48,746	57,564	64,849	21,306	49.0%	7,285	11.2%
Unincorporated Cameron County	71,973	83,744	108,987	100,274	28,301	39.3%	-8,713	-12.1%
TOTAL	209,727	260,120	335,227	406,220	196,493	48.3%	70,993	21.1%

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 Institute for Demographic and Socioeconomic Research. Population projects were based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate that occurred during 2000-2010.

SECTION 3: COUNTY PROFILE

Table 3-4. Cameron County Population Projections

COUNTY	LAND AREA	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)
Cameron	905.76	406,220	448.5	465,569	514.0	531,850	587.2	599,356	661.7

Economic Impacts

The economy is vital to all infrastructures. Located in the City of Harlingen is the Harlingen Economic Development Corporation (HEDC). The HEDC's mission is to "to create wealth that improves the quality of life for the citizens of Harlingen." The HEDC has two main goals: 1) to assist in the attraction of new investment to Harlingen which aids in the creation of new job opportunities, and 2) to assist commercial developers planning large-scale projects in Harlingen. Cameron County has many qualities to offer including a highly skilled and educated workforce, a diverse economy including manufacturing, agriculture, and wholesale and retail trade services, and affordable living costs. Harlingen boasts the lowest cost of living in the United States; for the First Quarter 2013, it is ranked 7th in the nation.¹

Additionally, a critical portion of the economy lies within the major industries in Cameron County. With many being in the Brownsville-Harlingen Metropolitan area, the major employers are: Texas Southmost College, Kreppel AnFELS, Walmart, Convergys, United Healthcare, Pentair, Dish Network, Valley Baptist Medical Center, Advanced Call Center Technologies, United Launch Alliance, Penske Logistics, Valley International Cold Storage, Aloe Laboratories, Penn Aluminum, ITD Precision, and West Corporation.

It is important to recognize the transportation capability for Cameron County. There are two major interstates: Interstate 2, which is an east-west freeway from the Hidalgo County line to I-69E in Harlingen, and Interstate 69E, a north-south freeway from the US-Mexican border in Brownsville to the Willacy County line. The other major roadways are US 77, US 83, US 281, and State Hwy 4, Hwy 48, Hwy 100, and Hwy 107. Railways Union Pacific and Brownsville & Rio Grande International Railroad are located in and service the County. One international airport provides services to the county. Cameron County has two international shipping ports: Port Brownsville and Port Isabel. Several International Trade Bridges also help with international connectivity.

¹ <http://www.harlingenedc.com/economic-development/business-climate/>

SECTION 3: COUNTY PROFILE

Existing and Future Land Use and Development Trends

Due to its location, Cameron County is expected to continue as a major international trade hub. Cameron County, Foreign Trade Zone (FTZ) #62, is one of the largest FTZs in the United States and the largest in Texas.

The Cameron County Space Port Development Corporation formed in order to help facilitate establishing an aerospace industry in the County. Space Exploration Technologies (SPACEX) has named Cameron County the front runner in their quest to build a rocket launch site, despite competition from Florida, Georgia, and Puerto Rico.²

The Lower Rio Grande Valley Development Council (LRGVDC) promotes cooperation among local units of government and provides forums and opportunities for them to work with economic interests and citizen groups in order to improve the region's health, safety, and general welfare and to plan for future development. State law authorizes commissions like the LRGVDC to make studies and plans to guide unified, far-reaching development of a region, eliminate duplication, and promote economy and efficiency through coordinated development. The LRGVDC is a strategic partner in developing the Cameron County and City of Harlingen Hazard Mitigation Action Plan as they work in partnership with state and local governments, regional economic development districts, and public and private nonprofit organizations to recover from the economic impacts of natural disasters and the depletion of natural resources.

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 Cameron County that have been granted between 1990 and 2012. 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 assessed in this 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 and the data includes that for the years of 2011 and 2012 if available to demonstrate growth.

Table 3-5. County Residential Building Permits³

CAMERON COUNTY			
Year	Buildings	Units	Construction Cost
1995	1,745	2,025	\$102,043,524
2000	2,811	3,111	\$194,469,723
2005	3,211	3,694	\$300,826,541
2010	1,090	1,258	\$179,567,508

² <http://news.yahoo.com/coming-soon-spacex-rocket-launches-texas-spaceport-100838958.html>

³ <http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl>

SECTION 3: COUNTY PROFILE

CAMERON COUNTY			
2011	1,075	1,136	\$109,449,392
2012	1,065	1,154	\$112,897,740

Current Residential and Commercial Development Trends

Cameron County and the City of Harlingen's main economic sectors are agriculture, retail service, manufacturing industries, tourism, and commercial fishing. The City of Harlingen and the Rio Grande Valley have experienced steady growth as more businesses and companies realize the benefits of doing business near Mexico and the advantages of a lower cost of living.

County-wide, development trends indicate an increase in growth in the larger, urban cities, and a decrease in unincorporated areas of the county. For example, from 2011-2012, the City of Harlingen issued 82 new residential and 28 new commercial building permits.

Development Changes Affecting Hazard Risk and Vulnerability

With an increase in development comes a need to address the risk of natural hazards that affect an area. For Cameron County and the City of Harlingen, flooding and hurricane wind continue as one of the highest threats to people and assets. The topography, climate, and soils of the planning area are favorable for agriculture, irrigation, and urban development, but they also combine to make adequate drainage challenging. Potential flooding creates severe limitations for urban land uses. Historically, flooding has not been a widespread problem, although intense rainfall occurring in short periods of time will cause some shallow flooding of roadways and poorly drained areas. Major flooding conditions are associated with the landfall of hurricanes along the Gulf Coast of South Texas and Northern Mexico. Major flood damages have not typically been suffered in the Harlingen area, although the potential clearly exists. A goal of community officials in both Cameron County and the City of Harlingen is to ensure that future development is not allowed to encroach upon the identified flood hazard areas. However, since 2008, when the initial 'Cover the Border' HMAP was approved, there have not been any significant factors or development trends with a consequential effect or increase in overall risk and vulnerability to natural hazards.

SECTION 4: RISK OVERVIEW

Hazard Identification	1
Natural Hazards and Climate Change.....	3
Overview of Hazard Analysis.....	4
Building Values	5

Hazard Identification

This section begins the risk assessment, which also includes hazard profiles and vulnerability assessments found in Sections 5 through 13. The purpose of this section is to provide background information for the hazard identification process, as well as descriptions for the natural and technological hazards identified.

Upon a review of the full range of natural hazards suggested under FEMA’s planning guidance, Cameron County and the City of Harlingen identified nine natural hazards that are to be addressed in the Hazard Mitigation Action Plan, or *the Plan*. These hazards were identified through an extensive process utilizing input from planning team members, and a review of the current State of Texas Hazard Mitigation Plan (“State Plan”). Readily available online information from reputable sources such as federal and state agencies was also evaluated to supplement information as needed. Based on this review, eight natural hazards and one quasi-technological hazard (dam failure) were identified as significant, as shown in Table 4-1. This table also takes into the account local knowledge regarding frequency of occurrence and the potential impact of each hazard.

Atmospheric hazards are events or incidents associated with weather generated phenomenon. Atmospheric hazards identified as significant from Table 4-1 include: extreme heat, hail, thunderstorm, tornado, and hurricane wind.

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 includes flood and drought; those ranked as minimal include coastal erosion. Storm surge and high wind impacts due to hurricane wind, in part, contribute to eroding shorelines. Therefore, for the purposes of the risk assessment, the hazard Coastal Erosion is addressed as a sub-hazard to hurricane wind. The hazard wildfire is considered “other” since it is neither atmospheric nor hydrologic.

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

SECTION 4: RISK OVERVIEW

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION	FREQUENCY OF OCCURRENCE	POTENTIAL IMPACT
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.	Unlikely	Minor
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.	Highly Likely	Limited
Thunderstorm	A severe thunderstorm contains large damaging hail of 1 inch (2.7 cm) diameter or larger, and/or damaging winds greater than 58 mph (95 km/h or 50 knots) or greater. Isolated tornadoes are also possible but not expected to be the dominant severe weather.	Highly Likely	Limited
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 intensity, size, and duration of the storm.	Highly Likely	Limited
Hurricane Wind	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.	Highly Likely	Substantial
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.	Occasional	Limited
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, or shallow flooding.	Highly Likely	Minor

SECTION 4: RISK OVERVIEW

HAZARD	DESCRIPTION	FREQUENCY OF OCCURRENCE	POTENTIAL IMPACT
Coastal Erosion (sub-hazard to Hurricane Wind)	Coastal erosion is a hydrologic hazard defined as the wearing away of land and loss of beach, shoreline, or dune material as a result of natural coastal processes or manmade influences. Coastal Erosion is ranked as a minimal hazard risk in the State's HMAP; and for the purposes of this Plan, is addressed as a sub-hazard of Hurricane Wind.		
OTHER			
Wildfire	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.	Highly Likely	Limited
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.	Unlikely	Substantial

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, and also directly endangers property due to sea level rise and biological organisms due to habitat destruction.

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 fourfold in the past 200 years, from .5 millimeters per year to 2 millimeters per year. With a higher sea level, storm surges will be bigger and coastal erosion will accelerate.

Communities all along the Texas coast face similar futures, according to some scientists, and Texas is considered one of the more vulnerable states in the U.S, to both abrupt climate changes and to the abrupt impact of gradual climate changes.

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 the water resources, as Texas experienced during 2011-2012.

SECTION 4: RISK OVERVIEW

Texas also has thousands of miles of coastline that are highly vulnerable to the combined impact of sea-level rise and the potential increase of storm intensity. Paleoclimate records also show that the climate over Texas had large swings between periods of frequent mega-droughts and the periods of mild droughts that we are currently experiencing. We do not know clearly what caused them, but we can anticipate that such change could occur again and it might already be occurring.

Texas has one of the longest coastlines in America coupled with some of the highest rates of coastal erosion in the nation. Approximately 64 percent of the Gulf shoreline is considered to contain critical erosion areas, with 235 acres of Texas Gulf shoreline lost to erosion annually. That is equivalent to 178 football fields lost each year. Critical erosion data for 2010 indicates that Cameron County has an annual erosion rate of -2 to -25 feet per year.

Erosion is a serious hazard on the Texas coast. Many homes, highways, and commercial establishments along the coast are threatened by continual shoreline erosion. Several processes contribute to chronic (long-term) or episodic (storm-induced) shoreline erosion. These processes include climate, tides, relative sea-level change, subsidence, tropical storms, and the amount and rate of sediment supply. Coastal erosion affects both Gulf and bay shorelines, resulting in the loss of agricultural, industrial, residential land, critical infrastructure, and wetlands. Erosion is attributable to relative sea level rise and to the fact that sediment removal by wave energy exceeds that supplied to the beach by currents. Climatic changes (from wetter to drier) have decreased the volume of sediments carried to the Texas coast by rivers.

Overview of Hazard Analysis

This risk assessment was conducted using two distinct methodologies: HAZUS-MH (FEMA's loss estimation software) and a statistical approach. Each approach provides estimates of potential impact by using a common systematic framework for evaluation.

The HAZUS-MH risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) were modeled using the HAZUS-MH software to determine the impact (e.g., damages and losses) on the built environment. The HAZUS-MH software was used to estimate losses from the flood hazard.

HAZUS-MH is FEMA's standardized loss estimation software program built upon an integrated geographic information system (GIS) platform. This risk assessment applies HAZUS-MH to produce regional profiles and estimate losses for the flood hazard only.

Records retrieved from National Climatic Data Center (NCDC) and SHELDUS are reported for the named participating cities. Remaining records occurring in a named area in a county were considered in the total for county events and maximum recorded magnitude of event.

The risk assessment includes four general parameters that are described for each hazard: frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact.

SECTION 4: RISK OVERVIEW

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 4-2 and impact statements are defined in Table 4-3 below.

Table 4-2. Frequency of Return Statements

PROBABILITY	DESCRIPTION
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next 3 years.
Occasional	Event is probable in the next 5 years.
Unlikely	Event is probable in the next 10 years.

Table 4-3. 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/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least two weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and/or 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/or illnesses are treatable with first aid. Minor quality of life lost. 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 in order to find out the percentage of damage that each hazard can cause to the community.

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.

Building Values

Table 4-4 presents the asset distribution for the Cameron County and City of Harlingen planning area. Data was gathered from the 2010 U.S. Census Bureau for population and housing units. Building numbers and values were collected from HAZUS.

SECTION 4: RISK OVERVIEW

Table 4-4. Asset Distribution¹

JURISDICTION	POPULATION (2010)	HOUSING UNITS (2010)	TOTAL BUILDING COUNT	TOTAL BUILDING EXPOSURE (DOLLAR VALUES)
Cameron County	100,274	31,620	40,460	\$4,703,158,000
City of Harlingen	64,849	25,585	16,856	\$2,494,441,000

¹ Source: U.S. Census Bureau (2010), [Building Numbers & Values]: using RS Means construction valuations from 2006 to estimate the Building Values by Census geography.

SECTION 5: FLOOD

- Hazard Description 1
- Location..... 4
- Extent 8
- Historical Occurrences 11
 - Significant Events..... 13
- Probability of Future Events..... 15
- Vulnerability and Impact 15
- NFIP Participation 16
- Flood Risk Reduction and Education 17
- Prioritizing Mitigation Actions 18
- Repetitive Loss 18

Hazard Description

Floods generally result from excessive precipitation, and the severity of a flooding event is typically 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 surface. Generally, floods are long-term events that may last for several days.

The primary types of general flooding are inland and coastal flooding, which are profiled in this section. Cameron County and the City of Harlingen also experience inland or riverine flooding as a function/result of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Inland and coastal flooding areas result of natural flooding risk. However, the planning area is also exposed to human-caused potential flooding from a number of levees and flood control projects. As a major concern to community officials in both Cameron County and the City of Harlingen, and an important component in mitigating flood risk in the planning area, levee and flood control flooding is addressed in this section as well.

Inland Flooding

Inland and riverine flooding is natural and inevitable as it is the overbank flooding of rivers and streams, typically resulting from large-scale weather systems that generate prolonged rainfall over a wide geographic area. 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.

SECTION 5: FLOOD

Coastal Flooding

Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Flooding in the coastal environment can be further exacerbated by tidal influence in the low lying coastal areas. Higher tides will increase stream and river stage heights from the mouth while floodwaters rush in from upland areas. Flooding in coastal areas is defined by recurrence intervals and where flood zones are determined. Coastal flood zones consider velocity of wave action. FIRM Zone A, X, and X500 results are provided in this coastal and inland flood section.

Levee and Flood Control Flooding

Levees are designed to provide a specific level of protection and can be overtopped in larger flood events. Levees can and do decay over time and maintenance can be a serious challenge. When levees do fail, or are overtopped, they can fail catastrophically – the flood damage may be more significant than if the levee was not there. For these reasons, Cameron County residents affected by levees need to understand the flood risks they face and take steps to address them.

Role of the United States International Boundary and Water Commission (USIBWC)

The planning area's most basic flood control infrastructure, designed to protect against risks, is in desperate need of repair. In November 2006, the US International Boundary and Water Commission (USIBWC) "determined that all levees in Cameron and Hidalgo Counties to be non-certifiable due to USIBWC's inability to provide continuous structural integrity ...for all reaches, the absence of an officially adopted Operations and Maintenance Plan, and hydraulically deficient reaches."

It is greatly felt that improvements need to be made with regards to the existing USIBWC Floodways /Arroyo Colorado, specifically in the matters of (1) operation and cooperation, (2) maintenance, and (3) improvements to the physical features of the flood control works.

With regard to operation and cooperation, local governmental entities can use the floodways with pipe / gate structures through the floodway's levees; however, when the USIBWC has to use the floodways to control the Rio Grande during flood events, the gates to the levee structures are closed, and the local government entities must rely on pump structures to pump the water over the levees in order to utilize the floodway for drainage. The pumps, in lieu of an actual drainage channel or ditch, are primarily used to remove the water *after* the actual event and are more often than-not inadequate to handle the water efficiently *during* the flood event. Although the USIBWC has operations and procedures that are mandated through treaty with Mexico at an international level, it is felt that improvements are needed in the operations and procedures in an effort to accommodate and incorporate the needs of the local entities. The existing operations and procedures should be reviewed at the federal level and revised. And most importantly, when a storm or major event is imminent, any storm-specific procedures should be ultimately and timely published for the public and local government entities.

Maintenance of the physical features of the floodways and the Arroyo Colorado is imperative. Although environmentally, it may appear problematic, it is recognized that silt build-up and plant growth in the channels

SECTION 5: FLOOD

and outfalls diminishes hydraulic efficiency and capacity. Additionally, the mechanical and structural features, such as the dams, levees, and gate structures must also be maintained.

Improvements to the flood control works are of a paramount necessity. From 2009 to 2011, the USIBWC, with funding from the American Recovery and Reinvestment Act of 2009 as well as major contributions from Hidalgo County, made improvements to the levee system in an effort to meet levee certification requirements. Not all of these improvements have been completed for the Lower Rio Grande Valley (LRGV) levee systems, including Cameron County, which are part of what is known as the USIBWC Lower Rio Grande Flood Control Project. And, as of the publish date of the Lower Rio Grande Valley Development Council Regional Economic Adjustment Plan (EAP) for building disaster resilient communities, none of the improved levees have been certified by FEMA. Failure of these and other levees not to be certified would lead to portions of the LRGV (and primarily the major urban areas as well as low-income areas such as the colonias) to be designated FEMA flood zones. Failure to get the levees certified by FEMA and the construction of additional improvements could lead to eventual / major economic impacts to the LRGV residents and businesses.

Finally, it is recognized that funding for the USIBWC has been limited in the past (typically to approximately \$10 million per year); however, the EAP study supports advising the congressional leadership that additional funding is needed to operate, maintain, and improve the existing USIBWC Floodways / Arroyo Colorado and new Regional / Main Channels. Although many of the small areas and cities focus on their own drainage deficiencies, almost all of the interviewed entities, as well as residents that attended the public forums, felt that another major goal for regional drainage is to have multiple, independent outfalls that flow from the inner developed areas of the LRGV to the Laguna Madre independent of the USIBWC Floodways / Arroyo Colorado.

Another desired improvement of the entities was to create regional drainage and development standards. These standards would be enforced at both the city and county level, and these new regulations would at a minimum ensure that developers create positive drainage and refrain from building in the floodplain. The guidelines set in the standards would also ensure that all developments would be analyzed in the same manner, no matter the developer, and also ensures that all plans are evaluated in the same manner so as to create uniformity within the LRGV.

Historically, the majority of the LRGV was used for farming or ranching, and from those operations, miles of irrigation channels and pipes have been laid since the first irrigation district was founded in 1898. A large majority of the earthen channels that carry water from the river to settling/retaining basins and eventually to landowners for irrigation have seepage, overflow, and runoff ditches on one or both sides. The ditches that are near or in the recently developed areas are not being utilized to not only hold the water from the channel, but also carry the runoff from some of the developed land as well. The once inaccessible farming and ranch lands with above ground channels now have roads that range from 2 lanes to 6 lanes and require that some of the channels be converted to underground pipes. Once the channels have been moved underground, the ditches that are located in or around the cities and unincorporated areas are taken over by either the counties or cities, which then have the responsibility of daily operation. Since these ditches were designed for seepage, overflow, and field runoff, and typically are not preserved in the same manner as drainage ditches, the entity taking over the ditch must increase ditch capacity and ensure that the ditch has a final outfall, which some irrigation drain ditches do not.

SECTION 5: FLOOD

Location

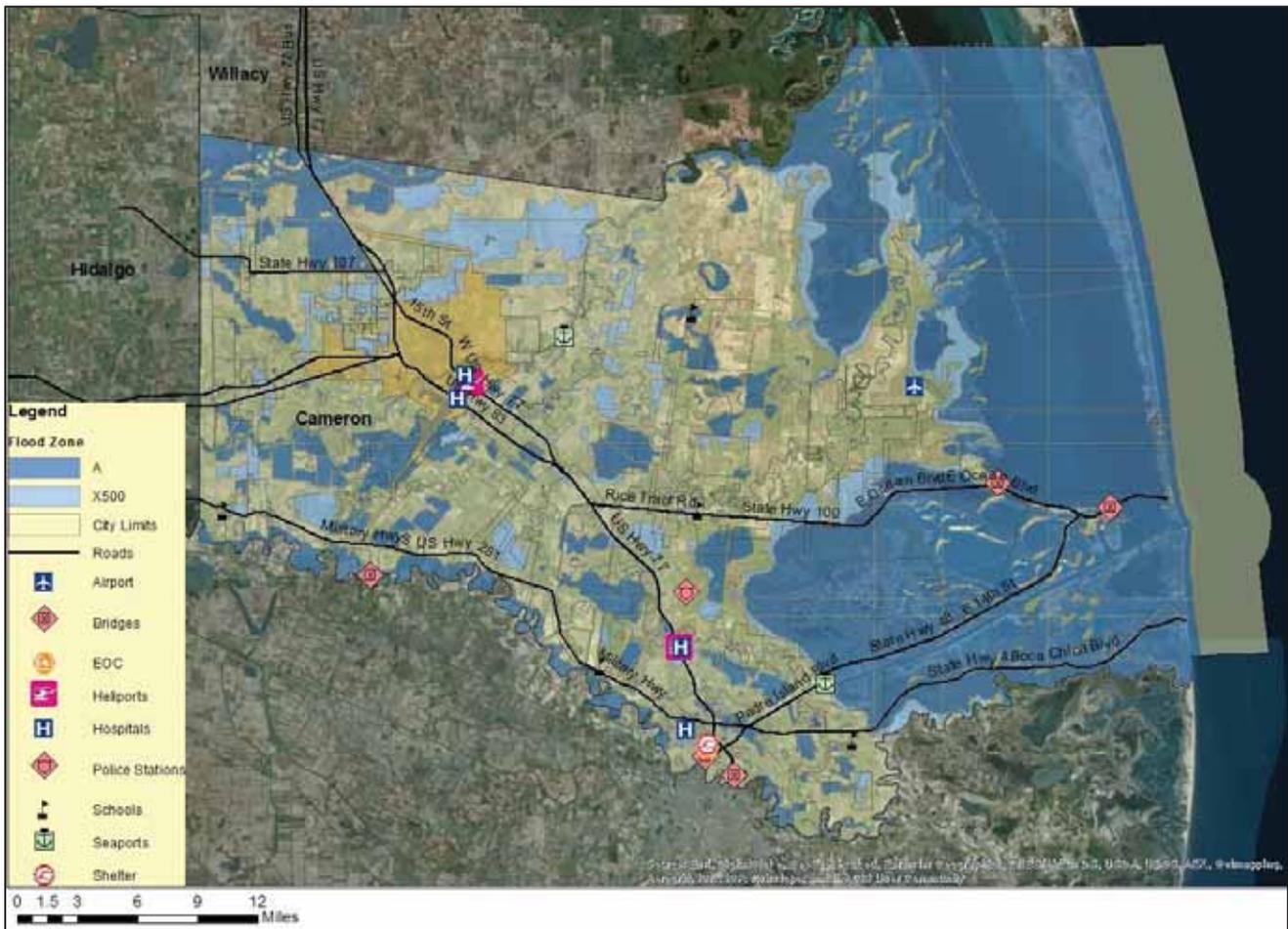
For mapping purposes, Digital Q3 Flood Data is also shown for Cameron County in Figure 5-1. The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Cameron County shows the following flood hazard areas:

- **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 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.
- **Zone X500:** 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.

Locations of flood zones in Cameron County based on the digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 5-1 through 5-4. The critical facilities located on the maps are facilities located within the flood zone.

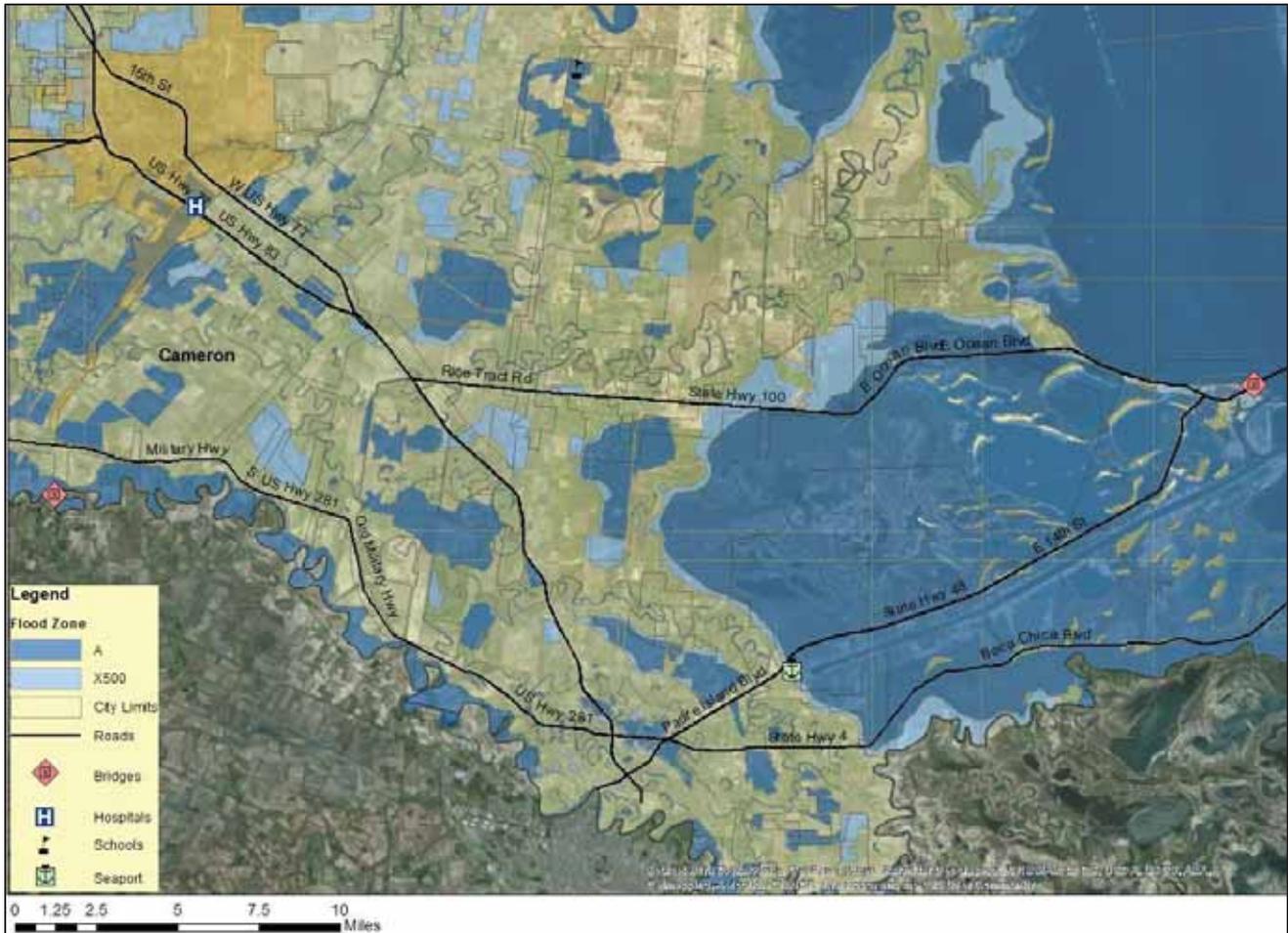
SECTION 5: FLOOD

Figure 5-1. Estimated Flood Zones in Cameron County



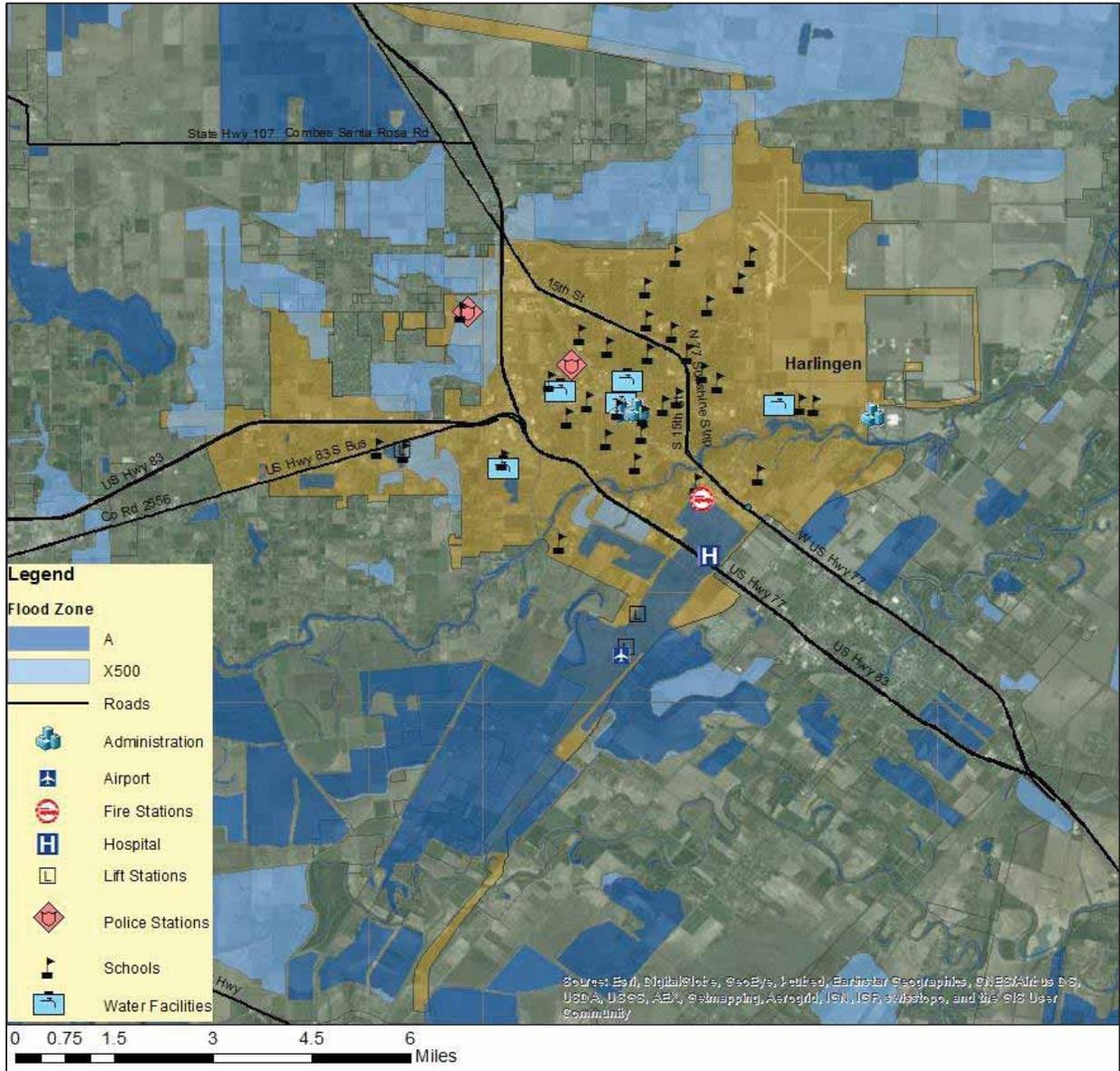
SECTION 5: FLOOD

Figure 5-2. Estimated Flood Zones in Cameron County, Critical Facilities Located in Flood Zones



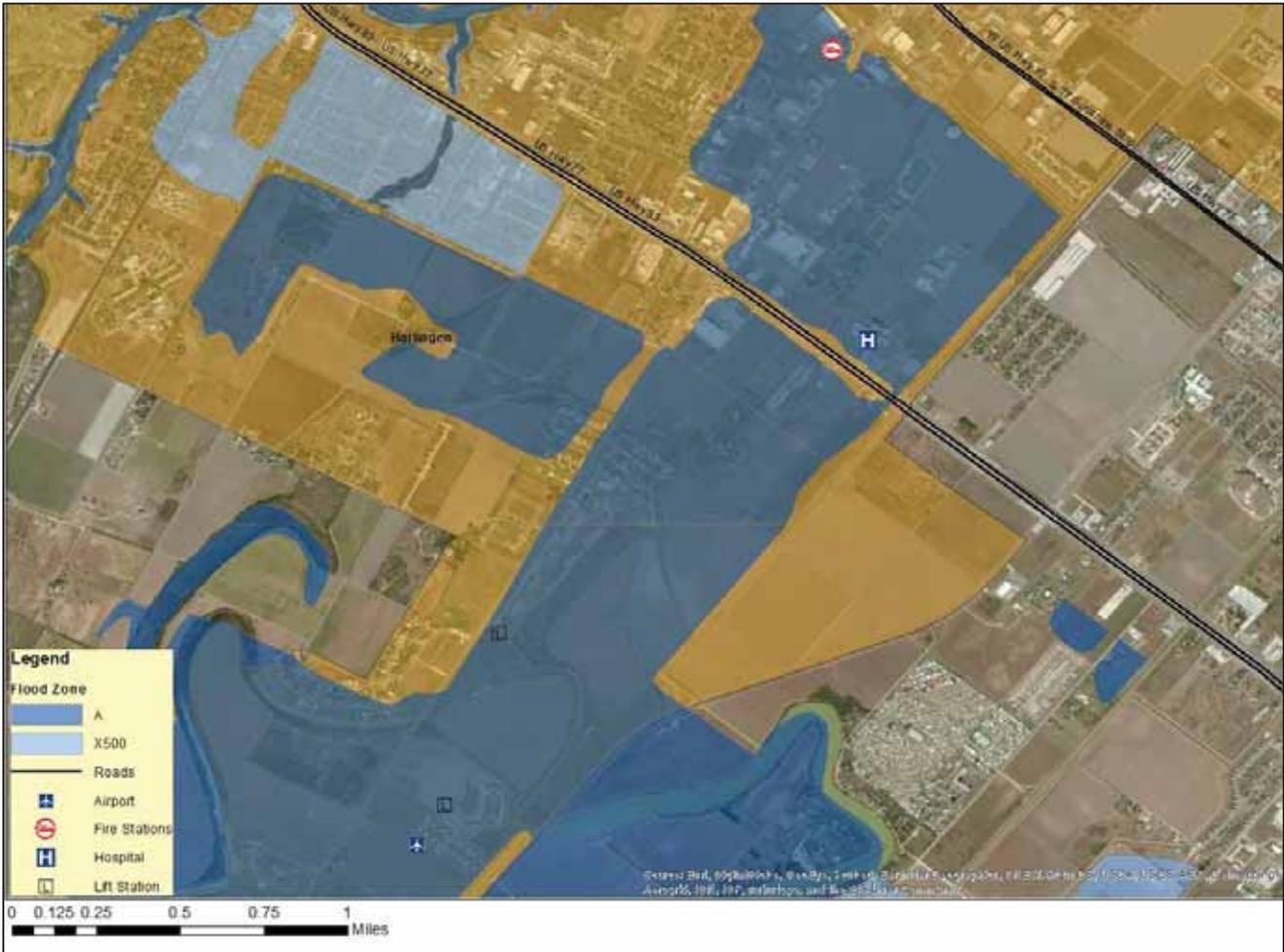
SECTION 5: FLOOD

Figure 5-3. Estimated Flood Zones in the City of Harlingen



SECTION 5: FLOOD

Figure 5-4. Estimated Flood Zones in the City of Harlingen, Critical Facilities Located in Flood Zones



Extent

The severity of a flood event is typically 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 surface. Floods resulting from excessive precipitation can be classified under two categories: 1) general floods, precipitation over a given river basin for an extended period of time combined with storm-induced wave or tidal action; or 2) flash floods, the product of heavy localized precipitation in a short time period.

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. 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 5-1 provides a description of FEMA flood zones and the flood impact in terms of severity or

SECTION 5: FLOOD

potential harm. Flood Zones A, X, and X500 are the only hazard areas mapped in the region. Figures 5-1 through 5-4 should be read in conjunction with the extent for flooding in Tables 5-1, 5-2, and 5-3 to determine the intensity of a potential flooding event.

Table 5-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1% annual chance of flooding and a 26% 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 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% 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% 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% 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% 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% 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.
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.

SECTION 5: FLOOD

Zone A is interchangeably referred to as the 100-year flood, the one-percent-annual chance flood, or the Special Flood Hazard Area (SFHA), or more commonly, the base flood. By any name, it is the area that will convey the base flood. This area constitutes a threat to the planning area.

Structures built in the Special Flood Hazard Area (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, if not elevated above Base Flood Elevation (BFE), may also be damaged.

In addition to the flood zones, extent is provided for the County in terms of depth of flood waters. Table 5-2 below describes the category of risk and potential magnitude of an event. The water depths depicted in Table 5-2 are an approximation based on elevation data (above sea level rather than above ground). Table 5-3 reflects extent associated with stream gauge data provided by the U.S. Geological Survey (USGS).

Table 5-2. Extent Scale – Water Depth (Mean Sea Level, MSL)

SEVERITY	MSL (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.
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.

SECTION 5: FLOOD

Table 5-3. Extent for Cameron County¹

JURISDICTION	ESTIMATED SEVERITY PER FLOOD EVENT ²	PEAK FLOOD EVENT
Cameron County	Major Flood Stage, 33 feet and above	Major Action Stage: Rio Grande near San Benito had floodwaters reach 61.05 feet in September 1967, as well as 33.24 feet near Brownsville in September 1942.
City of Harlingen	Action Stage, 16 to 23 feet	Action Stage: Arroyo Colorado reached 16.7 feet in Harlingen near Arroyo Park in September 2014.

The range of 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 “Major Flood Stage” as shown in Tables 5-2 and 5-3. Based on historical occurrences, Cameron County planning area could expect to experience from 6 inches up to 4 feet of water from storm surges, causing flooding effects within a 2 to 3 hour period, and the City of Harlingen could expect to experience from 8 to 12 inches of water within a 24 hour period.

Reading the Tables 5-1 through 5-3 together with Figures 5-1 through 5-4 provides estimated and potential magnitude and severity for the County. For example, the City of Harlingen, as shown in Figure 5-2, has areas designated as Zone A. Reading this figure in conjunction with Table 5-1 means that there is a high risk for flood in these areas.

Historical Occurrences

Historical evidence shows that areas within the 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 were factored into this risk assessment. It is likely that additional flood occurrences have gone unreported before and during this recording period. Tables 5-4 and 5-5 show historical incident information for Cameron County.

Table 5-4. Historical Flood Events by County, 1960-2012³

COUNTY	EVENTS	DEATHS	INJURIES
Cameron	76	1	0

¹ There is no data available for the City of Harlingen provided by USGS. Extent is based off severe weather updates provided by the NWS.

² Severity estimated by averaging floods at certain stage level over the history of flood events by county.

³ Source: NCDC and SHELDUS

SECTION 5: FLOOD

Table 5-5. Historical Flood Events for Cameron County Planning Area, 1960-2012⁴

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Countywide	10/28/1960	0	0	\$7,463	\$0
Countywide	5/7/1968	0	0	\$893	\$0
Countywide	7/1/1971	0	0	\$820	\$8
Countywide	8/9/1980	0	0	\$50,000,000	\$0
Countywide	8/9/1980	0	0	\$5,000,000	\$5,000,000
Countywide	11/12/1980	0	0	\$3,125	\$0
Countywide	4/30/1982	0	0	\$500,000	\$50,000
Countywide	2/25/1983	0	0	\$16,667	\$0
Countywide	7/15/1983	1	0	\$0	\$0
Countywide	9/18/1983	0	0	\$13,158	\$0
Countywide	9/16/1984	0	0	\$2,500,000	\$25,000
Countywide	9/18/1984	0	0	\$2,778	\$2,778
Countywide	9/29/1984	0	0	\$5,000	\$0
Countywide	10/19/1984	0	0	\$294,118	\$0
Countywide	9/30/1985	0	0	\$250,000	\$0
Countywide	11/24/1985	0	0	\$113,636	\$0
Countywide	2/6/1987	0	0	\$50,000	\$0
Countywide	4/5/1991	0	0	\$50,000,000	\$0
Countywide	10/30/1991	0	0	\$25,000	\$0
Countywide	1/26/1992	0	0	\$980	\$0
Countywide	10/11/1997	0	0	\$4,000	\$0
Countywide	10/13/1997	0	0	\$37,400	\$0
Countywide	9/19/2003	0	0	\$1,400,000	\$0
Brownsville	9/19/2003	0	0	\$25,000	\$0
Harlingen	10/7/2003	0	0	\$50,000	\$0
Countywide	10/13/2003	0	0	\$4,500,000	\$0
Brownsville	3/15/2004	0	0	\$25,000	\$0
San Benito	5/8/2004	0	0	\$2,000,000	\$0

⁴ Only recorded events with fatalities, injuries, and/or damages are listed.

SECTION 5: FLOOD

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Harlingen	5/25/2007	0	0	\$100,000	\$0
Harlingen	5/25/2007	0	0	\$20,000	\$0
Port Isabel	7/23/2008	0	0	\$42,750	\$37,500,000
Port Isabel	7/23/2008	0	0	\$42,750	\$37,500,000
La Feria	8/23/2008	0	0	\$5,000	\$0
La Feria	8/27/2008	0	0	\$1,000	\$0
Harlingen	4/16/2010	0	0	\$2,000	\$0
Rancho Viejo	6/30/2010	0	0	\$150,000	\$0
Port Isabel	6/30/2010	0	0	\$10,000	\$0
Rancho Viejo	7/1/2010	0	0	\$500	\$0
Santa Rosa	7/13/2010	0	0	\$100,000	\$100,000
Fernando	9/6/2010	0	0	\$0	\$10,000
Villa Nueva	9/19/2010	0	0	\$5,000,000	\$0
Maudlin Airport	6/30/2012	0	0	\$75,000	\$0
County Total		1	0	\$122,374,037	\$80,187,786

Significant Events

Flash Flood on June 30, 2012

A weak upper level disturbance, which had produced a few days of healthy thunderstorms in the western Gulf of Mexico during the final week of June, crossed the coast on June 30th and produced local downpours that flooded small portions of Cameron and Zapata/western Starr County. The disturbance combined with sea breeze influences and boundaries from activity across the Coastal Bend to enhance initial thunderstorms along the coast of eastern Willacy and Cameron County around noon. Heavy rain fell during the afternoon hours across Brownsville. Western and downtown portions of Brownsville were especially hard hit with rainfall totals over 5 inches reported by a spotter and CoCoRaHS reports. Flash floods closed several roads, overtopped resacas, and reached into properties near and in downtown. A trained spotter reported water in the streets and resacas out of their banks and over walls; this spotter also reported five inches of rain. A NWS employee reported that Price Road was impassible with at least a foot of water over it in western Brownsville. The Emergency Manager reported water in a few homes in downtown Brownsville and resacas getting high. The Emergency Manager also reported that Price Road was mostly closed, Boca Chica Blvd was closed in a few spots, and a few other streets were closed as well.

Flood on June 22, 2011 – City of Harlingen

From June 22nd into June 23rd, numerous showers and thunderstorms brought tropical downpours to the Rio Grande Valley, dumping more than 6 inches in some locations and creating urban flooding from McAllen to

SECTION 5: FLOOD

Harlingen, mainly in the usual low lying areas and poor drainage locations. Water levels in drain clogged neighborhoods had more than 3 inches fall in less than 2 hours both on the 22nd and 23rd and reached close to 3 feet, closing roads and seeping into a few properties. The torrential rains showed residents that the urban drainage systems in the river delta, Rio Grande Valley, can quickly become overwhelmed – even during an exceptional drought. Harlingen Valley International Airport also experienced wind gusts of 66 mph.

Flash Flood on September 19, 2010

Upper level energy, low level convergence, and a possible overnight low level jet stream of extremely moisture laden air from the Gulf of Mexico produced prolonged torrential rains across south central Cameron County between 3 and 8 AM CDT September 19th. The area shifted to the east and northeast between 8 and 9 AM CDT, but not before dumping 5 to 7 inches of rain from Brownsville to San Benito and creating extensive flooding, impacting perhaps 100 or more structures, particularly in poorly draining areas. Impacts included: Up to 60 homes with water incursion in Colonia Galaxia in West Brownsville along Military Highway; several homes with water in them in the nearby subdivision of Quail Hollow; 37 residents evacuated from 9 flooded homes in Laureles (2.5 miles northwest of Los Fresnos); and several homes flooded in the Green Valley Farms area along FM 510 near San Benito, including one location where 17 small mixed-breed dogs were rescued. Dozens of roads were closed temporarily or, in some cases, through the day. Notable closures included Paredes Line Road just north of Ruben Torres in Brownsville, Pablo Kisel near the Morrison Blvd. intersection in Brownsville, FM 1575 near/at State Highway 100 in Los Fresnos, and portions of State Highway 345 between San Benito and Rio Hondo. The Frontage Road near Price Road, along Federal Highway 77 in Brownsville had 2 to 3 feet of water well after the rains ended; notable poorly-draining roads in downtown Brownsville had similar high water. Though the rains ended between 9 and 10 AM CDT, significant poor-drainage flooding continued through 12 PM CDT and pockets of flooding remained into the morning of September 20th. Dozens of pump equipment were borrowed from Hidalgo County to assist with clearing water in poor drainage locations for the next few days.

Flood on September 23, 2008

A little before noon on the 23rd, the southern and western eyewall of Hurricane Dolly began to flare up, with radar data indicating reflectivity above 50 Dbz, which is indicative of blinding torrents of rain. These torrents, falling on top of already heavy rainfall earlier that morning, began to produce high water levels, likely 3 feet or more, starting in Port Isabel, Bayview, and Laguna Vista. Soon after the eyewall intensification, Dolly's center made landfall along the Cameron/Willacy County line, then very slowly edged west through southern Willacy County through the rest of the afternoon and evening, reaching the Hidalgo County line at around 9 PM CDT. Throughout the afternoon, blinding torrential rains persisted over northern and eastern Cameron County, and flash flooding of increasingly high water - as high as 5 feet in some places - spread west into Las Yescas, Rio Hondo, Harlingen, Combes, Santa Rosa, San Benito, and La Feria. Most of San Benito was under water at one point during the late afternoon. Measured and estimated rainfall totals in the flash flood areas from Dolly ranged from 14 to 18 inches, though there was one unconfirmed report of more than 20 inches along the Cameron/Willacy County line north of Rio Hondo. Hundreds of homes sustained some level of inundation, and farmland was inundated across the flood zone as well. High water and general flooding would continue for another day or two, persisting even longer in backed up drainage areas.

SECTION 5: FLOOD

Flash Flood on May 25, 2007 – City of Harlingen

Flash floods affected eastern portions of Deep South Texas during the evening hours of May 24th and into the early morning hours of May 25th. Thunderstorms with torrential rainfall then redeveloped during the afternoon and evening hours of May 25th. The hardest hit counties were Willacy and Cameron, with flooding also reported in Hidalgo County. Strong thunderstorms affected southwest Willacy County and northern Cameron County during the evening hours of May 24th and into the early morning hours on May 25th. Two to three inch rains were reported in northern Cameron County in Harlingen. Storms redeveloped during the afternoon hours on May 25th, and then affected many of the same areas that were hit hard the evening before. Heavy rains pounded an area extending northward from Harlingen to Raymondville, affecting areas in between such as Combes, Lyford, and Sebastian with flash flooding. Over the 24 hour period, much of that area experienced between 8-12 inches of total accumulated rains based on spotter reports, surface observations, and radar estimates. Valley International Airport at Harlingen set two new daily rainfall records during this episode. On the 24th, Harlingen received 2.73 inches of rain, breaking the previous daily record of 1.36 inches set back in 1985. On the 25th, 6.73 inches fell at Harlingen, breaking the previous daily record of 3.65 inches set back in 1959. The 6.73 inches falling on the 25th also set a new monthly daily record for the month of May. The previous record was 6.09 inches set on May 1st, 1959. Monthly rainfall total at Harlingen was 11.05 inches, which made it the 2nd wettest May on record, the wettest being May of 1982.

Flash Flood on April 5, 1991 – City of Harlingen

On the morning of April 5, 1991, the City of Harlingen experienced a 500 year flood event; 17 to 20 inches of rain fell in 6 hours. The event left many areas of Harlingen inundated including the airport, which was closed for several days. Over 4,000 homes were flooded and 3,000 cars were submerged. This event led to the passing of ambitious bonds to upgrade the drainage system.

Probability of Future Events

Based on recorded historical occurrences and extent, flooding is highly likely, meaning an event will occur in the next year for Cameron County.

Vulnerability and Impact

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

Cameron County encourages development outside of the floodplain, although there are some critical facilities, homes, and businesses already located in the floodplain. The critical facilities that are located in the floodplain and are vulnerable to flooding are Harlingen Medical Center, Las Yescas Elementary School, Free Trade International Bridge, Queen Isabella Causeway Bridge, and Port of Brownsville. The critical facilities that are vulnerable in the City of Harlingen are the Farmer's Co-op Airport, Harlingen Fire Department #4, Palm Boulevard Lift Station, 2601 South Ed Carey Drive/FM 801 Lift Station, and South Ed Carey Drive/Cottonwood Boulevard Lift Station.

SECTION 5: FLOOD

Historic loss estimates due to flood are presented in Table 5-6 below. Considering 76 flood events over a 52-year period, frequency is approximately two events every year. Annualized loss for the County over the same period is approximately \$5.6 million in property and crop damages.

Table 5-6. Potential Annualized Losses by Jurisdiction, 1960-2012

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS (2013 DOLLARS)	ANNUAL LOSS ESTIMATES (2013 DOLLARS)
City of Harlingen	13	\$200,265	\$3,851
Cameron County	76	\$292,725,868	\$5,629,344

The severity of a flooding event varies depending on the relative risk to citizens and structures located within each city. Table 5-7 depicts the level of impact for Cameron County and the City of Harlingen.

Table 5-7. Impact by Jurisdiction

JURISDICTION	IMPACT	DESCRIPTION
Cameron County	Minor	Cameron County could be injured or suffer illnesses, but not permanent disability. Critical facilities could be shut down for a week and 10 percent of total property could be damaged.
City of Harlingen	Limited	The City of Harlingen could have injuries and/or illnesses that are treatable with first aid. Critical facilities would be shut down for 24 hours or less and less than 10 percent of property destroyed or with major damage.

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. Both Cameron County and the City of Harlingen participate in the NFIP and have adopted ordinances to regulate the floodplain, or any land area susceptible to being inundated by water from any source. 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, the City of Harlingen is not participating in CRS.

Cameron County and the City of Harlingen, currently have in place minimum NFIP standards for new construction and substantial Improvements of structures, but are considering adopting higher regulatory NFIP standards. Additional freeboard would minimize flooding caused by flash flooding and many drainage issues as a result of the flat terrain typical of West Texas.

The flood hazard areas throughout Cameron 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.

SECTION 5: FLOOD

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.

As NFIP program participants, it is the purpose of the County and City of Harlingen to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by 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, and 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, Cameron County and the City of Harlingen follow these guidelines:

- Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, or 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;
- 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.

Flood Risk Reduction and Education

Cameron County and the City of Harlingen have also developed mitigation actions that relate to NFIP public education, flood mitigation, and higher regulatory standards. These actions can be found in Section 16.

Flooding was identified by the majority of the counties as a high risk hazard during hazard ranking activities at the Risk Assessment Workshop. 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. The City of Harlingen recognizes the need for higher NFIP regulatory standards to further minimize flood risk in their community. They are also focusing on NFIP public awareness activities, which include promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places.

SECTION 5: FLOOD

FEMA's Community Rating System (CRS) is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, the City of Harlingen is not participating in CRS, but has included a mitigation action to join the CRS program in the future.

Cameron County and the City of Harlingen have developed new mitigation actions that relate to NFIP compliance and public education. Flooding was identified as a high risk hazard during hazard ranking activities at the Risk Assessment Workshop. Flash flooding is inherently a problem throughout the Cameron County area due to the flat terrain and poor drainage. Planning workshops included discussions to consider higher regulatory standards for NFIP communities to require additional freeboard for new construction. As a result of these discussions, many of the mitigation actions were developed with flood mitigation in mind.

The City of Harlingen has already begun efforts to educate school-age children in the public schools about mitigating flood risk through structural and non-structural measures. Plans include working with the Texas Floodplain Management Association to promote the Flood Safety Education and Outreach Program directed towards Texas school children and parents. The primary tool of the program is the Stormwater Floodplain Simulation System. This is a dynamic hands-on simulation model that provides a visual representation of watersheds and floodplains. Additional education includes promoting the "Turn Around, Don't Drown" program.

Many of the flood mitigation actions included in Section 16 address reducing flood risk through structural alterations of culverts, drainage ditches, and drainage channels. County-wide actions include adding regional retention ponds to reduce runoff and capture flood waters, and development of a Master Flood Protection plan in Drainage District #5. A regional drainage project developed by the Lower Rio Grande Development Council recommends specific flood mitigation projects, including expanding culverts and widening drainage areas, and structural measures to minimize bank erosion due to flooding throughout Cameron County.

Prioritizing Mitigation Actions

The prioritization method for implementing actions was based on FEMA's STAPLEE criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result of this exercise, an overall priority was assigned to each mitigation action by each Team Member. The overall priority of each action is reflected in the mitigation actions found in Section 16 for the participating jurisdictions. In prioritizing actions a community must consider many factors. Of primary consideration is targeting specific mitigation actions for implementation following a major disaster. Other factors that determine prioritization are, in part, ease of implementation by the community, cost of the project vs. perceived benefit, timeframe for implementing the action, and available personnel to oversee and implement the project.

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

SECTION 5: FLOOD

to severe repetitive loss 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 four flood related damage claim payments (building and contents) over \$5,000.00 each, and the cumulative amount of such claims payments exceed \$20,000; or
- have made at least two separate claim payments (building payments only) with the cumulative amount of the building portion of such claims exceeding the market value of the building.

In either scenario, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.⁵ Table 5-8 shows repetitive loss and severe repetitive loss properties for the county.

The Texas Water Development Board provided loss information for Cameron County and the City of Harlingen.

Table 5-8. Repetitive Loss and Severe Repetitive Loss Properties

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID
Cameron County	NO	SINGLE FMLY	2	\$42,855.72
Cameron County	NO	SINGLE FMLY	2	\$8,755.94
Cameron County	YES	SINGLE FMLY	3	\$139,665.29
Cameron County	YES	SINGLE FMLY	2	\$54,962.02
Cameron County	NO	SINGLE FMLY	2	\$6,195.49
Cameron County	NO	SINGLE FMLY	2	\$9,289.46
Cameron County	NO	SINGLE FMLY	2	\$44,366.31
Cameron County	NO	SINGLE FMLY	5	\$44,917.38
Cameron County	NO	SINGLE FMLY	5	\$77,670.60
Cameron County	NO	SINGLE FMLY	2	\$21,665.31
Cameron County	YES	SINGLE FMLY	2	\$9,673.03
Cameron County	NO	SINGLE FMLY	2	\$73,179.57
Cameron County	NO	SINGLE FMLY	2	\$70,432.21
Cameron County	NO	SINGLE FMLY	4	\$26,621.17
Cameron County	NO	SINGLE FMLY	2	\$9,200.22

⁵ Source: Texas Water Development Board

SECTION 5: FLOOD

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID
Cameron County	NO	SINGLE FMLY	3	\$19,540.65
Cameron County	YES	SINGLE FMLY	3	\$18,581.50
Cameron County	NO	SINGLE FMLY	3	\$38,207.53
Cameron County	NO	SINGLE FMLY	2	\$27,046.81
Cameron County	NO	SINGLE FMLY	2	\$41,709.83
Cameron County	YES	SINGLE FMLY	2	\$60,124.79
Cameron County	NO	SINGLE FMLY	2	\$9,540.21
Cameron County	YES	SINGLE FMLY	2	\$24,728.09
Cameron County	NO	SINGLE FMLY	2	\$13,321.47
Cameron County	NO	SINGLE FMLY	2	\$30,902.16
Cameron County	NO	SINGLE FMLY	2	\$44,299.74
Cameron County	NO	SINGLE FMLY	2	\$5,732.72
Cameron County	NO	NON RESIDNT	2	\$27,526.80
Cameron County	NO	SINGLE FMLY	2	\$12,693.57
Cameron County	NO	SINGLE FMLY	2	\$114,587.53
Cameron County	NO	SINGLE FMLY	2	\$18,732.92
Cameron County	NO	SINGLE FMLY	2	\$2,661.84
Cameron County	NO	SINGLE FMLY	2	\$19,612.41
Cameron County	NO	SINGLE FMLY	2	\$116,782.79
Cameron County	NO	SINGLE FMLY	2	\$5,561.94
Cameron County	NO	SINGLE FMLY	2	\$3,410.71
Cameron County	NO	SINGLE FMLY	2	\$5,295.05
Cameron County	NO	SINGLE FMLY	2	\$58,857.85
City of Harlingen	NO	SINGLE FMLY	2	\$4,423.02
City of Harlingen	NO	SINGLE FMLY	2	\$13,348.47
City of Harlingen	NO	SINGLE FMLY	2	\$6,843.04
City of Harlingen	NO	SINGLE FMLY	7	\$55,429.39
City of Harlingen	YES	SINGLE FMLY	3	\$100,776.72
City of Harlingen	YES	SINGLE FMLY	2	\$4,147.12
City of Harlingen	NO	SINGLE FMLY	3	\$26,529.88
City of Harlingen	YES	SINGLE FMLY	3	\$85,487.54

SECTION 5: FLOOD

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID
City of Harlingen	NO	SINGLE FMLY	2	\$25,720.55
City of Harlingen	NO	SINGLE FMLY	2	\$30,234.31
City of Harlingen	NO	SINGLE FMLY	3	\$65,790.19
City of Harlingen	NO	SINGLE FMLY	2	\$3,986.78
City of Harlingen	NO	SINGLE FMLY	2	\$13,312.71
City of Harlingen	NO	SINGLE FMLY	2	\$8,160.84
City of Harlingen	NO	SINGLE FMLY	2	\$49,428.93
City of Harlingen	NO	SINGLE FMLY	3	\$17,628.87
City of Harlingen	YES	SINGLE FMLY	4	\$57,788.37
City of Harlingen	NO	NON RESIDNT	3	\$110,065.99
City of Harlingen	NO	SINGLE FMLY	2	\$11,652.75
City of Harlingen	NO	NON RESIDNT	2	\$12,958.22
City of Harlingen	NO	NON RESIDNT	2	\$71,248.17
City of Harlingen	NO	NON RESIDNT	2	\$31,680.41
City of Harlingen	NO	NON RESIDNT	2	\$35,194.09
City of Harlingen	SDF	NON RESIDNT	7	\$367,148.37
City of Harlingen	NO	NON RESIDNT	2	\$19,902.00
City of Harlingen	NO	NON RESIDNT	2	\$318,376.87
City of Harlingen	NO	NON RESIDNT	2	\$232,101.05
City of Harlingen	SDF	NON RESIDNT	4	\$400,682.96
City of Harlingen	NO	SINGLE FMLY	2	\$20,451.62
City of Harlingen	NO	SINGLE FMLY	2	\$43,093.92
City of Harlingen	NO	SINGLE FMLY	2	\$26,497.05
City of Harlingen	NO	SINGLE FMLY	2	\$45,971.42
City of Harlingen	NO	SINGLE FMLY	3	\$78,500.32
City of Harlingen	NO	SINGLE FMLY	2	\$25,831.95
City of Harlingen	NO	SINGLE FMLY	2	\$39,912.08
City of Harlingen	NO	NON RESIDNT	3	\$57,903.98
City of Harlingen	NO	NON RESIDNT	2	\$37,811.68
City of Harlingen	YES	SINGLE FMLY	2	\$55,077.02
City of Harlingen	NO	SINGLE FMLY	2	\$14,102.31

SECTION 5: FLOOD

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID
City of Harlingen	NO	SINGLE FMLY	2	\$57,667.77
City of Harlingen	YES	SINGLE FMLY	2	\$56,791.52
City of Harlingen	YES	SINGLE FMLY	3	\$8,819.07
City of Harlingen	NO	SINGLE FMLY	2	\$59,637.65
City of Harlingen	NO	SINGLE FMLY	3	\$23,548.52
City of Harlingen	NO	OTHER RESID	2	\$13,073.36
City of Harlingen	YES	NON RESIDNT	2	\$21,826.16
City of Harlingen	NO	SINGLE FMLY	2	\$8,395.35
City of Harlingen	NO	SINGLE FMLY	9	\$63,509.36
City of Harlingen	NO	SINGLE FMLY	2	\$32,222.13
City of Harlingen	YES	SINGLE FMLY	2	\$5,051.29
City of Harlingen	YES	SINGLE FMLY	2	\$58,787.51
City of Harlingen	NO	NON RESIDNT	2	\$24,839.25
City of Harlingen	YES	OTHER RESID	2	\$9,811.75
City of Harlingen	NO	OTHER RESID	2	\$30,619.20
City of Harlingen	NO	SINGLE FMLY	2	\$7,351.02
City of Harlingen	NO	SINGLE FMLY	2	\$32,524.31
City of Harlingen	NO	NON RESIDNT	2	\$19,293.05
City of Harlingen	NO	NON RESIDNT	2	\$4,709.15

SECTION 6: DROUGHT

Hazard Description	1
Location.....	2
Extent	2
Historical Occurrences	3
Significant Past Events	4
Probability of Future Events.....	5
Vulnerability and Impact	6

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.

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 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.

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.

¹ Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

SECTION 6: DROUGHT

Location

Droughts occur regularly throughout Texas, Cameron County, and the City of Harlingen, and are a normal condition. However, they can vary greatly in their intensity and duration. There is no distinct geographic boundary to drought; therefore, it can occur throughout the Cameron County planning area equally.

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 the magnitude of drought while Table 6-3 describes the classification descriptions.

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

² Source: National Drought Mitigation Center

SECTION 6: DROUGHT

CATEGORY	DESCRIPTION	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
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 U.S. Indicators correspond to the intensity of drought.

Based on the historical occurrences for drought and the location of Cameron County and the City of Harlingen in the Rio Grande Plains, the planning area can anticipate a range of drought from moderate drought to exceptional drought, or D1 to D4, based on the Palmer Drought Category.

Historical Occurrences

Cameron County may typically experience a severe drought. Tables 6-4 and 6-5 list historical events that have occurred in Cameron County as reported by the National Climatic Data Center (NCDC) and SHELDUS. Historical drought information, as provided by the NCDC and SHELDUS, shows drought activity across a multi-county forecast area for each event, therefore drought data for the City of Harlingen is included with Cameron County data. 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.

Table 6-4. Historical Drought Years, 1950-2012

DROUGHT YEAR
1977
1989
1996
2000
2001
2002
2003
2008
2009
2011
2012

SECTION 6: DROUGHT

DROUGHT YEAR
2013
13 unique events

Table 6-5. Historical Drought Events for Cameron County Planning Area, 1950-2012³

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Cameron County	5/1/1977	Unknown	0	0	\$7,042	\$70,423
Cameron County	1/1/2001	D1	0	0	\$0	\$9,880,000
Cameron County	8/18/2009	D3	0	0	\$0	\$20,700,000
Cameron County	6/1/2011	D4	0	0	\$0	\$1,830,000
Cameron County	8/23/2011	D2	0	0	\$0	\$4,650,000
County Totals			0	0	\$7,042	\$37,130,423

Significant Past Events

March 1, 2013

Extreme to exceptional drought conditions continued to spread across all of Deep South Texas and the Rio Grande Valley during the second half of March. A few isolated showers on March 16th and 20th provided patchy light rain. While pockets of Cameron County received light rain on a few occasions during the latter half of March, (the ASOS at KBRO reported only 0.02 inches for the second half of month, while the ASOS at KHRL reported only 0.05 inches), it was not enough to keep drought conditions at bay or to allow for any improvements. Drought conditions intensified across the far western side of the county, where exceptional (D4) drought conditions had nosed in. The vast majority of the county remained in extreme (D3) drought conditions.

August 23, 2011

Hot, rain free, and breezy weather from the 9th through the 24th brought an end to the temporary relief that Hurricane Don had brought at the end of July near the coast. Severe (D2) Drought conditions developed across the northern and eastern two thirds of Cameron County near the end of the month of August as dry conditions and a lack of rainfall continued across the county. While some rainfall returned to these areas, particularly on the 25th, 26th, and 31st, it was not enough to recover rainfall back toward the climatological averages, which typically increase by month's end. Preliminary insured damage and production loss to cotton, corn, and sorghum crops totaled more than \$4.5 million for the second reporting period (late July through the end of August).

³ Only recorded events with fatalities, injuries, and/or damages are listed.

SECTION 6: DROUGHT

June 1, 2011

The combination of zero rainfall, increasingly hot temperatures, higher sun angle, frequent gusty winds, and resultant low humidity maintained/spread extreme (D3) to exceptional (D4) drought across all of Deep South Texas and the Lower Rio Grande Valley for the balance of June. Rains arrived in the Lower Rio Grande Valley and spread a bit into the Brush Country and Rio Grande Plains on the 22nd and 23rd, but did little to dent the drought by the 28th except in local spots, particularly from eastern Hidalgo into western Cameron and western Willacy County. More prodigious rains associated with outer bands from Tropical Storm Arlene (June 30th/July 1st) would finally dent the drought in the Lower Valley to begin July. Exceptional (D4) Drought conditions covered all but the northern quarter of Cameron County through June 20th; Extreme (D3) Drought conditions continued across these areas (Combes to Arroyo City) through June 20th before moving to Exceptional to close out the month. Across the County, the withering drought torched most dryland crops, particularly un-irrigated corn. Grasslands turned brittle and brown and failed to grow (short). In all, more than \$1.8 million of insured losses to cotton, corn, and sorghum was reported by the Texas AgriLife Extension Service in Weslaco. Ranchers may have been sold livestock, unable to provide sufficient feed. Livestock loss data was unavailable. Locally heavy rainfall on June 22nd and 23rd began a slow process of dialing back the drought, as 4 to nearly 6 inches fell from Brownsville to Harlingen and points west. Torrential, tropical rains from outer rain bands of Tropical Storm Arlene would put a true dent into the drought to begin July, as another 3 to 5 inches fell countywide on June 30th and July 1st.

August 18, 2009

Continued record to near record heat, frequently breezy to windy conditions, low humidity for the time of year, and lack of rainfall allowed the 2009 Drought to peak before the end of August, ensuring massive dryland crop, pastureland, and livestock loss. The agricultural loss in the heart of Deep South Texas dryland crop country was one of the worst in recent times. The pattern, featuring a persistent high pressure ridge above the surface from the southwest U.S. through the central Gulf of Mexico, would begin to break at month's end, but the rains were far too little, far too late, to save much of the crop yield. A continued lack of rainfall over most of Cameron County intensified the drought conditions during the middle of August and the Exceptional (D4) drought spread across the remainder of Cameron County. The long duration of extreme to exceptional drought, which prevailed for most of July and August, resulted in massive dryland crop and pastureland losses for the entire event. The USDA Farm Service Agency in San Benito reported at the end of August, prior to the September 1st plowing date, was more than \$20 million in damage to pastureland, cotton, corn, sorghum, and sugar cane crops, county-wide.

March 1, 2008

Rainfall totals were been below normal during the winter (December - February) over Deep South Texas and the Lower Rio Grande Valley. Below normal rainfall and above normal temperatures allowed for soil moisture to be below normal over Deep South Texas and the Lower Rio Grande Valley. Daily evaporation rates during the past month have been a quarter of an inch to near half an inch. During this time period, rainfall totals averaged 3 inches or less over the region. Harlingen had its 12th driest winter on record (since 1911). Moderate drought conditions persisted over much of Deep South Texas the spring.

SECTION 6: DROUGHT

Probability of Future Events

Based on 13 recorded drought events over the 62-year reporting period, Cameron County and the City of Harlingen both average one drought every three to five years. This lends to an occasional frequency of occurrence, meaning a drought can be expected on a 5 year cycle.

Vulnerability and Impact

Loss estimates were based on 62 years of statistical data from the NCDC. 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 damage totals and Table 6-7 shows annualized exposure.

Table 6-6. Drought Event Damage Totals for Cameron County Planning Area, 1950-2012

JURISDICTION	NUMBER OF EVENTS	PROPERTY DAMAGES	CROP DAMAGES	PROPERTY DAMAGES (2013 DOLLARS)	CROP DAMAGES (2013 DOLLARS)
Cameron County	13	\$7,042	\$37,130,423	\$27,071	\$42,455,120
Total Losses			\$37,137,465		\$42,482,191

Table 6-7. Potential Annualized Losses for Cameron County Planning Area, 1950-2012

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Cameron County	\$42,482,191	\$685,197

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 in the entire Cameron County planning area. However, drought impacts are mostly experienced in water shortages and crop/livestock losses on agricultural lands and typically have no impact on buildings.

The economic impact of droughts can be significant as they produce a complex web of impacts that spans many sectors of the economy and reaches 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. Based on the 13 reported previous occurrences and potential exposure for the hazard, the potential severity of impact of droughts for Cameron County and the City of Harlingen is limited, with less than 10% of property destroyed. Annualized loss over the 62-year reporting period in Cameron County is \$685,197 annually.

SECTION 7: EXTREME HEAT

Hazard Description	1
Location.....	1
Extent	1
Historical Occurrences	4
Significant Past Events	6
Probability of Future Events.....	7
Vulnerability and Impact	7

Hazard Description

Extreme heat is defined as a combination of a prolonged period of excessively high temperatures and, usually, exceptionally humid conditions. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and Cameron County is no exception. The unincorporated areas of the County and the City of Harlingen typically experience extended heat waves. A heat wave is an extended period of extreme heat, and is often accompanied by high humidity.



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 population 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

Though an injury and death from extreme heat have been recorded at different locations throughout the County, there is no specific geographic scope to the extreme heat hazard. Extreme heat could occur at any area of the County and the City of Harlingen.

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

SECTION 7: EXTREME HEAT

relationship is referred to as the “Heat Index,” and is depicted in Figure 7-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 7-1. Extent Scale for Extreme Summer Heat¹

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 7-1 displays varying degrees 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 level of intensity where fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible, whereas 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 7-1.

¹ Source: NOAA

SECTION 7: EXTREME HEAT

Table 7-1. Heat Index & Warnings

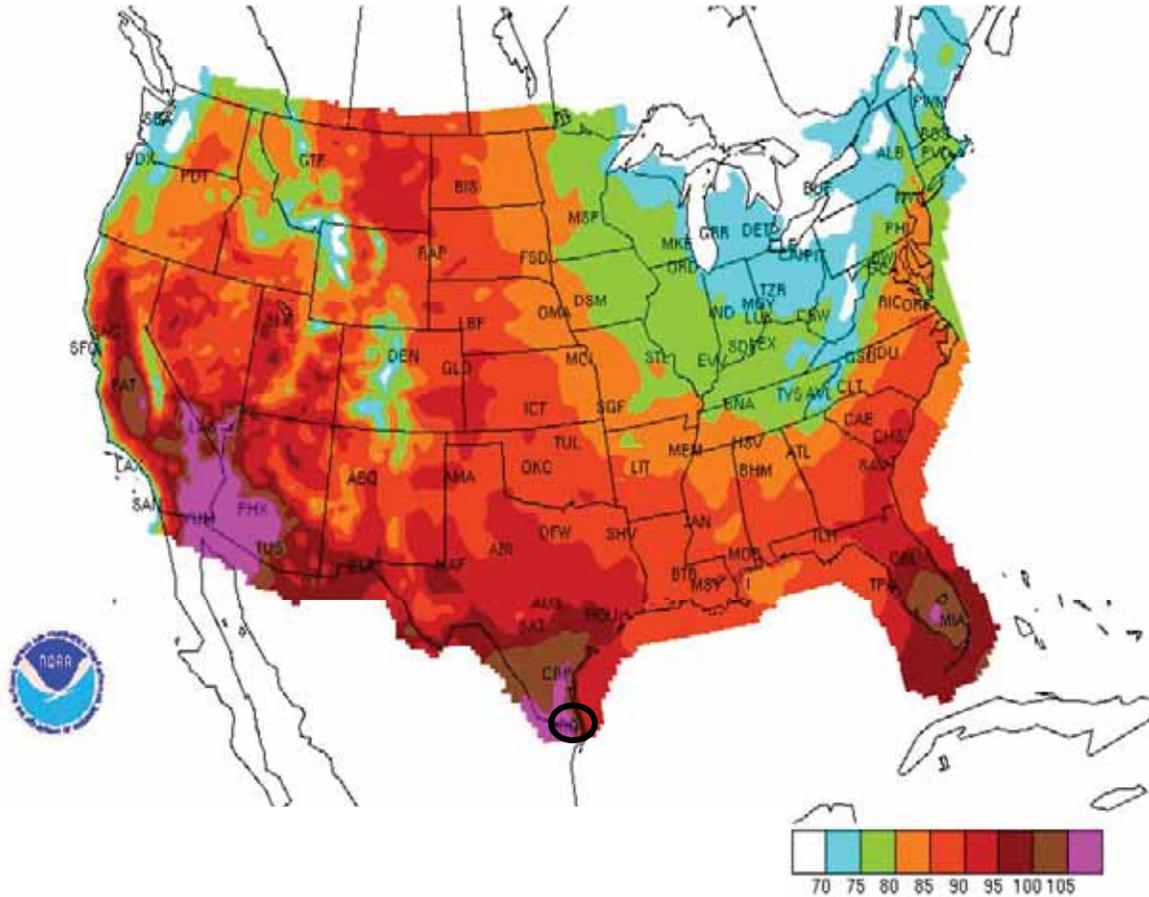
CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING
Extreme Danger	130° F and higher	Heat stroke or sun stroke likely.	A heat advisory will be issued to warn that the Heat Index may exceed 105° F.
Danger	105 – 129° F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	
Extreme Caution	90 – 105° 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.	

Most of the County is a flat plain, gently sloping to the northeast. The area is known as the Rio Grande Plains in South Texas. The vegetation along the eastern coast is typical Gulf Prairie and Marsh areas, the majority being marsh grasses, bluestems, and grama grasses. The rest of the County has small trees, brush, and weeds. There are a few naturally occurring trees, the majority of which are mesquite and oaks. Due to its geography, and its subtropical and subhumid climate, the Cameron County planning area, including the City of Harlingen, 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 7-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1849 to 2009. Brown and purple indicate a daily maximum heat index of 100 to above 105 degrees F. Cameron County and the City of Harlingen could experience extreme heat from 100° and above and should mitigate to the extent of “extreme danger.”

SECTION 7: EXTREME HEAT

Figure 7-2. Average Daily Maximum Heat Index²



Historical Occurrences

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the US. 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. Texas residents comprised 70 of these deaths. The United States Immigration and Naturalization Service reported that 51 foreign nationals died along the Texas/Mexico border though none of the reported deaths occurred in Cameron County. Table 7-2 depicts historical occurrences of mortality from heat from 1994 to 2004 from the Texas Department of State Health Services, and 2005 to 2011 from the NCDC database.

² Source: NOAA and the black circle indicates Cameron County.

SECTION 7: EXTREME HEAT

Table 7-2. Extreme Heat Related Deaths in Texas

YEAR	DEATHS
1994	1
1995	12
1996	10
1997	2
1998	66
1999	22
2000	71
2001	20
2002	1
2003	0
2004	3
2005	49
2006	2
2007	2
2008	7
2009	6
2010	4
2011	20

Because the Texas Department of State Health Services reports on total events statewide, previous occurrences for extreme heat are derived from the NCDC and SHELDUS databases. According to heat related incidents located solely within Cameron County there are six heat waves³ on record for Cameron County (Table 7-3). Historical extreme heat information, as provided by the NCDC and SHELDUS, 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 the event.

³ Even though the County experiences heat waves each summer, NCDC and SHELDUS data only records events reported. Based on reports, only six events are on record.

SECTION 7: EXTREME HEAT

Table 7-3. Historical Extreme Heat Events for Cameron County Planning Area, 1950-2012⁴

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Cameron County	7/01/1980	-	0	1	\$5,319	\$531,915
Cameron County	5/22/2008	Danger	0	0	\$0	\$0
Cameron County	6/12/2009	Danger	1	0	\$0	\$0
Cameron County	7/06/2009	Danger	0	0	\$0	\$0
Cameron County	7/30/2009	Danger	0	0	\$0	\$0
Cameron County	8/20/2009	Danger	0	0	\$0	\$0
County Totals			1	1	\$5,319	\$531,915

Significant Past Events

August 20, 2009

A developing upper level low pressure trough in the mid and upper Mississippi Valley helped push a weak cool front into north central Texas on August 20th and 21st. This front helped to increase compression and heating of the surface air mass across South Texas and Deep South Texas, while drawing up additional tropical moisture from the southeast. The result was two consecutive nights of widespread 80 or higher degree ambient temperature, along with a single day of afternoon heat index values which reached or exceeded 111 for 2 to 4 hours across much of the Rio Grande Valley. The 2 meter observation platform at the Santa Ana (Lower Rio Grande Valley National Wildlife Refuge) location carried heat index at or above 111 for three hours during the afternoon of the 20th, peaking at 116 at 3 PM local time/CDT before gradually falling back. Overnight lows by the 21st remained above 80, but heat index values fell just shy of the local advisory criteria (111) during the afternoon of the 21st.

July 30, 2009

Heat index values, which are commonly held between 103 and 108 for most July days in the Rio Grande Valley between Cameron and Zapata County, nudged upward above critical values beginning on the 30th and ending before sunset on the 31st across Cameron County, mainly west of Federal Highway 77 and along and south of Federal Highway 83. At the Lower Rio Grande Valley National Wildlife Refuge along the extreme southeast Hidalgo and southwest Cameron County line, the heat index peaked at 117 between 3 and 4 PM CDT. Duration of the critical heat index was from 2 to 4 hours each afternoon; overnight temperatures largely remained near or above 80.

⁴ Only recorded events with fatalities, injuries, and/or damages are listed.

SECTION 7: EXTREME HEAT

June 12, 2009

Strong high pressure above the surface, combined with a weak front approaching North Texas, helped import higher than average surface dew points into the Lower Rio Grande Valley, along with air temperatures a few degrees above normal. Heat index values rose to 107 at the Harlingen/Valley Airport and 112 at McAllen/Miller Airport. While the value of 107 is just under local advisory criteria, conditions where a fatality occurred may have been closer to the 111 benchmark. A man was found dead in a parking lot near a restaurant in downtown Harlingen during the afternoon of June 12th. Residents believed the man to be homeless, and the suspected cause of death was heat stroke. The man was pronounced dead at 5:50 PM CDT but may have died a few hours earlier during the peak of the heat. Heat index values at the Harlingen/Valley International Airport peaked at 107 during the afternoon, and at 112 at McAllen/Miller Airport in Hidalgo County. It is quite possible that heat index values could have been at, or very near, local advisory criteria, which is 111 during the afternoon, in the more urban setting where the fatality occurred. It is quite possible that where the fatality occurred, in a more urban setting, heat index values could have been at or very near local advisory criteria, which is 111 during the afternoon.

Probability of Future Events

According to historical records, Cameron County, including all unincorporated areas and the City of Harlingen, experience one extreme heat event every 10 years. Hence, the likelihood or future probability of excessive summer heat in the Cameron County planning area is unlikely.

Vulnerability and Impact

Because extreme heat events are not confined to specific geographic boundaries, all existing and future buildings, facilities, and populations are considered to be exposed to this hazard throughout Cameron County and the City of Harlingen and could potentially be impacted.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens, particularly the elderly population or the infirmed that live within the Cameron County planning area and cannot afford air conditioning or to run it on a regular basis. The major human risks associated with severe summer heat include: heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. Additionally, area mobile home housing may not be equipped to cool residents. These persons may need a place to go during the hottest daytime hours.

Six heat waves are on record for Cameron County. The databases report they occurred in July 1980, May 2008, and June, July, and August of 2009. Given that only 6 incidents were reported and that there is a limited likelihood for structural losses resulting from extreme heat occurrences in the planning area, annualizing potential structural losses over a long period of time would most likely yield a negligible annualized loss estimate for the county.

Typically more than twelve 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

SECTION 7: EXTREME HEAT

“minor” as injuries and/or illnesses do not result in permanent disability for Cameron County and the City of Harlingen.

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 run constantly, leading to a temporary power outage. Less than 10 percent of residential and commercial property could be damaged if extreme heat events led to structure fires.

Overall, the average loss estimate (in 2013 dollars) is \$1,518,840, having an approximate annual loss estimate of \$29,208 (Table 7-5). Based on historic loss and damages, the impact of extreme heat damages on Cameron County can be considered “limited,” indicating that less than 10 percent of property can be expected to be destroyed, injuries would be treatable with first aid, minor quality of life would be lost, and facilities would be shut down for 24 hours or less. Annualized losses specifically for Cameron County are negligible over the 62-year recording period.

Table 7-4. Extreme Heat Event Damage Totals for Cameron County Planning Area, 1950-2012

JURISDICTION	NUMBER OF EVENTS	PROPERTY DAMAGE	CROP DAMAGE	PROPERTY DAMAGE (2013 DOLLARS)	CROP DAMAGE (2013 DOLLARS)
Cameron County	6	\$5,319	\$531,915	\$15,038	\$1,503,802
Total Losses		\$537,234		\$1,518,840	

Table 7-5. Potential Annualized Losses for Cameron County Planning Area, 1950-2012

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Cameron County	\$1,518,840	\$29,208

SECTION 8: HURRICANE WIND

Hazard Description	1
Location.....	1
Extent	2
Historical Occurrences	3
Significant Past Event.....	7
Probability of Future Events.....	8
Vulnerability and Impact	10

Hazard Description

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 can be equally problematic without ever becoming a hurricane, resulting in heavy rainfall, high winds and tidal surge in coastal communities. When maximum sustained winds reach or exceed 39 mph, the system becomes a tropical storm. 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 and potential damage. Tropical storm-force winds are strong enough to be dangerous to those caught in them. For this reason, emergency managers plan to have evacuations completed and personnel sheltered before winds of tropical storm-force arrive, which precedes the arrival of hurricane-force winds.

According to the National Hurricane Center, the greatest potential for loss of life related to a hurricane is from storm surge. This happens when low pressure and high circular winds “pile” the water into a dome shape that can be 50-100 miles wide. The surge travels with the storm and is most severe on the right side of the storm, relative to the direction the storm travels. The surge can be 15 feet deep, topped by waves, and make landfall ahead of the center, or “eye”, of the hurricane. Wind-driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with normal high tides.

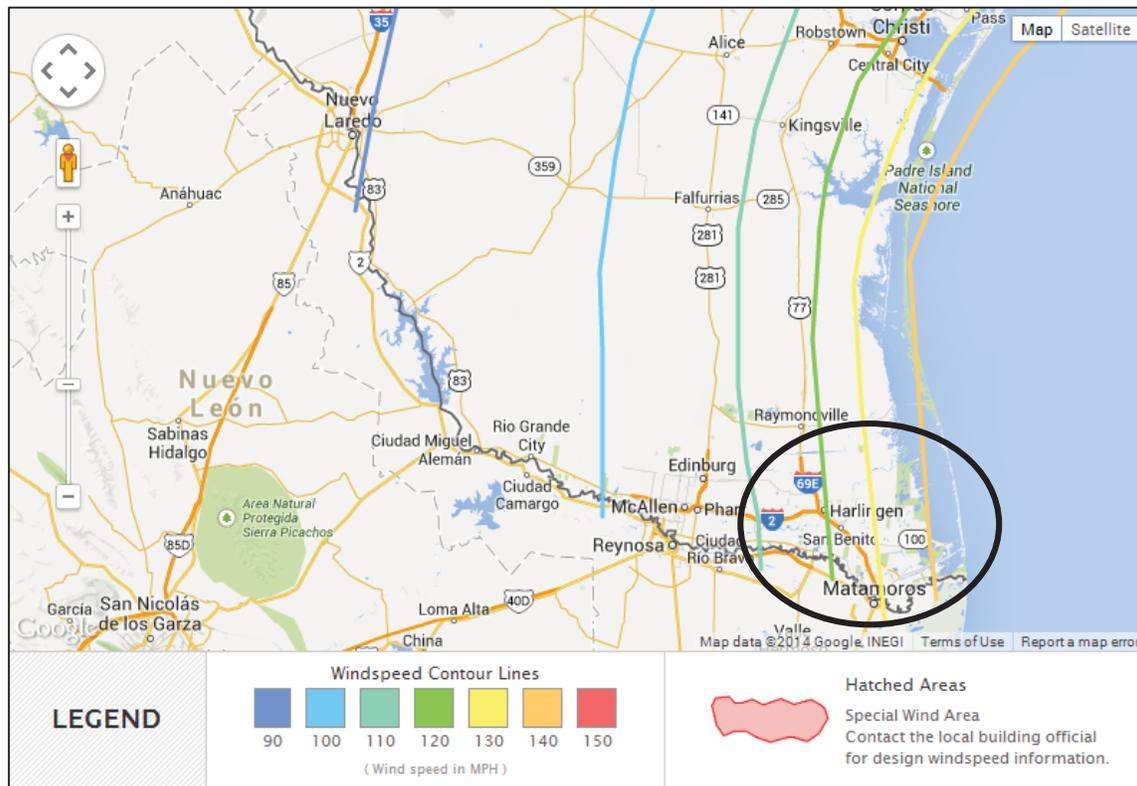
Texas has some of the highest coastal erosion rates in the country, eroding at an average rate of 2.3 feet per year, according to the Texas General Land Office. Coastal erosion is caused by large storms, flooding, sea level rise, and human activities that wear away the beaches and bluffs along the ocean. Erosion can have long-term economic and social consequences.

SECTION 8: HURRICANE WIND

Location

As a coastal community, Cameron County is vulnerable to threats directly and indirectly related to a hurricane event, such as high-force winds, storm surge, flooding, and coastal erosion. Hurricanes and/or tropical storms can impact Cameron County from June to November, the official Atlantic U.S. hurricane season. Cameron County and the City of Harlingen are in a moderate to high risk area for hurricane wind speeds of 110 to 140 miles per hour (mph) as shown in Figure 8-1.

Figure 8-1. Location of Hurricane Wind Zones¹



Extent

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale (See Table 8-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. This scale only ranks wind speed, but lower category storms can inflict greater damage than higher category storms depending on where they strike, other weather they interact with and how slow they move.

¹ Source: American Society of Civil Engineers (ASCE); the black circle indicates Cameron County.

SECTION 8: HURRICANE WIND

Table 8-1. Extent Scale for Hurricanes²

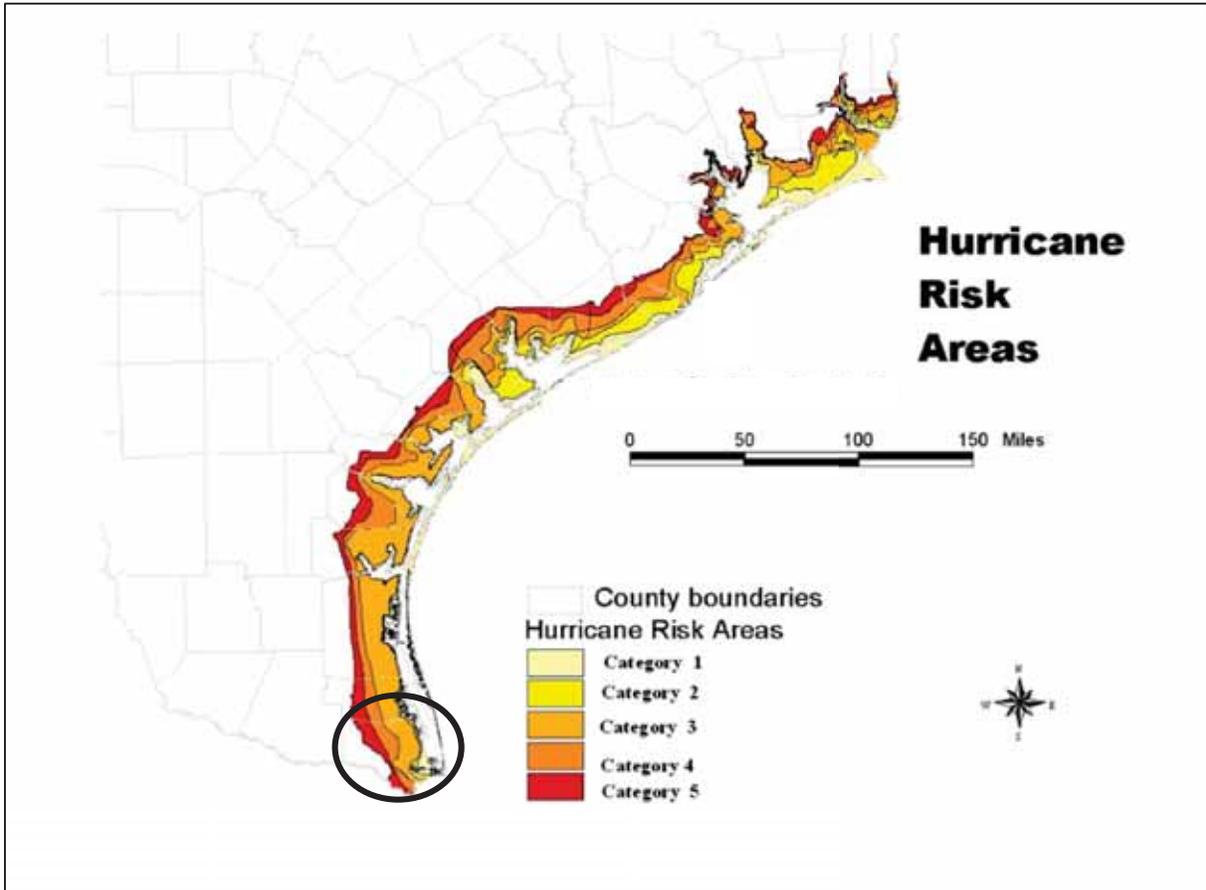
CATEGORY	MAXIMUM SUSTAINED WIND SPEED (Mph)	MINIMUM SURFACE PRESSURE (Millibars)	STORM SURGE (Feet)
1	74 – 95	Greater than 980	4 – 5
2	96 – 110	979 – 965	6 – 8
3	111 – 130	964 – 945	9 – 12
4	131 – 155	944 – 920	13 – 18
5	155 +	Less than 920	18 +

Based on the historical storm tracks for hurricanes and tropical storms, as well as the coastal location of Cameron County and the City of Harlingen, the average extent to be mitigated for is a Category 3 storm. Cameron County and the City of Harlingen are located in the 110-140 wind zone in terms of average wind speeds that should be mitigated in the event of a hurricane. This data is based on the design wind speeds for a 100-year event. Figure 8-2 displays the location of hurricane risk by storm category along the Gulf Coast on the following page.

² Source: National Hurricane Center

SECTION 8: HURRICANE WIND

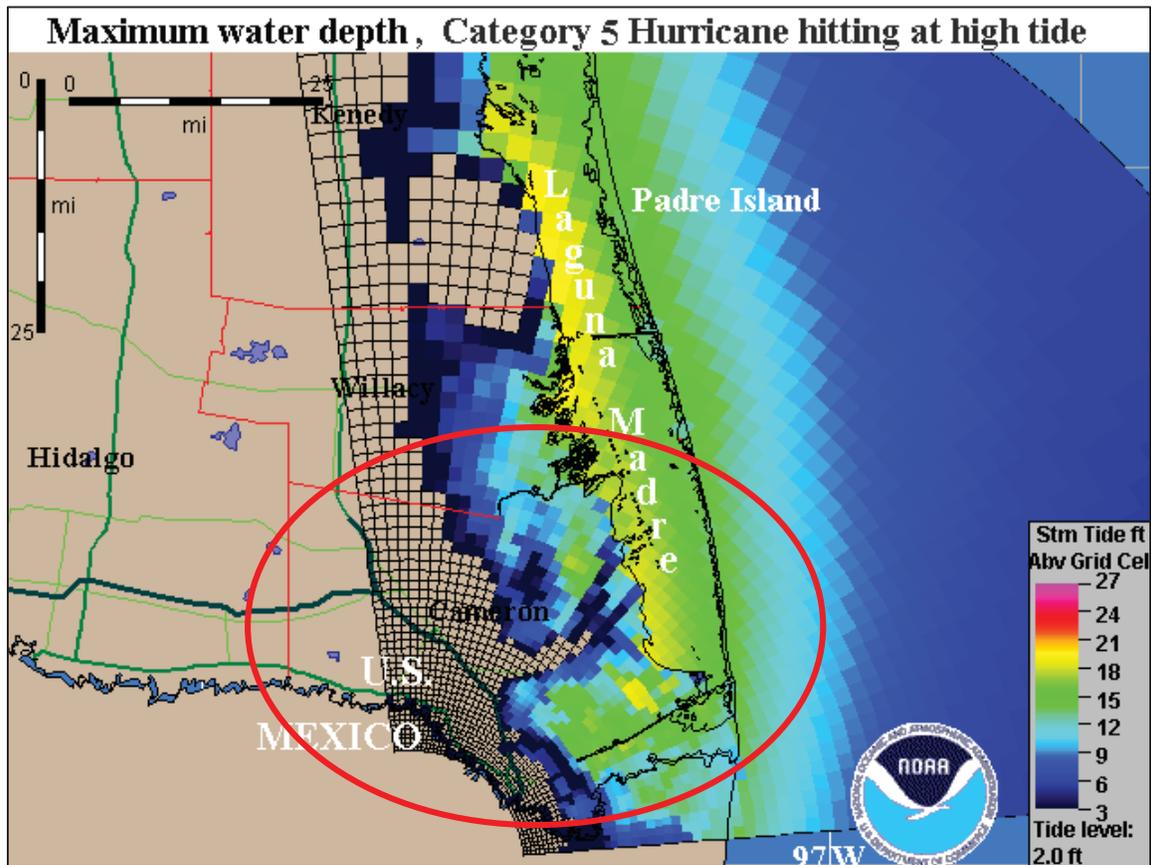
Figure 8-2. Location of Hurricane Risk along the Texas Coast



The worst-case scenarios of potential extent of a Category 5 hurricane of storm surge in the Cameron County planning area is displayed in Figure 8-3; the Cameron County study area is indicated by the red circle. The map reflects a general geographic analysis that does not consider specific factors such as levee system.

SECTION 8: HURRICANE WIND

Figure 8-3. Maximum Storm Surge Water Depths, Category 5 Hurricane³



Cameron County and the City of Harlingen are located along the coast, and therefore have a greater risk, with all land and buildings being vulnerable to all storms, category 1 through 5.

Cameron County's coastline is also vulnerable to the effects of coastal erosion from the Gulf of Mexico. In Cameron County there are no stable (vegetated) dunes in the undeveloped area located as close to the mean low water (MLW) line. Through experience it has proven that barrier island development imposes risks on private property owners, investors, and to taxpayers statewide. The average rate of retreat is estimated at 12 feet per year according to the study for the Erosion Protection Dune System (EPDS).

³ Source: NOAA SLOSH (Sea, Lake, and Overland Surge from Hurricanes).

SECTION 8: HURRICANE WIND

Figure 8-4. Critical Eroding Areas



Source: Texas General Land Office

SECTION 8: HURRICANE WIND

Historical Occurrences

Previous occurrences include storms that had a direct path through the Cameron County study area, and the tracks near the county. Table 8-2 below lists the storms that have impacted the Cameron County planning area during the years of 1960-2012.

Table 8-2. Historic Events for Cameron County Planning Area⁴

YEAR	STORM NAME/ CATEGORY	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE	TOTAL EXPENDITURES FOR HARLINGEN
1961	Hurricane Carla	Category 4	0	4	\$505,051	\$505,051	-
1963	Hurricane Cindy	Category 1	0	0	\$125,000	\$12,500	-
1968	Hurricane Beulah	Category 5	0	1	\$35,900,000	\$0	-
1968	Tropical Storm Candy	Tropical Storm	0	0	\$45,455	\$45,455	-
1970	Hurricane Celia	Category 3	0	6	\$657,895	\$67,568	-
1971	Hurricane Fern	Category 5	0	0	\$81,967	\$81,967	-
1971	Hurricane Edith	Category 5	0	0	\$877	\$877	-
1973	Tropical Storm	Tropical Storm	0	0	\$41,667	\$4,166,667	-
1980	Hurricane Allen	Unknown	0	0	\$5,319,150	\$531,915	-
1980	Tropical Storm	Tropical Storm	0	0	\$3,125	\$0	-
1988	Hurricane Gilbert	Category 2	0	0	\$89,286	\$893	-
1998	Tropical Storm Frances	Tropical Storm	0	0	\$0	\$0	-
1999	Hurricane Bret	Category 3	-	-	-	-	\$12,767
2000	Hurricane Beryl	Unknown	-	-	-	-	\$1,141
2003	Hurricane Erika	Category 1	-	-	-	-	\$14,915
2005	Hurricane Emily	Category 3	-	-	-	-	\$42,905
2007	Hurricane Dean	Category 5	-	-	-	-	\$7,094
2007	Tropical Storm Erin	Tropical Storm	-	-	-	-	\$1,940
2007	Hurricane Ike	Category 2	-	-	-	-	\$11,454
2008	Hurricane Dolly	Category 1	0	0	\$224,000,000	\$0	\$3,578,501
2010	Hurricane Alex	Category 1	0	0	\$100,000	\$0	\$115,189
2010	Tropical Storm Hermine	Tropical Storm	0	0	\$10,000,000	\$0	\$37,421

⁴ Damages are provided where available.

SECTION 8: HURRICANE WIND

Significant Past Events

Tropical Storm Hermine on September 6, 2010

Hermine arrived in fits and starts, with frequent gusty feeder band showers followed by relatively calm conditions through the day and early evening of September 6th. Between 9:30 and 10 PM CDT, the action got underway as the central core of Hermine brought a rapid increase in sustained winds and gusts, along with increasingly heavy rainfall. Between 11 PM and 12 AM CDT, the northern doughnut crossed the Rio Grande over lower populated southwest Cameron County. Meanwhile, intense feeder bands east of the center, where some of the strongest winds were sampled, pounded Brownsville with sustained winds of 40 to 55 mph and gusts as high as 69 mph at the Brownsville/SPI International Airport. Between 1 and 1:30 AM, a very intense band would reform around the center, curling from just south of Harlingen to north of Brownsville. This band would cross Harlingen just prior to 2 AM, and produced near hurricane force gusts (72.5 mph) along with brief sustained winds of 59 mph, which damaged a number of roofs, knocked down limbs and uprooted trees, and wiped out power to more than 14,000 residents, many in the Harlingen/San Benito area. In all, between 46,000 and 50,000 customers in Cameron County were without power during the peak of the storm, including those in the AEP Texas, Brownsville PUB, and Magic Valley Electric Co-op service areas. After the inner core of Hermine sliced through, winds quickly diminished below tropical storm force from south to north across the county, between 1:30 AM CDT near the river and 2:30 CDT near the Willacy County line. Significant damage included roof collapses to at least one apartment complex in Brownsville, and the La Casita apartments in Harlingen, displacing at least two families. A large part of an industrial building roof collapsed in north Harlingen, and other poorly constructed lightweight roofs were blown off in Brownsville and the Port of Brownsville. Hundreds of medium to large tree limbs fell along the Highway 77 corridor from Brownsville through San Benito and the central and east side of Harlingen. Boaters, particularly Mexican shrimping vessels, did their best to seek refuge in the Port of Brownsville prior to the arrival of the storm. The sharp increase in east winds ahead of the center's arrival drove breaking waves down the 17 mile Brownsville ship channel; some waves broke as high as the windows of the Harbormaster office. Sixty-four vessels reached the Port, but 5 others became stranded at the coast, including three running aground in Texas and two in Mexico when buoys floated toward the beach and guided the boats toward the rocks. Each boat was able to beach safely, with no human casualties.

Hurricane Dolly on July 23, 2008

The approach of Hurricane Dolly to the barrier shoreline of South Padre Island early on the morning of July 23rd brought sustained tropical storm force winds inland to the east side of Brownsville, including the Port, just before 7:30 AM on the 23rd. Prior rain bands had produced frequent gusts to 40 mph, but the arrival of sustained tropical storm winds was soon followed by wind damage and power outages, particularly during the afternoon. Prior to Dolly's landfall along the Cameron/Willacy County line, the western and southern eyewall intensified. The core of the eyewall traversed northern Cameron County, where impacts were more substantial than in southern Cameron County. Northern Cameron (Harlingen, San Benito, Rio Hondo): A period of estimated and measured sustained winds between 60 and 70 mph, with frequent gusts to hurricane force (at least 78 mph measured at 2.25 meters), developed around 1 PM and continue through around 5 PM, beginning in northeast Cameron County near Arroyo City and extending west through Las Yescas, Rio Hondo, Harlingen, San Benito, Palm Valley, and La Feria, not only created widespread freshwater flooding, but

SECTION 8: HURRICANE WIND

created notable damage to poorly fastened roofs and some walls, particularly at industrial parks, strip centers, and farm buildings, especially from Harlingen to points east. Otherwise, numerous large limbs, power lines and power poles, highway signs and billboards, were blown down across the area during this time period. As Dolly's center eased slowly from southern Willacy into northern Hidalgo County, the last of the sustained tropical storm force winds began to exit Cameron County from Palm Valley to Santa Rosa and La Feria, just after midnight on the 24th. Southern Cameron: Along and just north of the Rio Grande, from the Kellers Corner/Brownsville Airport area through Brownsville and to points west, roughly along federal highway 281 through Los Indios out toward the Hidalgo/Cameron County line, conditions were a bit more benign, as the core of the southern and western eyewall generally missed the area. Here, sustained tropical storm force winds persisted from around 8:30 AM until 6 PM, though gusts above 40 mph persisted until near midnight. In this area, sustained wind generally peaked between 45 and 55 mph, with peak gusts just below hurricane force between 11:30 AM and 2 PM. Here, damage was primarily to thousands of tree limbs, hundreds of power lines, and many elevated highway signs and billboards, but structural damage was primarily to unfastened shingles of roofs of moderate to well-constructed buildings, and occasional failures of more poorly constructed roofs at industrial parks and farm buildings. At the peak of the storm, power was out to just about all of Cameron County, with an estimated 115,000 customers down during the middle of the afternoon. Across northern Cameron County, power recovery took days to more than a week, while many locations in southern Cameron County returned to power within a few days after Dolly's passage.

Hurricane Beulah on September 21-22, 1967 – City of Harlingen



Hurricane Beulah made landfall just east of Brownsville about 7 AM CDT on September 20, 1967. Docked at the Port of Brownsville, the S.S. Shirley Lykes reported 136 mile per hour wind. "Beulah" continued moving northwest passing near Harlingen. The Arroyo Colorado's additional flow caused damages in Harlingen near the arroyo. Streets flooded over the curb caused by water back up through the storm drains. The City of Harlingen suffered from extensive flood damages to residential, commercial, and other properties due to the Arroyo Colorado Floodway overflowing. Total damages for Harlingen were estimated at \$3.6 million, of that \$3.2 million was

the result of flooding.

A large portion of the devastation in Texas was due to the torrential rains resulting in flooding, also the strong winds and high tide resulted in considerable damage. Cameron County physical damages totaled \$35.9 million. The county suffered from wind and wind driven rain, flooding from hurricane tide, stream overflow, as well as inadequate drainage. Countywide fresh water flood damages were estimated to be \$15.6 million.

Pictured above: Flood waters covered many homes in the Parkwood area of Harlingen in the wake of Hurricane Beulah. The area is adjacent to the Arroyo Colorado which cuts through the heart of Harlingen.

SECTION 8: HURRICANE WIND

Probability of Future Events

Due to the location on the Gulf Coast, and the previous history of hurricanes for the area, the likelihood or future probability of a tropical storm or hurricane in Cameron County and the City of Harlingen is highly likely, meaning an event is probable in the next year.

Vulnerability and Impact

Hurricane-force winds 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. Warning time for hurricanes has lengthened due to modern and early warning technology. Hurricane-force winds can easily destroy poorly constructed buildings and mobile homes, as well as debris such as signs, roofing materials, and small items left outside become extremely hazardous in hurricanes and tropical storms. Extensive damage to trees, towers, and underground utility lines (from uprooted trees) and fallen poles cause considerable civic disruption.

Storm track data was available for the past 150 years; however, property and crop loss data is only available from 1960 to the present. Table 8-3 shows impact or loss estimation for storms impacting the County. Annual loss estimates were based on the 52 year reporting period for such damages (Table 8-4). The average annual loss estimate for Cameron County is approximately \$21.9 million.

Table 8-3. Hurricane Event Damage Totals, 1960-2012⁵

JURISDICTION	NUMBER OF EVENTS	PROPERTY DAMAGE	CROP DAMAGE	PROPERTY DAMAGE (2013 DOLLARS)	CROP DAMAGE (2013 DOLLARS)
City of Harlingen	22	\$7,423,327	\$0	\$28,246,439	\$0
Cameron County	22	\$276,961,688	\$5,412,892	\$1,111,396,606	\$28,579,940
TOTAL LOSSES		\$282,374,579		\$1,139,976,546	

Table 8-4. Potential Annualized Losses for Cameron County Planning Area, 1960-2012

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Cameron County	1,139,976,546	\$21,922,626

The potential severity of impact from a hurricane for Cameron County and the City of Harlingen is classified as substantial; 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.

⁵ The City of Harlingen provided property and crop damages where available.

SECTION 9: TORNADO

Hazard Description	1
Location.....	2
Extent	3
Historical Occurrences	5
Significant Past Events	8
Probability of Future Events.....	10
Vulnerability and Impact	10

Hazard Description

Tornadoes are among the most violent storms on the planet. A tornado is a violently 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 or more. In extreme cases, winds may approach 300 miles per hour. Damage paths can be in excess of one mile wide and 50 miles long.



The most powerful tornadoes are produced by “super cell thunderstorms.” Super-cell 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.

Tornado producing 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 typically smaller high frequency period can emerge in the fall during the brief transition between the warm and cold seasons.

SECTION 9: TORNADO

Table 9-1. Variations among Tornadoes

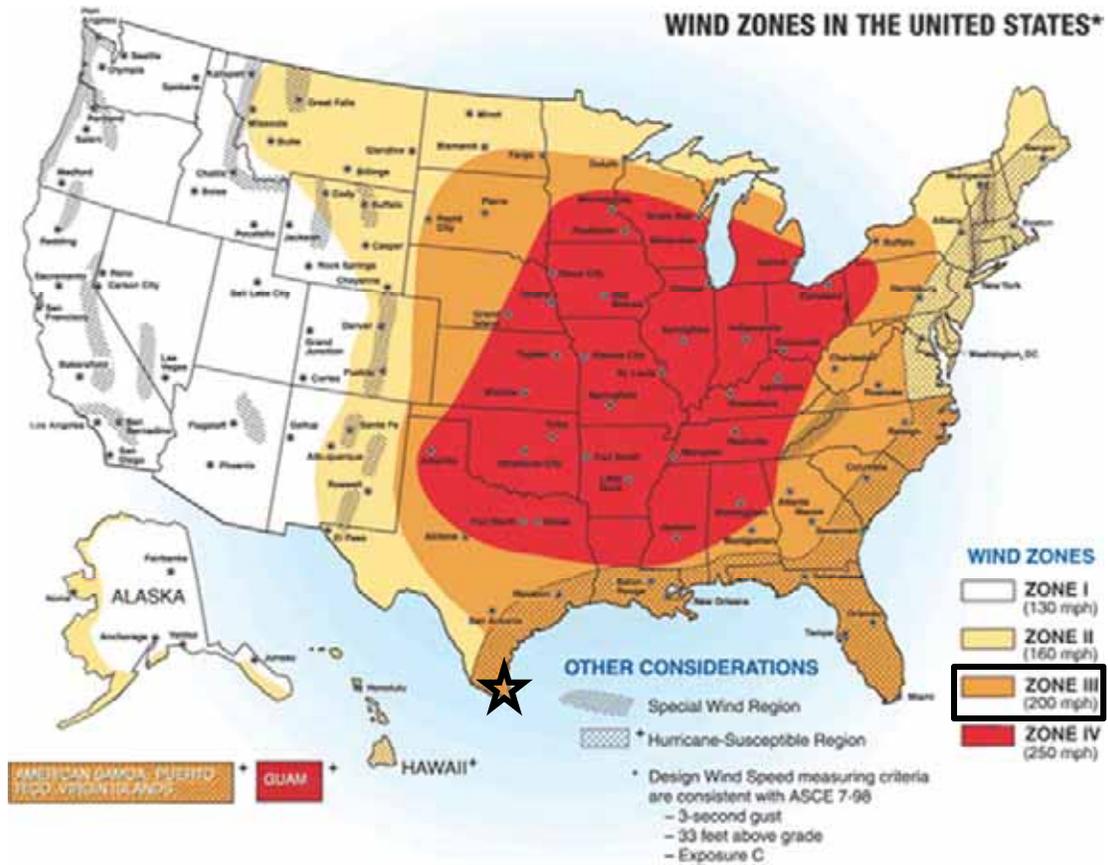
WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
<ul style="list-style-type: none">• 69% of all tornadoes• Less than 5% of tornado deaths• Lifetime 1-10+ minutes• Winds less than 110 mph	<ul style="list-style-type: none">• 29% of all tornadoes• Nearly 30% of all tornado deaths• May last 20 minutes or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

Location

As with thunderstorms, tornadoes do not have any specific geographic boundary and can occur throughout the County uniformly. It is assumed that the county planning area and the City of Harlingen are uniformly exposed to tornado activity. Cameron County is located in Wind Zone III, meaning tornado winds can be as high as 200 mph.

SECTION 9: TORNADO

Figure 9-1. 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). Additionally, it should be noted that tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (Table 9-2).

¹ Cameron County is indicated by the star.

SECTION 9: TORNADO

Table 9-2. 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%

Since February 2007, the Fujita Scale (above) has been replaced by the Enhanced Fujita Scale (Table 9-3 below), which retains the same basic design as its predecessor with six strength categories. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures.

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

SECTION 9: TORNADO

Table 9-3. 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 as tornado events prior to 2007 will follow the original Fujita Scale. The largest magnitude reported within the county planning area is F1 on the Fujita Scale, or a moderate tornado. Based on this data, the area could experience anywhere from an EF0 to an EF5 depending on the wind speed.

Although the entire County has experienced tornadoes as devastating as an F3 on the Fujita Scale, the typical range of intensity that the Cameron County planning area would be expected to mitigate would be a low to moderate risk, or an EF0 to an EF1 (Table 9-4).

Historical Occurrences

It is important to note that only reported tornadoes were factored into the risk assessment. It is likely that a high number of occurrences have gone unreported over the past 62 years. Figure 9-2 shows the locations of

SECTION 9: TORNADO

previous occurrences in Cameron County from 1950 to 2012. A total of 59 events have been recorded by the Storm Prediction Center (NOAA), NCDC, and SHELDUS databases for Cameron County.

Figure 9-2. Spatial Historical Tornado Events for Cameron County Planning Area, 1950–2012³

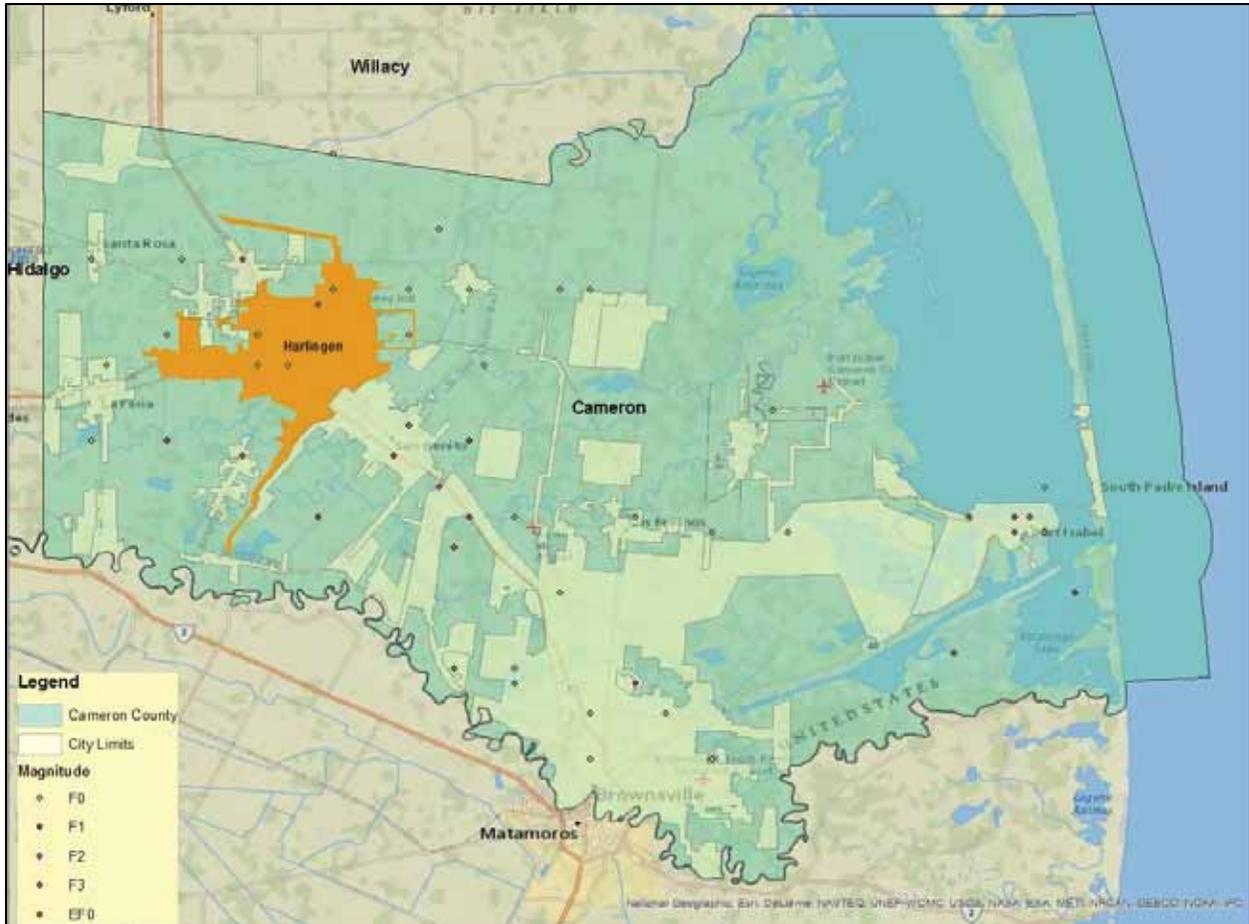


Table 9-4. Overall Historical Tornado Impact

NUMBER OF EVENTS	MAGNITUDE (FUJITA SCALE)							MAXIMUM F SCALE
	N/A	F0	F1	F2	F3	F4	F5	
59	1	44	10	3	2	0	0	3

³ Source: NOAA Records

SECTION 9: TORNADO

Table 9-5. Historical Tornado Events for Cameron County Planning Area, 1950-2012⁴

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Unknown	7/15/1953	13:30	F1	0	0	\$250	\$0
Unknown	2/16/1957	13:30	F0	0	0	\$250	\$0
Unknown	5/12/1969	18:00	F3	0	0	\$25,000	\$0
Unknown	5/12/1969	20:30	F2	0	0	\$25,000	\$0
Unknown	5/12/1969	21:00	F3	0	0	\$25,000	\$0
Unknown	5/13/1969	1:30	F1	0	0	\$250	\$0
Unknown	5/24/1970	18:23	F2	0	0	\$25,000	\$0
Unknown	8/24/1976	13:00	F0	0	0	\$2,500	\$0
Unknown	4/16/1977	6:25	F1	0	0	\$25,000	\$0
Unknown	4/21/1977	14:15	F1	0	0	\$250,000	\$0
Unknown	8/9/1980	3:45	F2	0	0	\$2,500,000	\$0
Unknown	11/6/1983	11:30	F0	0	0	\$25,000	\$0
Unknown	11/6/1983	11:50	F0	0	0	\$25,000	\$0
Unknown	9/16/1988	12:30	F0	0	0	\$250,000	\$0
Unknown	9/16/1988	13:00	F0	0	0	\$250,000	\$0
Unknown	9/16/1988	14:00	F1	0	0	\$2,500,000	\$0
Unknown	11/17/1989	14:50	F0	0	0	\$25,000	\$0
Unknown	4/29/1991	7:03	F0	0	0	\$2,500	\$0
Brownsville Arpt	4/4/1997	3:25	F1	0	0	\$45,000	\$0
Los Fresnos	11/4/1998	3:25	F0	0	0	\$20,000	\$0
Combes	4/26/1999	16:35	F0	0	0	\$0	\$2,000
Rio Hondo	5/29/2002	19:17	F0	0	0	\$10,000	\$0
Rio Hondo	7/20/2005	6:35	F0	0	0	\$30,000	\$0
Bayside	11/7/2008	12:10	EF0	0	0	\$1,000	\$0
Port Isabel	6/30/2010	9:10	EF0	0	0	\$4,000	\$0
Villa Nueva	6/30/2010	9:35	EF0	0	0	\$10,000	\$0
San Benito Muni Arpt	5/11/2012	2:15	EF0	0	0	\$15,000	\$0

⁴ Only recorded events with fatalities, injuries, and/or damages are listed.

SECTION 9: TORNADO

Table 9-6. Summary of Historical Tornado Events, 1950-2012

JURISDICTION	EVENTS	MAGNITUDE (MAX EXTENT)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Harlingen	11	F1	0	0	\$2,752,500	\$0
Cameron County	59	F3	0	1	\$6,090,750	\$2,000

Significant Past Events

May 11, 2012

A mini-supercell thunderstorms dropped a very brief tornado, containing estimated 80 mph winds (high end EF0 on the Fujita Scale) on top of a single family home, causing considerable damage to property and the well-built structure. Damage included: four sections of cyclone fence bent in different directions around the home; a boat and trailer flipped over, numerous snapped tree limbs in different directions and other limbs that came from an undetermined tree, barrel-tile roof shingles lifted off, one broken window, and a damaged carport. The singular nature of the damage – striking only this property – was unusual, with one of the shortest track lengths (a tenth of a mile) seen on survey.

April 20, 2012 – City of Harlingen

A rapidly developing disturbance raced through southeast Texas causing an unstable atmosphere during the late afternoon of April 20th, and thunderstorms exploded into the atmosphere well above the freezing layer. Large hailstones occurred ranging from golf ball size to as large as grapefruits. Cameron County Emergency Manager reported a funnel and touchdown southwest of Highway 77 in Harlingen. Resident at the intersection of Rangerville Road and CR 800 reported a split tree blown across the road and debris in the backyard.

August 31, 2005 – City of Harlingen

Clusters of severe thunderstorms moved through the Lower Rio Grande Valley of Texas causing damage to numerous trees, utility poles, railroad equipment, and buildings extending from Raymondville to Harlingen to McCook and Edinburg. The storms began to develop in the midafternoon hours between 2 and 3 PM CDT as the sea breeze boundary migrated westward from the Gulf of Mexico. Additional thunderstorms over northern Hidalgo and Starr counties began generating surface outflow boundaries near the original storm northeast of Raymondville. Of interesting note, several large dust devils had been observed by NWS meteorologists in Kenedy and Willacy counties in the early afternoon, suggesting that the surface air was quite unstable and sufficient rotation was available for tornadoes to form. As the outflow boundaries began to converge at Raymondville, the storm began producing severe wind gusts. A tornado moved through Raymondville, Texas at 4:50 PM CDT, lasting about two minutes, while the entire storm lasted from 4:45 PM until about 5:30 PM CDT. The tornado touched down near 6th Street and San Francisco, moving southwest along the railroad track and Business 77. The director of Emergency Management in Raymondville was a witness to the tornado and relayed the report to the police department. The tornado dissipated at the southern end of town and appeared to have been the only tornado to form out of this storm. Spotter reports and damage survey crews noted isolated damage along the path with several trees and buildings sustaining

SECTION 9: TORNADO

minor damage. Rail gate crossings were twisted and broken apart along with several utility poles that were snapped apart several feet above the ground. Another tornado was reported just west of Combes, Texas. That tornado was short-lived and did not produce any damage. Elsewhere, reports of funnel clouds and a tornado were also received in Harlingen, Texas south of Raymondville. The tornado touched down in open farm land spinning up dust and some debris. However, no damage was reported with this twister. Additional storms generated severe winds around McCook, Texas, where minor damage was sustained to barns and smaller structures. Several reports of broken trees (6-8 inches in diameter) were also noted. At the intersection of M Road and Schunior, in Edinburg, Texas, a series of high tension power poles were snapped off 10 to 12 feet above the ground. Oddly, no other structures in the vicinity sustained damage and it appears that the damage was caused by straight line severe thunderstorm wind gusts. Incidentally, several days prior to these severe thunderstorms, the Rio Grande Valley and northeast Mexico (state of Tamaulipas) had experienced record maximum temperatures ranging from 104 to 106 degrees Fahrenheit, due in large part to atmospheric subsidence caused by the effects of Hurricane Katrina.

July 20, 2005

Hurricane Emily first formed as the 5th tropical depression of the 2005 Atlantic Season at 10 pm CDT Sunday July 10th, 2005. Emily then went on to become a hurricane at 10 pm July 13th and then proceeded to become a Category 3 storm at 4 pm CDT July 14th in the Caribbean Sea. Emily then reached Category 4 strength at 1 am CDT July 15th and made landfall along the Yucatan peninsula during the early morning of July 18th. Emily re-emerged off the Yucatan peninsula and regained Category 3 strength in the Southwestern Gulf of Mexico at 6 pm CDT July 19th. Emily then proceeded to make landfall along the northeast coast of Mexico early in the morning on July 20th. Emily produced heavy rains over south Texas with storm total rainfall amounts generally ranging between 1.5 and 5 inches. Storm tides (including astronomical tide, storm surge, and wind-driven waves) caused minor to moderate flooding along the lower Texas coast from the port mansfield jetties southward to the Rio Grande. Sea water washed over the State Road 100, approximately 4 to 6 miles north of the South Padre Island City limits, where only the beach and natural sand dunes exist. The building of additional burms along the beaches and dunes did prevent much of the sea water from flooding within the City of South Padre Island. Only minimal and isolated damage was reported from local law enforcement agencies and county emergency operation centers. Damage consisted of isolated structural damage to buildings from tropical storm force winds. Several trees were uprooted or damaged and were consistent with the reported observed wind speeds. Emily produced five confirmed tornadoes over Deep South Texas, and isolated flash flooding, primarily over Hidalgo County. A short-lived tornado was reported by the general public in Cameron County. Completed damage assessments confirmed destruction to a mobile home by the tornado.

Probability of Future Events

According to historical records, Cameron County experiences two tornado touchdowns every three years (one and a half tornadoes a year). Hence, the probability of future tornado occurrences affecting the jurisdictions within Cameron County and the City of Harlingen is highly likely, meaning an event may occur within the year.

SECTION 9: TORNADO

Vulnerability and Impact

Because tornadoes often cross-jurisdictional boundaries, all existing and future buildings, facilities, and populations in and around Cameron County and the City of Harlingen 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.

Overall, the average loss estimate of property and crops (in 2013 dollars) is \$10.04 million, having an approximate annual loss estimate of \$162,016 (Table 9-8). Based on historic loss and damages, the impact of tornado damages in the Cameron County planning area can be considered “limited,” with less than 10 percent of property expected to be destroyed, injuries would be treatable with first aid, and critical facilities would be shut down for less than 24 hours.

Table 9-7. Tornado Event Damage Totals by Jurisdiction, 1950-2012

JURISDICTION	NUMBER OF EVENTS	PROPERTY DAMAGE	CROP DAMAGE	PROPERTY DAMAGE (2013 DOLLARS)	CROP DAMAGE (2013 DOLLARS)
City of Harlingen	11	\$2,752,500	\$0	\$5,419,591	\$0
Cameron County	59	\$6,090,750	\$2,000	\$10,042,179	\$2,797
Total Losses		\$6,092,750		\$10,044,975	

Table 9-8. Potential Annualized Losses by Jurisdiction, 1950-2012

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
City of Harlingen	\$5,419,591	\$87,412
Cameron County	\$10,044,975	\$162,016

SECTION 10: SEVERE THUNDERSTORM

Hazard Description	1
Location.....	1
Extent	1
Historical Occurrences	3
Significant Past Events	5
Probability of Future Events.....	6
Vulnerability and Impact	6

Hazard Description

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, and sub-hazards of thunderstorms are hail, lightning, and tornadoes.

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. Along with rolling thunder, lightning detection networks routinely track cloud-to-ground flashes to help track thunderstorms.

Location

Thunderstorms can develop in any geographic location, and are considered a common occurrence in Texas. A thunderstorm could occur at any location within Cameron County's planning area, including the City of Harlingen, as these storms develop randomly and are not confined to any geographic area within the County. It is assumed that Cameron County is uniformly exposed to the threat of thunderstorms.

Extent

The extent or magnitude of a thunderstorm event is measured by the Beaufort Wind Scale. Table 10-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

SECTION 10: SEVERE THUNDERSTORM

Table 10-1. 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

On average, the planning area experiences one thunderstorm every year, which are not usually accompanied by maximum or extreme wind speeds. However, Cameron County has experienced a significant wind event, or an event with winds in the range of "Force 12" on the Beaufort Wind Scale, although the average measurement of severe winds with a thunderstorm in Cameron County is a "Force 10", with winds at 55-63 knots. Therefore, planning participants on average could experience and would be expected to mitigate a range of wind speeds of "Force 6" to "Force 10," where the storm seldom is experienced on land, trees are broken or uprooted, and there is considerable structural damage.



¹ Source: World Meteorological Organization.

SECTION 10: SEVERE THUNDERSTORM

Historical Occurrences

Since January 1950, 121 severe thunderstorm events are known to have impacted Cameron County, based upon NCDC and SHELDUS records. Tables 10-2 and 10-3 present historical occurrences of thunderstorm events reported to NCDC for the Cameron County study area. It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section.

The NCDC is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCDC is the largest archive available for climate data; however, it is important to note that only thunderstorm events that have been reported to the NCDC have been factored into this risk assessment, and in most cases NCDC data is limited to severe thunderstorm events that are noteworthy for specific reason (high winds, deaths, injuries, property or crop damages, lightning strikes). It is likely that a high number of thunderstorms have gone unreported over the past 63 years. In the tables that follow throughout this 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 available. When this occurs, estimates are provided. Where an estimate has been provided in a table for losses, the dollar amounts have been altered to indicate the damage in 2013 dollars.

Table 10-2. Historical Thunderstorm Wind Events, 1950-2013

MAXIMUM WIND SPEED RECORDED (knots)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	3
41-50	7
51-60	40
61-70	15
71-80	4
81-90	0
91-100	2
Unknown	34

Table 10-3. Historical Thunderstorm Events, 1950-2013²

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Harlingen	2/1/1998	16:22		0	0	\$5,000	\$0

² Only recorded events with fatalities, injuries, or damages are listed.

SECTION 10: SEVERE THUNDERSTORM

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Brownsville	11/4/1998	03:15		0	0	\$76,000	\$0
Los Fresnos	5/18/1999	05:15		0	0	\$2,000	\$0
Harlingen	3/14/2000	07:01	65 knots	0	0	\$0	\$0
Laguna Vista	5/2/2000	19:20	100 knots	0	0	\$5,000,000	\$0
Port Isabel	10/31/2005	21:23	60 knots	0	0	\$10,000	\$0
Brownsville	4/29/2006	01:00	60 knots	0	0	\$50,000	\$0
Brownsville	12/23/2006	17:30	52 knots	0	0	\$10,000	\$0
San Benito	12/23/2006	17:45	52 knots	0	0	\$5,000	\$0
Santa Rosa	5/16/2008	02:50	70 knots	0	0	\$50,000	\$0
Harlingen Airpark	5/16/2008	03:00	75 knots	0	0	\$200,000	\$0
Fernando	6/24/2008	11:08	50 knots	0	0	\$500	\$0
Port Isabel	5/24/2009	05:00	46 knots	0	0	\$10,000	\$0
Port Brownsville	5/27/2009	04:25	52 knots	0	0	\$2,000	\$0
Santa Rosa	6/1/2009	02:16	53 knots	0	0	\$1,000	\$0
Los Fresnos	10/26/2009	01:50	49 knots	0	0	\$1,000	\$0
Santa Rosa	5/18/2010	08:20	52 knots	0	0	\$5,000	\$0
Brownsville	5/18/2010	09:05	50 knots	0	0	\$10,000	\$0
Port Isabel	5/18/2010	09:25	56 knots	0	0	\$25,000	\$0
San Benito	5/15/2012	08:49	48 knots	0	0	\$3,000	\$0
Rancho Viejo	4/28/2013	12:19	52 knots	0	0	\$2,000	\$0
Laureles	4/28/2013	12:23	56 knots	0	0	\$50,000	\$0
La Paloma	4/28/2013	12:25	52 knots	0	0	\$2,000	\$0

Table 10-4. Summary of Historical Thunderstorm Events, 1950-2013

JURISDICTION	EVENTS	MAGNITUDE (max extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Harlingen	33	75 knots	0	0	\$205,000	\$0
Cameron County	121	100 knots	1	2	\$5,645,500	\$0

SECTION 10: SEVERE THUNDERSTORM

Significant Past Events

April 28, 2013

A small but potent line of strong to severe thunderstorms dumped torrential rains, produced frequent lightning strikes, and slammed heavy winds across much of the Rio Grande Valley during the afternoon of April 28th. A microburst powered up when it reached Cameron County, and ultimately caused significant damage to two poorly built mobile trailers in northern Los Fresnos. Tin roofs were lifted from the trailers in a colonia neighborhood just east of the intersection of FM 510 and FM 1847 (Arroyo Blvd). Severe water and structural damage occurred at each residence; insulation was peeled from the roofs and some walls had cracked or collapsed. Both structures were uninhabitable and nine persons were displaced. Farther west along FM 510, a power pole was leaning at a 45 degree angle, and a mesquite tree was uprooted near the intersection of FM 803 and Henderson Road, about 4 miles to the southwest of the residential damage.

May 16, 2008 – City of Harlingen

The severe thunderstorm which caused structure, vehicle, and power line damage moments earlier in Santa Rosa roared into the northern portion of Harlingen, eventually producing an 86 mph wind gust at Valley International Airport (KHRL) at exactly 4:05 AM CDT, which blew off portions of three hangar roofs on the airport grounds. Pieces from one of these roofs, made of heavier asphalt underlines, knocked out at least two large windows in the control tower. In a nearby neighborhood just west of the airport, generally well-constructed buildings fared well; however, dozens of large tree limbs were snapped and some fences were partially blown down. The storm continued to produce damage farther east, with a 25 square foot portion of one residence's roof ripped away by the winds in Las Yescas. The storm gradually weakened as it headed through largely uninhabited eastern Cameron County, on its way to dissipation in the Gulf.

May 30, 2005 – City of Harlingen

Large clusters of severe thunderstorms affected Deep South Texas beginning on the evening of May 29th and extending through the early morning hours of May 30th. The event began as storms produced large hail over Zapata and Kenedy counties during the early evening hours of the 29th. Another complex of storms proceeded into Hidalgo and Cameron counties. Strong thunderstorm wind gusts up to 70 mph were measured during the early morning hours of the 30th. Strong thunderstorm winds damaged the roofs of several homes, overturned a mobile home, and downed trees and power lines just to the northwest of Brownsville. Similarly, powerful thunderstorm winds also produced damage to a barn in Harlingen where beams used to support the structure were twisted. Finally the storm proceed to coastal sections of Cameron county where it produced significant damage to the White Sands Motel. According to media reports, the roof was ripped off, wind damage affected several units, and a parked car was moved several feet. A National Weather Service storm survey conducted later that morning, concluded that the damage pattern was consistent with those that occur during straight-line wind events in association with downburst formation.

SECTION 10: SEVERE THUNDERSTORM

May 2, 2000

A very strong heavy precipitation type supercell did extensive straight line wind damage to Laguna Vista, Laguna heights, Port Isabel, and South Padre Island on the evening of May the 2nd. A National Weather Service ground survey team reported that all debris was oriented from northwest to southeast. The storm first struck the Laguna Heights and Laguna Vista communities between 8:20 and 8:35 PM CDT. Then it struck Port Isabel and South Padre Island between 8:40 PM and 9:00 PM CDT. These damaging winds knocked down 50 power poles. In addition, the damaging thunderstorm winds knocked down power lines and trees. Approximately 8,800 customers were left without power and schools were closed in Port Isabel on May 3rd and 4th. Many residents reported damage to roofs, awnings, signs, canopies, marinas, and garage doors. Windows were shattered by the strong winds. The United States Coast Guard Office reported 106 knots or 122 mph winds before power failed at the Coast Guard station. Several recreational vehicles parked at Isla Blanca Park on South Padre Island were tossed on their sides. Hail the size of golf balls was reported at South Padre Island. Total damage to the utility lines and poles was estimated to be around \$3 million. Total damage done to the rest of the area was around \$2 million. In all, it was estimated that approximately \$5 million of damage was done to the bay front communities and South Padre Island.

Probability of Future Events

Most thunderstorms occur during the spring, in the months of March, April, and May, and in the fall, during the month of September. Even though the intensity of thunderstorms is not always damaging for the County, the frequency of occurrence for a thunderstorm event is highly likely, meaning that an event is probable within the next year for Cameron County and the City of Harlingen.

Vulnerability and Impact

Vulnerability is difficult to evaluate since thunderstorms can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of this event, all existing and future structures, and facilities in Cameron County and the City of Harlingen could potentially be impacted and remain vulnerable to possible injury and/or property loss from lightning, hail, and strong winds associated with severe thunderstorms.

Trees, power lines and poles, signage, manufactured housing, radio towers, lighting, concrete block walls, storage barns, windows, garbage receptacles, brick facades, and vehicles, unless reinforced, are vulnerable to severe winds associated with thunderstorm events. 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. In numerous instances roofs have been reported as having been torn off of buildings.

A severe thunderstorm can also result in heavy rains, traffic disruptions, injuries and in rare cases, fatalities, can occur. The impact of thunderstorms experienced in the Cameron County planning area has resulted in 2 injuries and 1 fatality. Generally, the severity of impact would be limited because injuries would be treatable with first aid, the quality of life lost would be minor, and facilities would only be shut down for 24 hours or less.

SECTION 10: SEVERE THUNDERSTORM

Overall, the average loss estimate (in 2013 dollars) is \$7.5 million, having an approximate annual loss estimate of \$119,355 (Table 10-6).

Table 10-5. Thunderstorm Event Damage Totals by Jurisdiction, 1950-2013

LOCATION	NUMBER OF EVENTS	PROPERTY DAMAGE	CROP DAMAGE	PROPERTY DAMAGE (2013 DOLLARS)	CROP DAMAGE (2013 DOLLARS)
City of Harlingen	33	\$205,000	\$0	\$223,545	\$0
Cameron County	121	\$5,645,500	\$0	\$7,519,394	\$0
Total Losses		\$5,645,500		\$7,519,394	

Table 10-6. Potential Annualized Losses by Jurisdiction, 1950-2013³

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
City of Harlingen	\$223,545	\$3,548
Cameron County	\$7,519,394	\$119,355

³ Source: NCCDC, values are in 2013 dollars and include property and crop damages.

SECTION 11: HAIL

Hazard Description	1
Location.....	1
Extent	2
Historical Occurrences	2
Significant Past Events	4
Probability of Future Events.....	5
Vulnerability and Impact	5

Hazard Description



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 the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals, until they fall as precipitation that is round or irregularly shaped masses of ice 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 byproduct of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

Location

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. As a result, they are not confined to any specific geographic location, and can vary greatly in terms of size, location, intensity, and duration. Therefore, the Cameron County planning area, including the City of Harlingen, is equally at risk to the hazard of hail.

SECTION 11: HAIL

Extent

The National Weather Service (NWS) classifies a storm as severe if hail of three-quarters of an inch in diameter (approximately the size of a penny) or greater is present, based on radar intensity or seen by observers. The intensity category of a hailstorm depends on its size and the potential damage it could cause, as depicted in the NCDC Intensity Scale in Table 11-1.

Table 11-1. 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 scale in Table 11-1 extends from H0 to H10, with its increments of intensity or damage potential related 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 Cameron County planning area may experience hailstorms ranging from an H0 to an H9. Therefore, the County and the City of Harlingen can mitigate a storm from hard hail to an extensive, super hailstorm with tennis ball size hail that leads to extensive structural damage and could cause fatal injuries.

Historical Occurrences

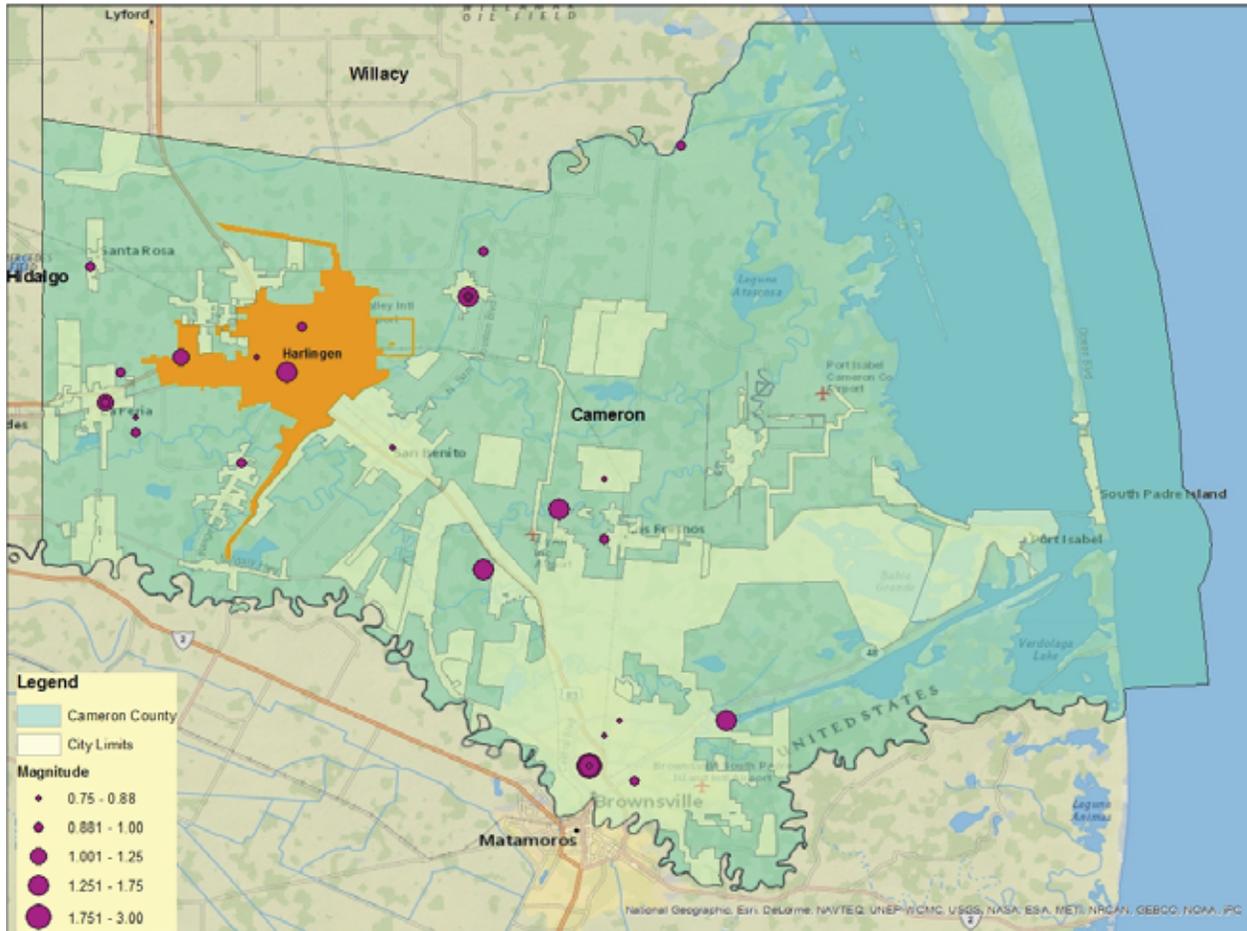
Historical evidence shown in Figure 11-1 depicts how the planning area is vulnerable to hail events overall, which typically result from severe thunderstorm activity. Indications are that 44 historical hail events are known to have impacted Cameron County between 1950 and 2012 (Table 11-2). These events were reported

¹ NCDC Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

SECTION 11: HAIL

to NCDC, NOAA, and SHELDUS databases, and may not represent all hail events to have occurred during the past 62 years. Only those events for Cameron County with latitude and longitude available were plotted on the map (Figure 11-1).

Figure 11-1. Spatial Historical Hail Events in Cameron County Planning Area, 1950–2012²



² Source: NOAA/NCDC Records.

SECTION 11: HAIL

Table 11-2. Historical Hail Impact for Cameron County Planning Area

JURISDICTION	NUMBER OF REPORTED EVENTS	MAXIMUM HAIL SIZE (INCHES)
Cameron County	44	4.00

Table 11-3. Historical Hail Events, 1950-2012³

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Harlingen	3/9/1994	07:10	1.75 in.	0	0	\$50,000	\$5,000
Brownsville	4/8/2003	08:25	3.00 in.	0	5	\$50,000,000	\$0
Stuart Place	5/12/2012	04:20	1.25 in.	0	0	\$500	\$0

Table 11-4. Summary of Historical Tornado Events, 1950-2012

JURISDICTION	EVENTS	MAGNITUDE (MAX EXTENT)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Harlingen	15	2.00 inches	0	0	\$50,500	\$5,000
Cameron County	44	4.00 inches	0	5	\$50,106,000	\$5,060,000

Significant Past Events

May 12, 2012 – City of Harlingen

A little more than a day after a thunderstorm system brought more severe weather to the Rio Grande Valley, the last vestige of very unstable air held forth mainly along and east of Highway 77. Despite unfavorable upper level conditions, the combination of the unstable air with a trigger in the form of a wind shift/dry line, which moved within striking distance of Highway 77, allowed a small but potent cluster of thunderstorms to explosively grow initially in northern Willacy County just before 4 PM CDT. These storms would produce south moving outflows, which added to the dryline trigger. Additional storms would fire in only a half hour, working on the very unstable atmosphere to increase updraft speed and develop at least quarter to half dollar sized hail between west Harlingen, La Feria, and points south between 5:15 and 5:45 PM CDT. Once again, there was some damage to vehicles caught in the hail, many containing jagged edges. Many residents were caught by surprise by the rapid development and moved their vehicles under gas station canopies, car washes, and highway underpasses. Nickel to quarter size hail was reported at Altas Palmas and Highway 83, and quarter size hail along Highway 83 on the west side of Harlingen. A report from the spouse of a NWS employee confirmed that a car windshield was broken from the hail.

³ Only recorded events with fatalities, injuries, and/or damages are listed.

SECTION 11: HAIL

April 8, 2003

One of the most destructive hail events in recorded history for the City of Brownsville occurred on this day. A severe thunderstorm emerged into Cameron County from northern Mexico and dropped large amounts of wind-driven hail upon the city. The hail destroyed roofs of homes and businesses, broke countless windows of automobiles and homes, and damaged vegetation. Approximately 10,000 insurance claims were filed in association with this storm. Most of the large hail reports occurred between 9:25 and 9:50 AM CDT. The Brownsville Police Department reported that 12 cruisers had windshields shattered by hail, and Hanna High School in central Brownsville reported 285 automobiles with windows broken by hail. Much of the northern and central portions of the city suffered damage from this intense and historic storm. The storm was heavily documented and covered in the media with widespread accounts of its damage. The storm proceeded eastward and downed power lines in the community of Laguna Vista.

March 9, 1994

A severe thunderstorm formed along the Rio Grande River as a cold front was moving through Deep South Texas. The storm produced hail up to one-inch in diameter and very strong wind gusts near Weslaco. As the storm moved eastward, it continued to produce hail in eastern Hidalgo and western Cameron County. Hail up to golf ball-size fell in the west side of Harlingen. Marble-size hail was reported between Weslaco and Harlingen in the towns of La Feria and Los Fresnos.



Probability of Future Events

Based on the 44 events over the last 62 years (1950 – 2012), it is probable that a hail event is a highly likely occurrence happening within the next year for the county planning area, including the City of Harlingen. Most hailstorms occur during the spring (March, April, and May) and in the fall during the month of September. Warning time for a hailstorm is generally minimal or there is no warning.

Vulnerability and Impact

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

Hail has been known to cause injury to humans, and occasionally has been fatal. Impact of hail experienced in the region has resulted in 5 injuries and no fatalities, supporting a possible limited severity of impact for Cameron County and the City of Harlingen meaning injuries would be treatable with first aid, minor quality of life would be lost, facilities would be shut down for 24 hours or less, and less than 10% of property would be destroyed.

SECTION 11: HAIL

Annualized loss is approximately \$1.5 million of damage occurring annually based on available data. Frequency of return of a hail event can be assumed to be 1 hail event every year.

Table 11-5. Hail Event Damage Totals, 1950-2012

JURISDICTION	NUMBER OF REPORTED EVENTS	PROPERTY DAMAGE	CROP DAMAGE	PROPERTY DAMAGE (2013 DOLLARS)	CROP DAMAGE (2013 DOLLARS)
City of Harlingen	15	\$50,500	\$5,000	\$79,102	\$7,860
Cameron County	44	\$50,106,000	\$5,060,000	\$63,606,406	\$28,102,715
Total Losses		\$55,166,000		\$91,709,122	

Table 11-6. Potential Annualized Losses by Jurisdiction, 1950-2012

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATES
City of Harlingen	\$86,962	\$1,976
Cameron County	\$91,709,122	\$1,479,179

SECTION 12: WILDFIRE

Hazard Description	1
Location and Historical Occurrences	1
Extent	5
Probability of Future Events.....	8
Vulnerability and Impact	8

Hazard Description

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

Wildfires can start as a slow burning flame along the forest floor, killing and damaging trees. They 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 fire.

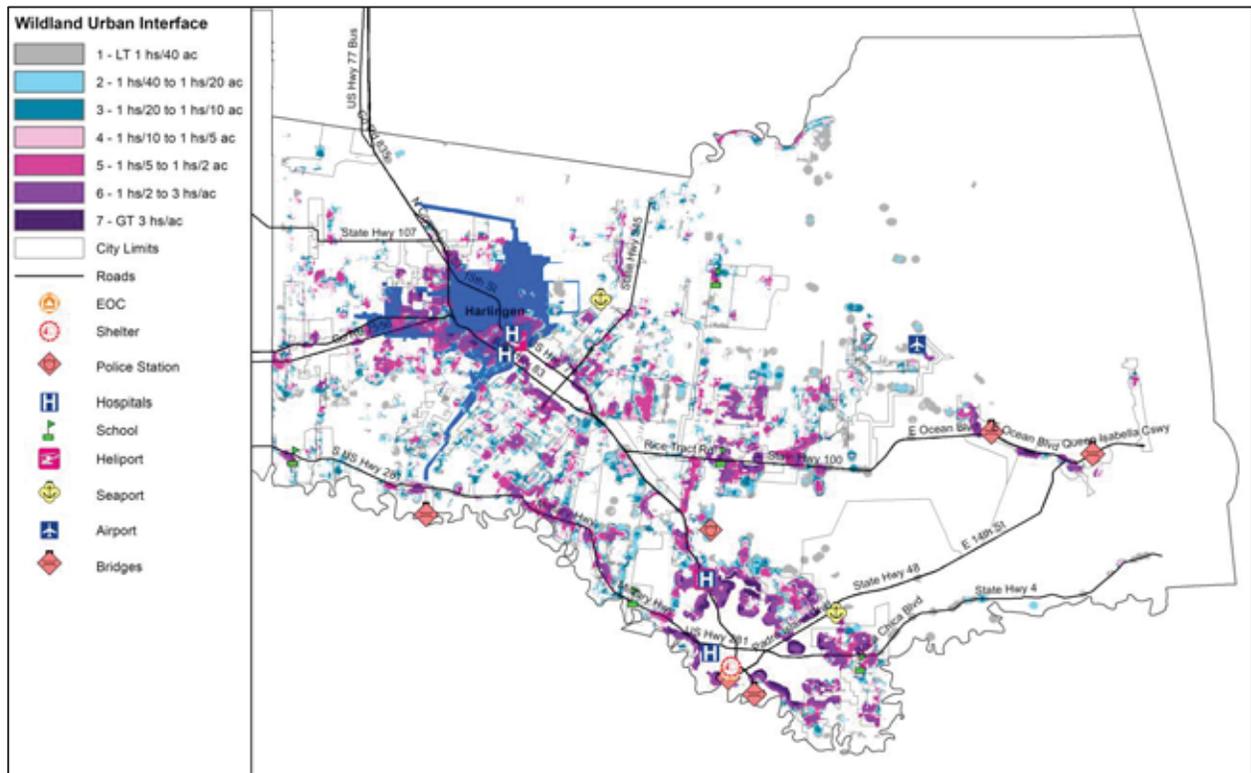
Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, interface, or intermix fires. Wildfires are fueled almost exclusively by natural vegetation while interface or intermix fires are urban/wildfires in which vegetation and the built-environment provide the fuel.

Location and Historical Occurrences

Wildfires can be a potentially damaging outgrowth of drought. While they are not confined to any specific geographic location, and can vary greatly in terms of size, location, intensity, and duration; they are most likely to occur in open grasslands. The threat to people and property is greater in the fringe areas where developed areas meet open grass lands for the Cameron County planning area (Figures 12-1 and 12-2). It is estimated that 36 percent of the total population in Cameron County live within the Wildland Urban Interface and 23 percent of the total population in the City of Harlingen.

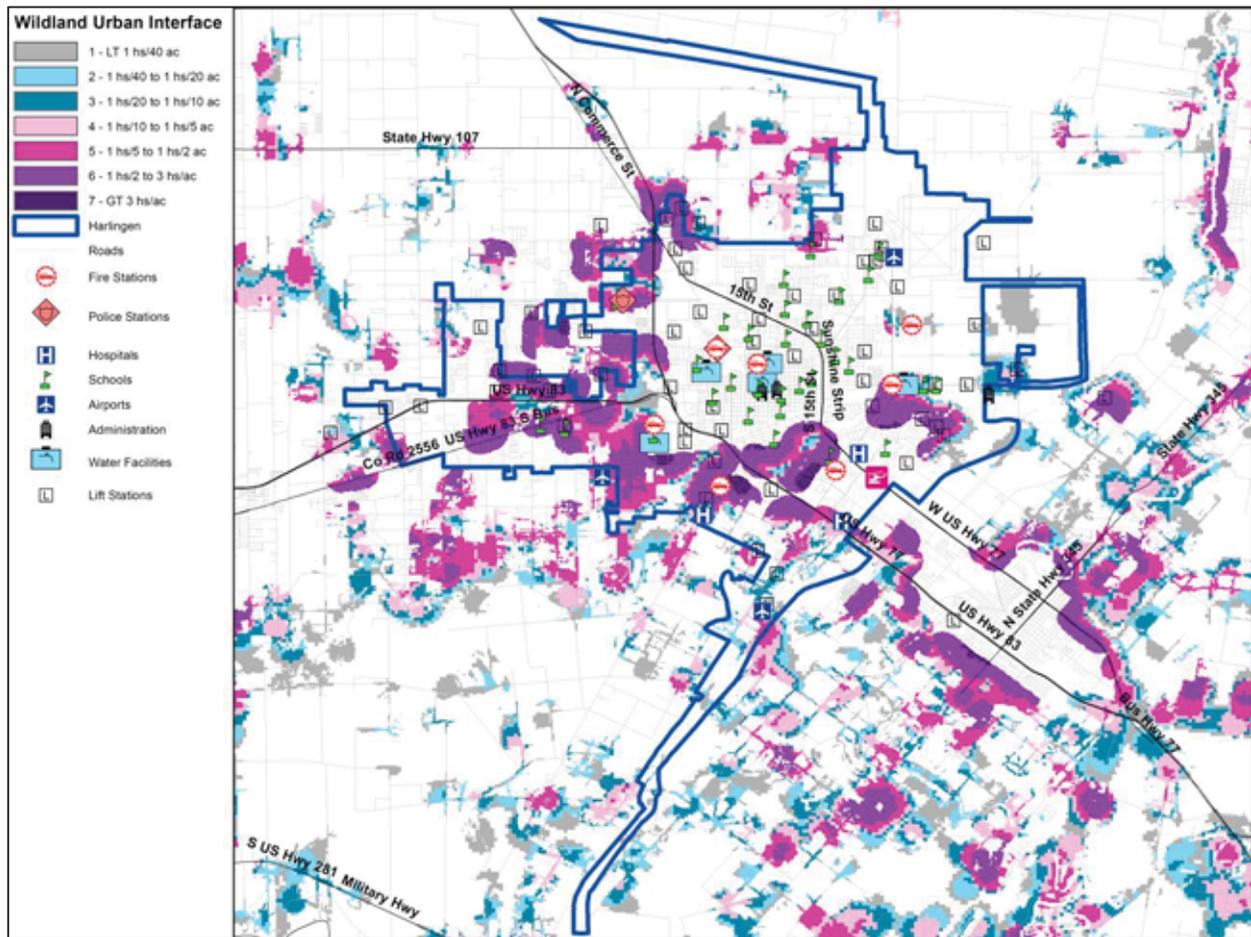
SECTION 12: WILDFIRE

Figure 12-1. Wildland Urban Interface Map – Cameron County



SECTION 12: WILDFIRE

Figure 12-2. Wildland Urban Interface Map – City of Harlingen



From 2005 to 2009 the Texas Forest Service (TFS) database reported 137 wildfire events within Cameron County lines. TFS started collecting wildfire data in 1985, but volunteer fire departments did not start reporting events until 2005. Prior to 2005, there are not any recorded wildfire events for Cameron County. Due to lack of recording prior to 2005, frequency calculations were based on a 7 year period, and only data received during those years were included in the calculations. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 12-3). Tables 12-1 thru 12-4 provide jurisdictional information (provided by local volunteer fire departments) on the number of wildfires by ignition causes, number of fires reported by year, number of fires by month, and acreage of suppressed wildfire by year.

SECTION 12: WILDFIRE

Figure 12-3. Location and Historic Wildfire Events for Cameron County Planning Area

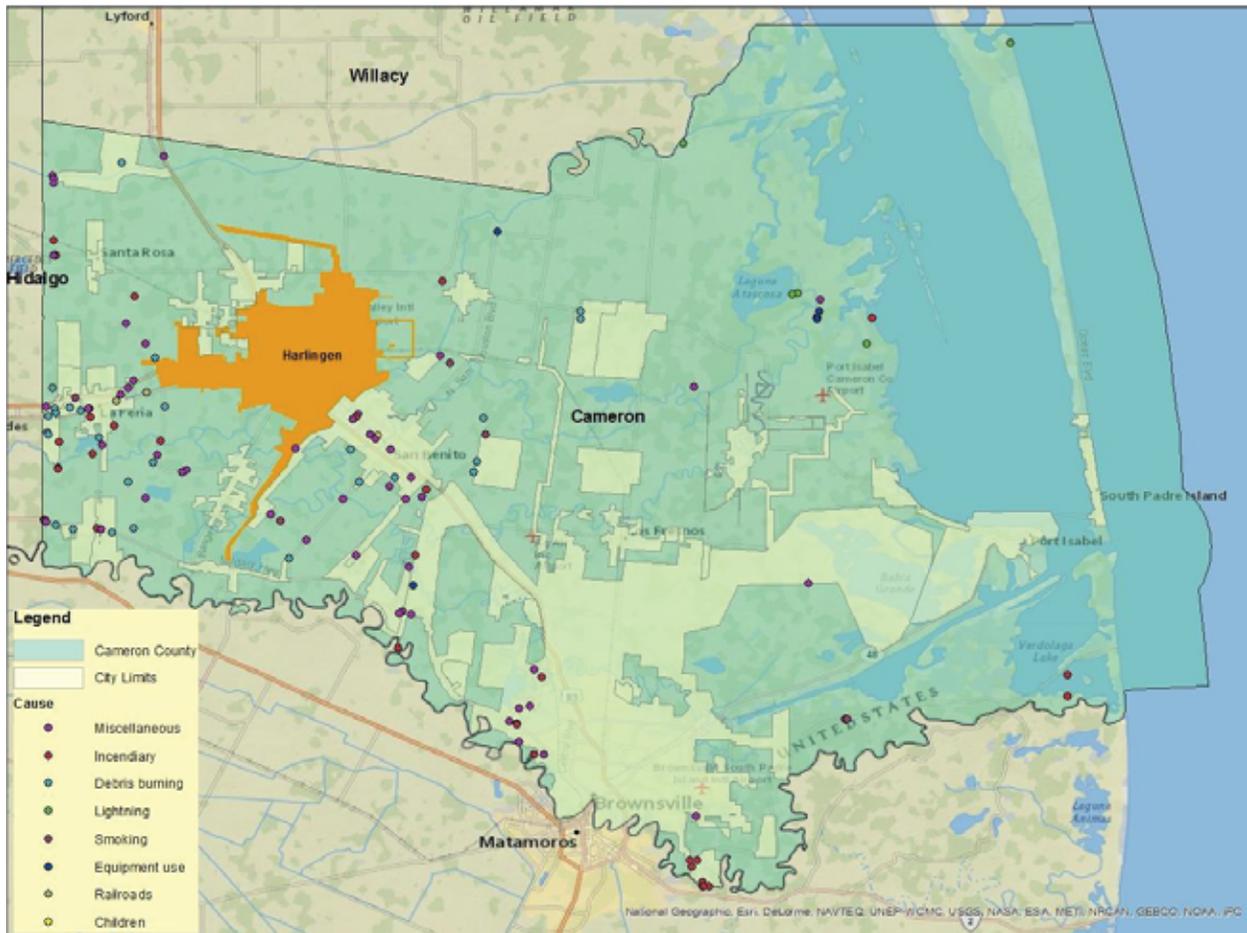


Table 12-1. Number of Wildfires by Cause

JURISDICTION	Campfire	Children	Debris Burning	Equipment Use	Incendiary	Lightening	Miscellaneous	Railroads	Smoking
Cameron County	0	1	24	4	37	5	55	2	4
City of Harlingen	0	0	1	0	0	0	1	0	0

Table 12-2. Number of Fires Reported By Year

JURISDICTION	2005	2006	2007	2008	2009
Cameron County	34	65	8	10	15
City of Harlingen	1	1	0	0	0

SECTION 12: WILDFIRE

Table 12-3. Number of Fires Reported By Month

JURISDICTION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Cameron County	17	13	24	31	8	10	10	5	1	2	1	10
City of Harlingen	1	0	0	0	0	0	0	0	0	0	0	1

Table 12-4. Acreage of Suppressed Wildfire by Year

JURISDICTION	2005	2006	2007	2008	2009
Cameron County	712.15	1,184.44	5.8	193.1	34.9
City of Harlingen	1	3	0	0	0

Extent

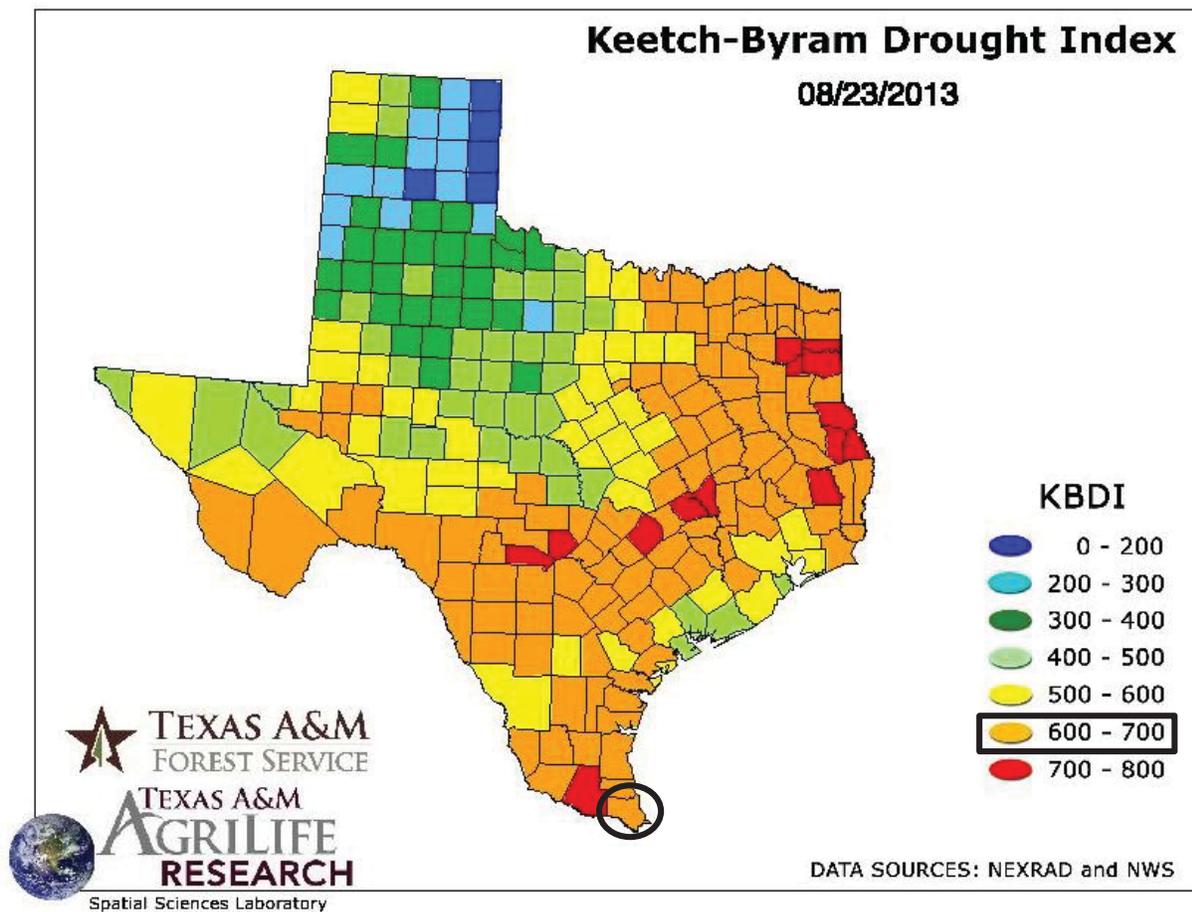
Fire risk is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, where a drought factor is balanced 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 on the map represents the drought index at that location. The drought index ranges from 0 to 800, where a drought index of 0 represents no moisture depletion, and an index of 800 represents absolutely dry conditions.

SECTION 12: WILDFIRE

Figure 12-4. KBDI for the State of Texas, 2013¹



Fire behavior can be categorized at four distinct levels:

- **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.
- **200 - 400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still 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.

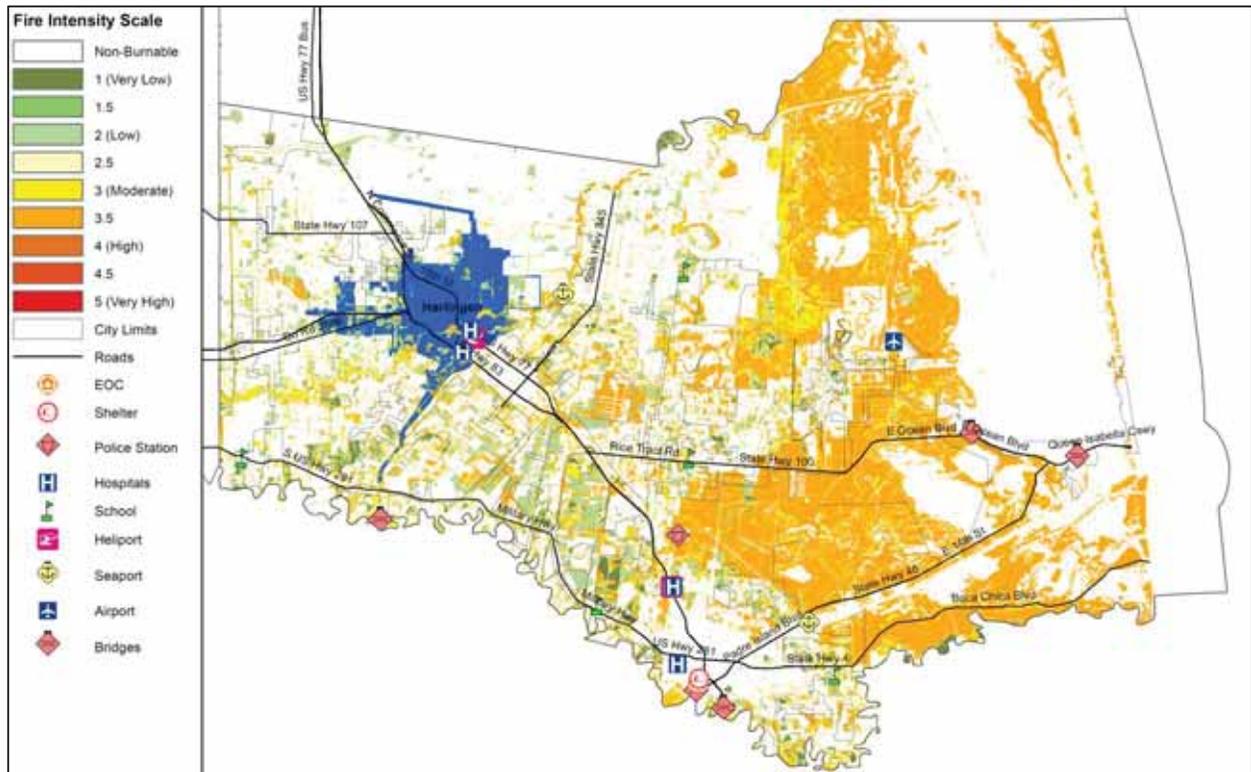
¹ Cameron County located within the black circle.

SECTION 12: WILDFIRE

Using the KBDI index is a good measure of the readiness of fuels for wildland fire. Caution should be exercised in dryer, hotter conditions, and the KBDI should be referenced as the area experiences changes in precipitation and soil moisture.

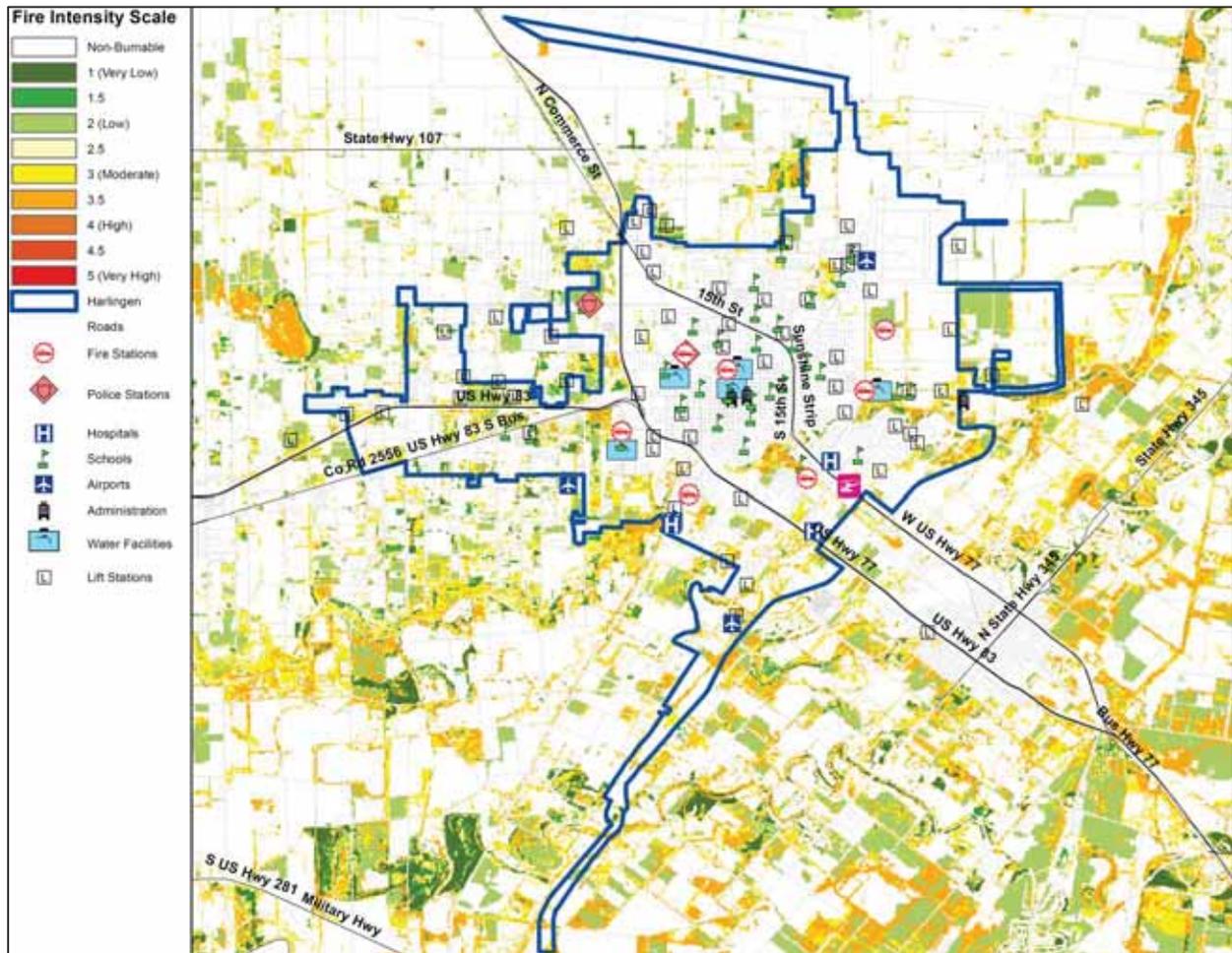
The range for intensity for Cameron County is within 600 to 700. The average extent to be mitigated for the Cameron County planning area, including the City of Harlingen is a KBDI index of 654. At this level fires will burn readily, exposing mineral soils. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity. Figures 12-5 and 12-6 identifies the wildfire intensity for Cameron County and the City of Harlingen.

Figure 12-5. Fire Intensity Scale Map – Cameron County



SECTION 12: WILDFIRE

Figure 12-6. Fire Intensity Scale Map – City of Harlingen



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 137 events in a 7 year period, an event within Cameron County, including the City of Harlingen 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 set the stage for wildfires. Areas along railroads and people whose homes are in rural woodland settings have an increased risk of being affected by wildfire.

The heavily populated, urban areas of Cameron County and the City of Harlingen are not likely to experience large, sweeping fires; areas outside of city limits and in the unincorporated areas of the County are vulnerable. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to

SECTION 12: WILDFIRE

wildfire. The overall level of concern for wildfires is located mostly along the perimeter of the study area where wildland and urban areas interface.

Areas along railroads and people with homes in wooded, rural areas have an increased risk of wildfire. The sparsely populated unincorporated areas of Cameron County are capable of experiencing large sweeping fires, especially where areas of vegetation are not maintained. In Cameron County, the critical facilities that would be a risk are Ben Wright Elementary, Santa Maria ISD Administration, Los Cuates Middle School, Las Yescas Elementary School, Port of Brownsville, Cameron County Sheriff Office, Harlingen Medical Center, Valley Regional Medical Center, and the Port Isabel Cameron County Airport.

Areas along major highways in the City of Harlingen have an increased vulnerability where empty lots and unoccupied areas are located. Critical facilities that would be at risk for wildfire for the City of Harlingen are the Shofner Farms Airport, Farmer's Co-op Airport, City of Harlingen Public Works, Harlingen Fire Department #3, Harlingen Fire Department #6, Harlingen Fire Department #7, South Texas Hospital, Rio Grande State Hospital, 25 lift stations, Cameron County Annex Police Station, wastewater treatment plant, and seven Harlingen CISD schools.

Within Cameron County, a total of 137 fire events were reported from 2005 to 2012. All of these events were suspected wildfires. Historic loss and annualized estimates due to wildfires are presented in Table 12-5 below. The frequency is approximately 20 events every year.

Table 12-5. Historic Loss Estimates Due to Wildfire²

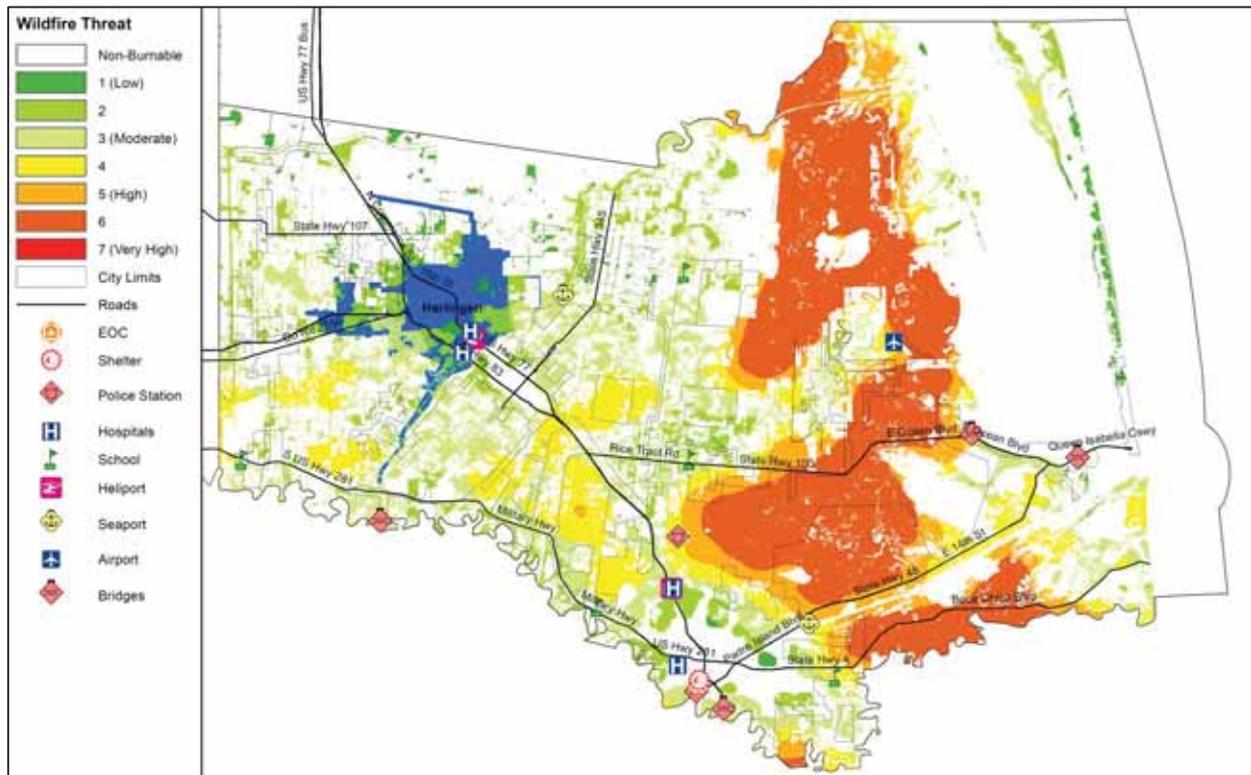
JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	INJURIES	DEATHS	ANNUAL ACRE LOSSES
City of Harlingen	2	4	0	0	0.57
Cameron County	137	2,130	0	0	304

Figures 12-7 and 12-8 show the threat of wildfire to Cameron County and the City of Harlingen.

² Events divided by 7 years of data.

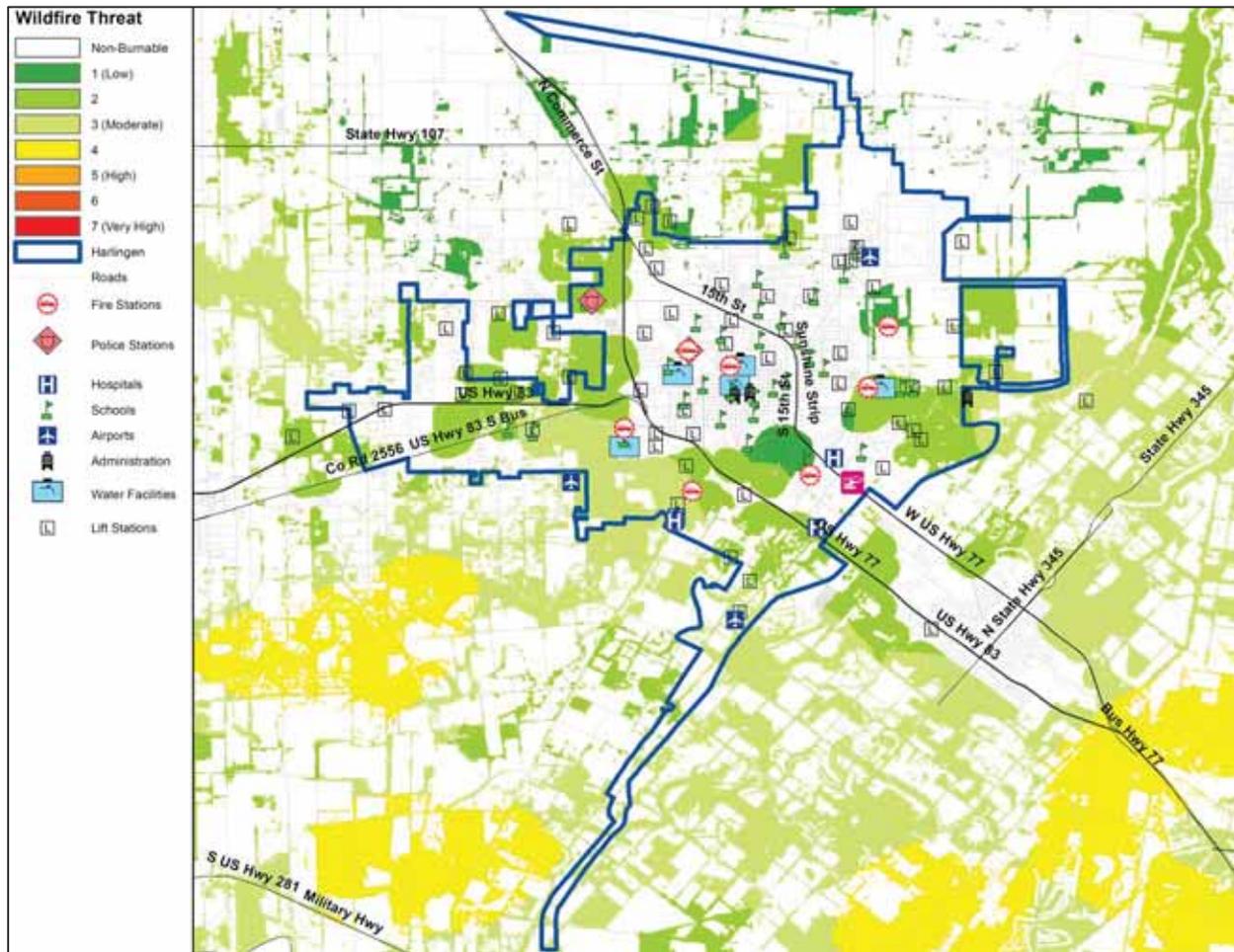
SECTION 12: WILDFIRE

Figure 12-7. Wildfire Threat – Cameron County



SECTION 12: WILDFIRE

Figure 12-8. Wildfire Threat – City of Harlingen



Diminished air quality may be a result of wildfire. The smoke plumes from wildfires can contain potentially carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long term effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to these effects.

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 these types of fires. The intensity of fires and the rate at which they spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact of major wildfire events can be substantial. Such events can cause multiple deaths, completely shut down facilities for thirty days or more, and cause more than fifty percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, and injuries and fatalities. For Cameron County and the City of Harlingen, the impact can be considered to be limited: injuries would be treatable with first aid, shutdown of critical facilities and services would be for 24 hours or less, and less than 10 percent of property would be destroyed or experience major damage.

SECTION 13: DAM FAILURE

Hazard Description	1
Location.....	2
Extent	5
Historical Occurrences	9
Probability of Future Events.....	9
Vulnerability and Impact	10

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 terrorists; and
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments, leading to structural failure.

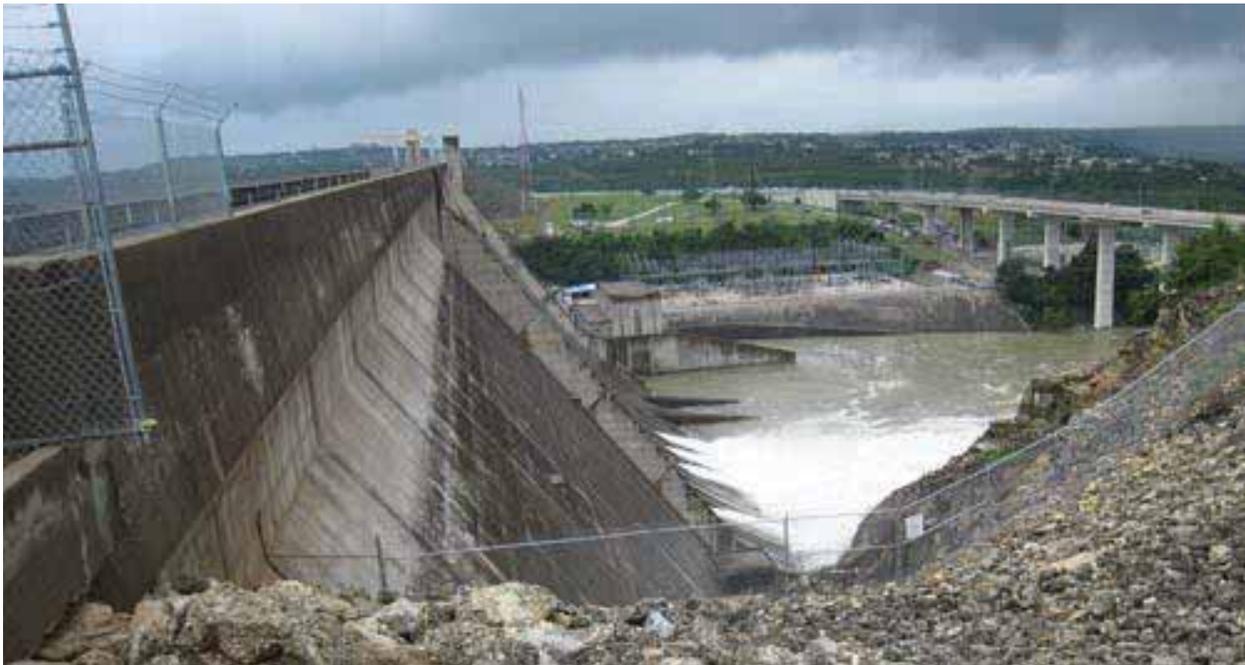
Benefits provided by dams include water supplies for drinking, irrigation and industrial uses; flood control; hydroelectric power; recreation; and navigation. At the same time, dams also represent a risk to public safety. Dams require ongoing maintenance, monitoring, safety inspections, and sometimes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

SECTION 13: DAM FAILURE

One major issue with the safety of dams is their age. The average age of America's 80,000 dams is 51 years. More than 2,000 dams near population centers are in need of repair, according to statistics released in 2009 by the Association of State Dam Safety Officials¹. 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 \$16 billion will be needed to fix all high-hazard dams, but the total for all state dam-safety budgets is less than \$60 million². 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 7,413 dams, all regulated by the Texas Commission on Environmental Quality (TCEQ). Of these, 854 are considered "high-hazard," 779 are considered "significant-hazard," and 5,780 are considered "low-hazard." According to the American Society of Civil Engineers' "Report Card," the Association of State Dam Safety Officials reports that there are 403 unsafe dams in Texas.³ For dams in Cameron County classifications, location, volume, elevation and condition information was provided and factored into the risk ranking in Figure 13-1, which illustrates general locations for each dam in the area. Currently, there are 42

¹ Association of State Dam Safety Officials, Journal of Dam Safety

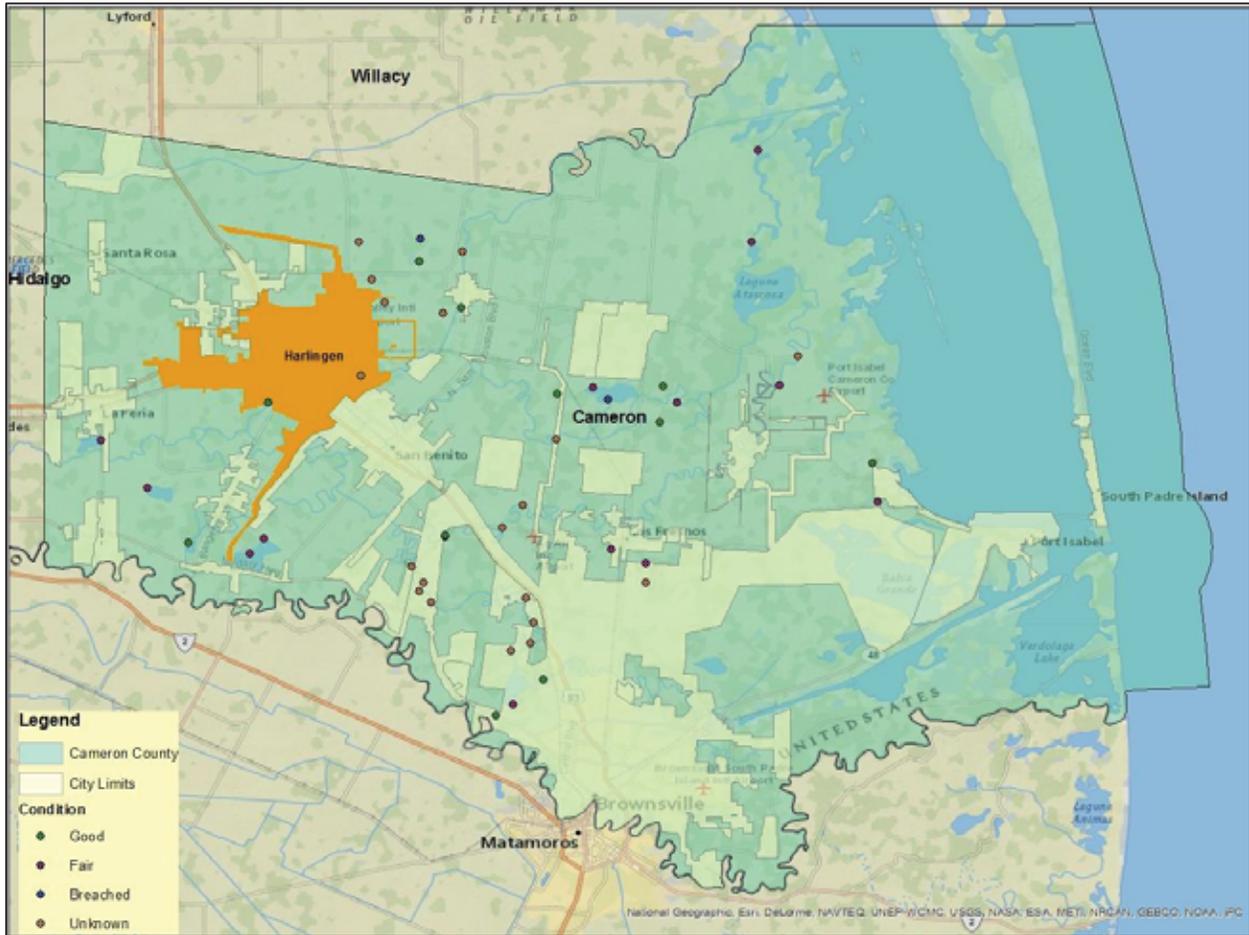
² Ibid

³ Source: <http://www.asce.org/reportcard/pdf/tx.pdf>

SECTION 13: DAM FAILURE

dams located in Cameron County. Thirty-eight of the dams are classified as “low- hazard” dams, one dam is classified as “significant-hazard” dams, and three dams are classified as “high-hazard” dams as recorded by the U.S. Army Corps of Engineers (USACE) in the National Inventory of Dams. All dams are listed in Table 13-1 with regulation information. Local level maps of each significant and high-hazard dam is provided below in Figures 13-2 through 13-4 to graphically illustrate flood risk areas. All low hazard dams have been omitted from the risk assessment due to their lack of risk to Cameron County and the City of Harlingen.

Figure 13-1. Dam Locations in Cameron County Planning Area



SECTION 13: DAM FAILURE

Table 13-1. Cameron County Planning Area Dam Survey

JURISDICTION	DAM NAME	HEIGHT (Ft.)	STORAGE (Acre Ft.)
Cameron County	CAMERON COUNTY FWSD DAM 1	7	1,900
Cameron County	DANA-TULE LEVEE 1	8	525
Cameron County	DANA-TULE LEVEE 2	8	374
Cameron County	CAIN DAM 2	8	336
Cameron County	MERCER DRY RESERVOIR LEVEE	7	2,000
Cameron County	SWEENEY LAKE WEST LEVEE	8	6,000
Cameron County	CAIN DAM 1	10	430
Cameron County	RANOHO VIEJO DAM SITE D	7	380
Cameron County	CAMERON COUNTY WID 16 DAM A	8	2,171
Cameron County	RUSSELL DAM 1	14	1,075
Cameron County	ROOS DAM A	7	800
Cameron County	ROOS DAM C	7	305
Cameron County	DISTRICT 17 LOS CUATES DAM	7	245
Cameron County	CAMERON CO ID NO 2 RESERVOIR NO 1 LEVEE	14	3,595
Cameron County	CAMERON CO ID NO 2 RESERVOIR NO 2 LEVEE	15	1,872
Cameron County	CULLEN THOMPSON DAM	7	168
City of Harlingen	DIXIELAND RESERVOIR	8	1,205
Cameron County	ABBOTT DAM	9	120
Cameron County	MONTGOMERY DAM	21	505
Cameron County	CUATES DAM NO 1 AND NO 2	8	425
Cameron County	WARDNER LEVEE	10	505
Cameron County	ADAMS GARDENS RESERVOIR LEVEE	16	4,100
Cameron County	LA FERIA RESERVOIR LEVEE	20	2,480
Cameron County	MCCLOUD - HOOD LEVEE	15	660
Cameron County	CANTWELL MAIN LEVEE	9	235
Cameron County	CANTWELL AUXILIARY LEVEE	7	126
Cameron County	ESPERANZA FARMS LEVEE	7	300
Cameron County	MAIN RESERVOIR LEVEE	9	4,500
Cameron County	LAKEWAY SUBDIVISION LAKE DAM	8	122
Cameron County	CAMERON CO WCID NO 1 RESERVOIR DAM	12	1,200

SECTION 13: DAM FAILURE

JURISDICTION	DAM NAME	HEIGHT (Ft.)	STORAGE (Acre Ft.)
Cameron County	LMB CORPORATION RESERVOIR DAM	12	550
Cameron County	RANCHO VIEJO DAM A	7	295
Cameron County	RANCHO VIEJO DAM B	7	150
Cameron County	RANCHO VIEJO DAM C	7	300
Cameron County	RANCHO VIEJO DAM D	8	255
City of Harlingen	TREASURE HILLS DAM	9	129
Cameron County	CAMERON CO FWSD NO 1 RES NO 3 LEVEE	10	283
Cameron County	CAMERON COUNTY FWSD NO 1 RESERVOIR NO 4 LEVEE	10	953
Cameron County	RAW WATER RESERVOIR NO 2 LEVEE	10	87
Cameron County	LOMA ALTA DAM	15	750
Cameron County	LAGUNA ATASCOSA CROSSING 1 DAM	7.7	34,579
Cameron County	LAGUNA ATASCOSA CROSSING 2 DAM	7.4	19,248

As there are no inundation maps for the planning area, in order to determine location of potential total exposure for each dam can be estimated by using 2010 census population and building inventory data from HAZUS-MH, in combination with the location and maximum storage capacity of high and significant hazard dams. For dams with a maximum storage capacity of 100,000 acre-feet or more, all census blocks within five miles are considered to be at risk to potential dam failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, all census blocks within one mile are considered to be at risk to potential dam failure hazards. With developments downstream of the dams, all populations located downstream of the dams are considered to be at risk to potential safety hazard if a dam failure occurred, especially the area downstream at a lower elevation.

Extent

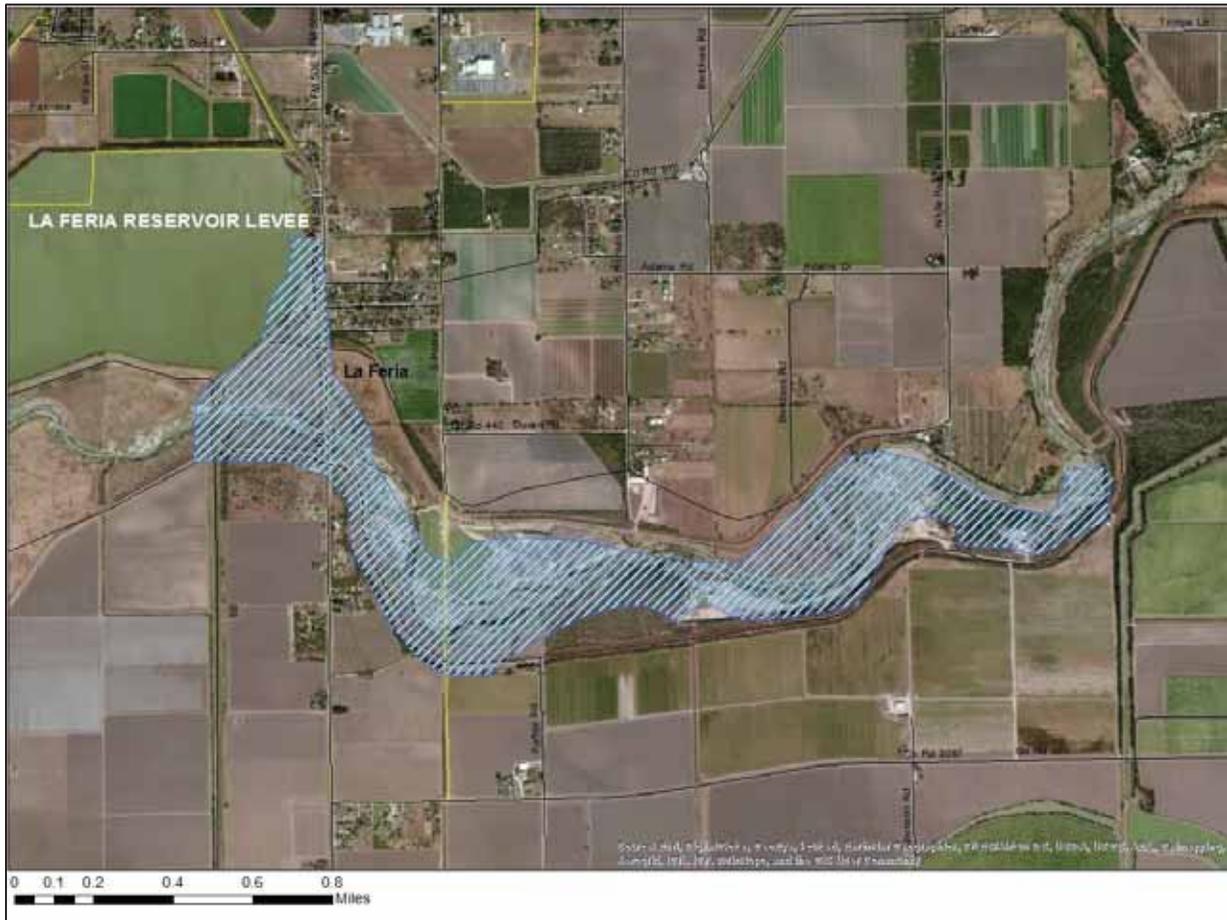
The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam's failure; not the probability of failure. The National Interagency Committee on Dam Safety defines high hazard dams as those where failure or mis-operation would cause loss of human life. Prior to 2009, high hazard dams were defined as those at which failure or mis-operation would probably cause loss of human life. Dams classified as "significant" were those at which failure or mis-operation probably would not result in loss of human life but could cause economic loss, environmental damage, and disruption of lifeline facilities or other significant damage. Low hazard potential dams are those at which failure or mis-operation probably would not result in loss of human life but would cause limited economic and/or environmental losses. Losses would be limited mainly to the owner's property. Classifications for extent after 2009 are found in Table 13-2 below.

SECTION 13: DAM FAILURE

Table 13-2. Extent Classifications

HAZARD POTENTIAL CLASSIFICATION	LOSS OF HUMAN LIFE	DAM STORAGE CAPACITY
Low	None Expected	Less than 10,000 acre-feet
Significant	Probable (1 to 6)	Between 10,000 and 100,000 acre-feet
High	Loss of Life Expected (7 or More)	100,000 acre-feet or more

Figure 13-2. La Feria Reservoir Levee Flood Risk Areas



La Feria Reservoir Levee Dam is located in unincorporated rural west Cameron County right next to the City of La Feria. It uses off-channel water from the Arroyo Colorado River and is used for irrigation purposes. It is owned by La Feria Id Cameron County No. 3 and was constructed in 1926 by earthen construction with a core of homogeneous, earth. Populations in the plan area and critical facilities would not be directly impacted. If there was a breach, it is estimated the average breach width would be 141.8 ft. with a maximum breach flow of 37,413 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. It is

SECTION 13: DAM FAILURE

estimated that the water would flow downstream for 310 miles at the depth of 15 feet. However, there may be significant environmental effects that result in flooding that disperses debris and hazardous materials downstream, damaging local ecosystems.

Figure 13-3. Cameron Co WCID No 1 Reservoir Dam Flood Risk Areas



Cameron County WCID No 1 Reservoir is located in unincorporated rural south-central Cameron County near Rangerville. It uses off-channel water from the Reservoirca Del Rancho Viejo River and is used for irrigation purposes. It is owned by the Harlingen Irrigation District and was constructed in 1953 by earthen construction with a core of homogeneous, earth. Populations in the plan area and critical facilities would not be directly impacted. If there was a breach, it is estimated the average breach width would be 104.1 ft. with a maximum breach flow of 12,559 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. It is estimated that the water would flow downstream for 150 miles at the depth of 9 feet. However, there may be significant environmental effects that result in flooding that disperses debris and hazardous materials downstream, damaging local ecosystems.

SECTION 13: DAM FAILURE

Figure 13-4. Raw Water Reservoir No 2 Levee Flood Risk Areas



Raw Water Reservoir No. 2 Levee Dam is located in the City of Los Fresnos in Cameron County and is an off-channel river and is used for flood control purposes. It is owned by the City of Los Fresnos and was constructed in 1996 by earthen construction with a foundation of soil. A dam failure could cause power outages and disrupt utilities systems and populations in the planning area would be vulnerable. If there was a breach, it is estimated the average breach width would be 51.6 ft. with a maximum breach flow of 4,401 cubic feet per second according to the National Weather Service (NWS) Dam Break Equation. It is estimated that the water would flow downstream for 11 miles at the depth of 7.5 feet. There may be significant environmental effects that result in flooding that disperses debris and hazardous materials downstream, damaging local ecosystems.

The extent or average magnitude of a dam failure event that could be expected for the county and the City of Harlingen, therein is shown in Table 13-3. The extent classification was determined by taking the average of dams in each 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 13: DAM FAILURE

Table 13-3. Extent by Jurisdiction

JURISDICTION	DAMS & CLASSIFICATION	EXTENT CLASSIFICATION	LEVEL OF INTENSITY TO MITIGATE
Cameron County	42 – Total 38 – Low 1 – Significant 3 – High	Significant	The County has 1 significant hazard dam and 3 high hazard dams. One of the high hazard dams is located in a semi-densely populated area, therefore dam failure presents a significant threat. Loss of life is probable and economic loss could be significant in the event of a failure.
City of Harlingen	2 – Total 2 – Low	Low	Both Dixieland Reservoir and Treasure Hills Dam are considered to be low risk dams, and have below 1,205 acre feet of storage capacity. Loss of life is not expected in the event of a failure.

Historical Occurrences

There are about 80,000 dams in the United States today.⁴ 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, nine major dams failed worldwide. Some of the largest disasters in the U.S. have resulted from dam failures. More than 520 dam incidents, including 21 dam failures, were reported in the past two 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 twentieth 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 Cameron County planning area.

Probability of Future Events

No historical events of dam failure have been recorded in the Cameron County planning area, including the City of Harlingen 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 ten years.

⁴ Federal Emergency Management Agency, Dam Safety Program, available at: <http://www.fema.gov/hazards/damsafety/>

SECTION 13: DAM FAILURE

Vulnerability and Impact

There are 42 dams in the Cameron County planning area that are classified as high, significant, and low hazard dams that are located in both rural and populated areas. 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 amount of low and significant hazard dams in the county.

Flooding is the most prominent effect of dam failure. If the dam failure is severe, 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. In addition debris carried downstream can block traffic flow, cause power outages, and disrupt local utilities such as water and wastewater, which could result in school closures if severe.

Annualized loss-estimates for dam failure are not available; neither is a breakdown of potential dollar losses of critical facilities, infrastructure and lifelines, or hazardous-materials facilities is not available. If a major dam should fail, however, the severity of impact could be substantial.

Aerial maps indicate areas with populations and critical facilities close to some of the dams and known to be vulnerable, therefore the potential severity of impact of dam failure could be substantial. 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. For these reasons, creating mitigations actions to remove or protect people and structures from the path of destruction is necessary in order to minimize impact from dam failure.

SECTION 14:

MITIGATION STRATEGY

Mitigation Goals	1
Goal 1.....	1
Goal 2	1
Goal 3.....	2
Goal 4	2
Goal 5.....	3

Mitigation Goals

Based on the results of the risk and capability assessments, the Cameron County and City of Harlingen Planning Team was able to develop and prioritize the mitigation strategy. At the Mitigation Workshop held on October 9th, 2013, Planning Team members refined the mitigation strategy for the Hazard Mitigation Action Plan, or the *Plan*, choosing to maintain the overall goal of reducing and eliminating the long-term risk of loss of life and property damage from the full range of disasters.

Goal 1

Protect public health and safety in the county.

Objective 1.1

Maintain critical facilities.

Objective 1.2

Maximize the 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

Protect new and existing properties.

SECTION 14: MITIGATION STRATEGY

Objective 2.1

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

Objective 2.2

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

Objective 2.3

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

Goal 3

Build and support partnerships to enhance mitigation to continuously become less vulnerable to hazards.

Objective 3.1

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

Objective 3.2

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

Objective 3.3

Build hazard mitigation concerns into planning and budgeting processes.

Goal 4

Leverage outside funds for investment in hazard mitigation.

Objective 4.1

Maximize the use of outside sources of funding.

Objective 4.2

Maximize participation of property owners in protecting their properties.

Objective 4.3

Maximize insurance coverage to provide financial protection against hazard events.

Objective 4.4

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

SECTION 14: MITIGATION STRATEGY

Goal 5

Increase the understanding of residents for the need for mitigation, and steps they can take to protect people and properties.

Objective 5.1

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

Objective 5.2

Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards.

Objective 5.3

Publicize and encourage the adoption of appropriate hazard mitigation measures.

SECTION 15: MITIGATION ACTIONS

Summary	1
Cameron County	3
City of Harlingen	17
County-Wide.....	115

Summary

As discussed in Section 2, the mitigation workshop, comprised of key community officials and City and County departments, developed 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 STAPLEE criteria, which includes consideration of the social, technical, administrative, political, legal, economic, and environmental factors 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 all costs associated with it. As a result of this exercise, a ranking 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 prioritized for implementation 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 may not be implemented until “High” and “Moderate” actions have been completed.

All mitigation actions created by Planning Team members are presented in this section. Individual actions by jurisdictions and/or participating entities are found at the beginning of this section. County-wide mitigation actions are found at the end of the section. Table 15-1 indicates that the minimum criteria have been met for development of a comprehensive range of mitigation actions per current state and FEMA Guidelines, including two actions per hazard, per jurisdiction.

SECTION 15: MITIGATION ACTIONS

Table 15-1. Mitigation Action Matrix

Jurisdiction	Dam Failure	Drought	Extreme Heat	Flood	Hail	Hurricane Wind	Thunderstorm	Tornado	Wildfire
Cameron County	XX	XX	XX	XXXX	XX	XX	XX	XX	XX
City of Harlingen	XX	XXXX	XX	XXXX	XX	XX	XX	XX	XX

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

SECTION 15: MITIGATION ACTIONS

Cameron County

Cameron County – Action #1 (NFIP)	
Proposed Action:	Flood proof basement of the County Emergency Management Office by incorporating Floodproofing components that may include floodwalls, small localized levees, pumps, berms around buildings, or a combination thereof.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Dancy Bldg. 1100 E. Monroe, Brownsville, TX 78520
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce impact of flooding on first responder and emergency operations; ensure continuance of critical operations during flood event; reduce cost to repair and maintain structure following a flood event
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce cost to repair and maintain structure
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGF
Lead Agency/Department Responsible:	Emergency Management office
Implementation Schedule:	2014-2020
Incorporation into Existing Plans:	Emergency Operations Plan, Floodplain Mgmt. Plan, Flood Response Plan

COMMENTS
The Dancy Building basement previously experienced flooding, requiring sandbagging and evacuation of employees. As the County EOC is located in the building, the Emergency Operations Center could be forced to shut down.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #2	
Proposed Action:	Install temporary cooling stations at county facilities to aid low income and elderly residents during extreme heat events
BACKGROUND INFORMATION	
Jurisdiction/Location:	County facilities: San Benito Annex (Health Dept.), Isla Blanca Park/Recreation Center, Dancy Building, Lucio Clinic, and possible other sites
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce health risk, loss of life to a segment of population without air-conditioning
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems 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):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	HUD grant/ CDBG/ HMGP
Lead Agency/Department Responsible:	County Health and Hospital Authority
Implementation Schedule:	1-3 Years
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS
Cooling stations may be installed at county parks, recreation centers or other facilities; some may include misting areas.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 3; Legal = 5; Economically Sound = 2; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #3	
Proposed Action:	Install hail guards on A/C units for all Cameron County critical facilities
BACKGROUND INFORMATION	
Jurisdiction/Location:	County critical facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Increase efficiency of units by minimizing debris damage, reduce electrical costs, reduce health risk from overheating units unable to properly cool buildings
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Retrofit and protect all buildings
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	County maintenance dept.
Implementation Schedule:	2014
Incorporation into Existing Plans:	Emergency Operations. Continuity of Operations 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 = 3; Administratively Possible = 2; Politically Acceptable = 3; Legal = 5; Economically Sound = 2; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #4	
Proposed Action:	Relocate the Emergency Operations Center (EOC) to an existing county structure at a higher elevation and retrofit with enhanced wind protection
BACKGROUND INFORMATION	
Jurisdiction/Location:	County facility
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure essential operations continue and protect residents from all natural hazard and disaster events
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind
Effect on New/Existing Buildings:	Secure EOC structure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000,000
Potential Funding Sources:	HGMP, Homeland Security grants
Lead Agency/Department Responsible:	Cameron County Emergency Management
Implementation Schedule:	2015-2019
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS
Current EOC is located in basement of Dancy Building which is prone to flooding during severe rain events and hurricane.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #5	
Proposed Action:	Install permanent and mobile back-up generators on county critical facilities
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical facilities in county
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensures vital services continue to function in an emergency
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind, Flood, Tornado, Thunderstorm, Extreme Heat
Effect on New/Existing Buildings:	Provide back-up power for new and existing buildings in the event of a disaster.
Priority (High, Moderate, Low):	High
Estimated Cost:	\$300,000
Potential Funding Sources:	General Revenue, Grants
Lead Agency/Department Responsible:	Cameron County Emergency Management
Implementation Schedule:	2014-2015
Incorporation into Existing Plans:	Emergency Operations, Continuity of Operations 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #6	
Proposed Action:	Work with General Land Office to develop and implement a dune restoration plan to protect roads and minimize washouts from flooding and tidal surge
BACKGROUND INFORMATION	
Jurisdiction/Location:	Coastal areas of county
Risk Reduction Benefit (Current Cost/Losses Avoided):	Prevent County, State, and Federal agencies from having to continually incur repair costs and prevent loss of life and property
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind
Effect on New/Existing Buildings:	Continue essential services to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000,000
Potential Funding Sources:	State and Federal Grants
Lead Agency/Department Responsible:	Cameron County Parks and Recreation, GLO
Implementation Schedule:	24 months after start date
Incorporation into Existing Plans:	Flood 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 = 3; Technically Feasible = 3; Administratively Possible = 2; Politically Acceptable = 3; Legal = 5; Economically Sound = 2; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #7	
Proposed Action:	Update the existing Regional Mobility Authority Plan (RMA) to include long-range planning mechanisms
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County
Risk Reduction Benefit (Current Cost/Losses Avoided):	The RMA would provide a mechanism for long-range planning, administration and implementation of structural projects to mitigate hazards
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Response Action not funded under federal grant programs

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Hail, Thunderstorm, Tornado, Drought
Effect on New/Existing Buildings:	Reduction of damage for new and existing buildings
Priority (High, Moderate, Low):	High
Estimated Cost:	\$16,000,000
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	County Administrator
Implementation Schedule:	2014
Incorporation into Existing Plans:	Annual Budget, Stormwater Plan, 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 = 2; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 2; Legal = 5; Economically Sound = 4; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #8	
Proposed Action:	Remove debris from beaches that may act as projectiles and damage and exacerbate erosion on shorelines
BACKGROUND INFORMATION	
Jurisdiction/Location:	Coastal areas of County
Risk Reduction Benefit (Current Cost/Losses Avoided):	Removing hazardous debris from the beaches will make recreational areas safer and cleaner for the residents of Cameron County
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Preparedness Action not eligible under federal grant programs

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Coastal Erosion, Hurricane Wind, Thunderstorm, Flood, Tornado
Effect on New/Existing Buildings:	Minimize debris that can damage/destroy structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$85,000
Potential Funding Sources:	State or Federal funds, General Land Office
Lead Agency/Department Responsible:	Parks and Recreation
Implementation Schedule:	2014
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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #9 (NFIP)	
Proposed Action:	Survey structures and implement a FEMA buyout for repetitive loss flood prone structures
BACKGROUND INFORMATION	
Jurisdiction/Location:	Green Valley Farms, Kendall Street, Tio Cano Lake & White Ranch Road area, Iowa Gardens, Laureles Subdivision
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Restore natural flood prone areas, reduce loss to NFIP Program, remove unsafe structures from flood prone areas, reduce loss of lives from flooding
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Remove repetitive loss structures from floodplain
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$15,000,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Floodplain Administrator
Implementation Schedule:	2017
Incorporation into Existing Plans:	Annual Budget, Flood Ordinance, Flood 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #10	
Proposed Action:	Work with General Land Office to develop a living coastline constructed from natural materials derived from regional materials such as rock and seagrass
BACKGROUND INFORMATION	
Jurisdiction/Location:	Laguna Madre area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk of dune washout
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind
Effect on New/Existing Buildings:	Protect coastal properties
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$5 Million
Potential Funding Sources:	State land office grants, HMGP
Lead Agency/Department Responsible:	County Parks & Recreation, TX Parks & Recreation, GLO
Implementation Schedule:	2015-2020
Incorporation into Existing Plans:	Dune Restoration 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #11	
Proposed Action:	Create and implement a wildfire recovery plan to address soil erosion control and vegetative recovery
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated areas in county
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare; protect natural habitat area
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Minimize wildfire damage to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Grant, General Fund, Texas Forest Service
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise, Fire Code

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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #12	
Proposed Action:	Conduct a Public Education Campaign to address extreme heat
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides education to the public on the dangers of extreme heat; reduces the risk to public health and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems 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:	Grant, General fund, CDBG
Lead Agency/Department Responsible:	Health Department, CDBG
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan, County Health Dept. Regs

COMMENTS
Provide information on EOC website regarding location of cooling stations, dangers of working outdoors in extreme heat, care for pets in extreme heat and drought 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 = 4; Technically Feasible = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #13	
Proposed Action:	Conduct a public education campaign through social media regarding relocating or elevating HVAC and utility systems in and around the home in the event of dam failure
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to public health, safety, and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Effect on New/Existing Buildings:	Educate residents on protecting structures/evacuation
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Grant, General fund
Lead Agency/Department Responsible:	Public Works, Engineering, Public Information Officer
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations, Evacuation Plan

COMMENTS
Develop a public awareness campaign regarding evacuation routes, safety information, documentations needed for re-entry into evacuated areas, medical transportation, shelters, and animal care facilities and evacuations procedure for people with pets, etc. Will include development of brochures, fliers, T.V. and/or radio spots, webpage development; Requires coordination with multiple agencies and departments.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #14	
Proposed Action:	Conduct a public education campaign for drought
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides an increase level of preparedness to reduce risk to public health, safety, and welfare, reduce risk to agricultural and wildlife; ensure continued essential water supply
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Xeriscape plantings protect exposure of buildings to extreme heat temperatures and drought conditions
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grants, General funds
Lead Agency/Department Responsible:	VFD, County Fire Depts.
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise Plan, County Health Dept. Regs.

COMMENTS
Develop pre-disaster activities to increase the level of preparedness in county, create mitigation actions to identify/address the slow on set nature of drought; Partner with fire department, water works, irrigation and drainage districts, agriculture groups, conservation groups, and wildlife groups; look into alternate technologies and methodologies for water conservation including xeriscaping.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #15	
Proposed Action:	Improve Animal Shelter capability during and following disaster events by expanding capacity, and upgrading and reinforcing county shelter
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County Animal Shelter, 26957 FM 510, San Benito, TX 78586
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduced risk to public health, safety and general welfare to animals and the general public; eliminate displaced animals due to an event.
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project not eligible under federal grant programs.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm, Hurricane
Effect on New/Existing Buildings:	Expand and upgrade facility
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000
Potential Funding Sources:	Grants
Lead Agency/Department Responsible:	Cameron County Dept. of Health and Human Services
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise Plan, County Health Dept. Regs.; Emergency Plan

COMMENTS
Referencing Appendix O, Animal Response Plan, State of Texas Emergency Management Plan, “An occurrence or event, natural or human-caused, requires an emergency response to protect life or property, including animals. “Evacuees, seeking shelter in hosting areas, have the primary responsibility for caring for their animals in an emergency incident or disaster and will need appropriate sheltering for their pets and livestock. Currently the Cameron County Shelter is not sufficient to accommodate large number of displaced domestic or livestock animals during a disaster 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)

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #16	
Proposed Action:	Upgrade codes and regulations to require burying power lines in conjunction with new construction in coastal areas
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and incorporated boundaries along coastline
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduced risk to public health, safety and general welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind, Tornado, Flood, Thunderstorm
Effect on New/Existing Buildings:	Expand and upgrade existing lines
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000
Potential Funding Sources:	Grants
Lead Agency/Department Responsible:	Cameron County Electric Utility
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Plan, 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 = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #17	
Proposed Action:	Upgrade existing wooden power poles to concrete along coastal areas
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and incorporated boundaries along coastline
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduced risk to public health, safety and general welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind, Tornado, Flood
Effect on New/Existing Buildings:	Expand and upgrade existing lines
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000
Potential Funding Sources:	Grants
Lead Agency/Department Responsible:	Cameron County Electric Utility Services
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Plan, 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 = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #18	
Proposed Action:	Work with General Land Office to implement beach nourishment activities to sustain dune protection from storm surge and erosion
BACKGROUND INFORMATION	
Jurisdiction/Location:	Laguna Madre area and coastal areas of county
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk of dune washout
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind
Effect on New/Existing Buildings:	Protect coastal properties
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5 Million
Potential Funding Sources:	State land office grants, HMGP
Lead Agency/Department Responsible:	County Parks & Recreation, TX Parks & Recreation, GLO
Implementation Schedule:	2015-2020
Incorporation into Existing Plans:	Dune Restoration 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #19	
Proposed Action:	Develop and implement a Drought Emergency Plan to protect new and existing buildings during wildfire events
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated county areas
Risk Reduction Benefit (Current Cost/Losses Avoided):	Ensure essential water supplies to protect structures during extreme drought conditions
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce potential fire danger to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	Texas Forest Service, FireWise
Lead Agency/Department Responsible:	Parks & Recreation
Implementation Schedule:	2016
Incorporation into Existing Plans:	FireWise Plan, Fire 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 = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #20	
Proposed Action:	Install shutters on glass windows and doors to protect critical facilities during severe hail and thunderstorm events, hurricane wind, and tornado
BACKGROUND INFORMATION	
Jurisdiction/Location:	Key critical facilities within county area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce continued glass replacement and repairs; reduce possible injury to county staff and residents due to flying glass during severe weather events
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Hurricane Wind, Tornado, Thunderstorm
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$350,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2015-2016
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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #21	
Proposed Action:	Become a “StormReady” community to reduce risk and damage caused by hail, tornado, and thunderstorm events
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated county
Risk Reduction Benefit (Current Cost/Losses Avoided):	Assist residents in preparing, mitigating risk to hail, tornado, and thunderstorms
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Tornado, Thunderstorm
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2015-2016
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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #22	
Proposed Action:	Remove dead and downed trees to decrease fire fuels in Wildland Urban Interface (WUI) areas
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated county areas
Risk Reduction Benefit (Current Cost/Losses Avoided):	Natural landform protection and reduced risk of loss of property due to wildfire
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Effect on New/Existing Buildings:	Reduce potential fire danger to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000
Potential Funding Sources:	Texas Forest Service, FireWise
Lead Agency/Department Responsible:	Parks & Recreation
Implementation Schedule:	2016
Incorporation into Existing Plans:	FireWise Plan, Fire 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 = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #23	
Proposed Action:	Install hail guards on HVAC systems supporting critical facilities and to protect against severe Hail in excess of ½ inch diameter.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Key critical facilities within county area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repairs and replacement of costly systems and continue essential service to facilities
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce damage to structures/HVA C systems
Priority (High, Moderate, Low):	High
Estimated Cost:	\$250,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2015-2016
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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

Cameron County – Action #24	
Proposed Action:	Add protective cover to parking areas to reduce damage to county-owned vehicles in the event of hail and thunderstorm events
BACKGROUND INFORMATION	
Jurisdiction/Location:	Parking facilities within county area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repairs and replacement of costly vehicles
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, Thunderstorm
Effect on New/Existing Buildings:	Reduce damage to structures/HVA C systems
Priority (High, Moderate, Low):	High
Estimated Cost:	\$250,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2015-2016
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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

City of Harlingen

City of Harlingen – Action #1	
Proposed Action:	Improve drainage systems by expanding capacity through an increase in channel size and culvert size (13th Street Drainage Ditch Improvements)
BACKGROUND INFORMATION	
Jurisdiction/Location:	On the west side of 13th Street from Alcott Avenue north to the North Main Drain outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$750,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Annual Budget, Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
Will be a collaborative effort between the Drainage District and the City of Harlingen.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #2	
Proposed Action:	Improve drainage systems by expanding capacity through an increase in channel size and culvert size (Dixieland Drainage Ditch Improvements)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From Lincoln Avenue, between Dixieland Road and Tucker Road, to the outfall at the Arroyo Colorado
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,100,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
Will be a collaborative effort between the Drainage District and the City of Harlingen.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #3	
Proposed Action:	Improve drainage systems by expanding capacity through an increase in culvert size (Lipscomb Drainage Ditch Improvements)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Culvert crossing on Louisiana, south of Calle Reina
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$300,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
Will be a collaborative effort between the Drainage District and the City of Harlingen.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 3; Legal = 5; Economically Sound = 2; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #4	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 001)
BACKGROUND INFORMATION	
Jurisdiction/Location:	On New Combs Avenue between Pitman and B Street; On First Street between Brentwood and Austin
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$252,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #5	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 002)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From Lincoln and 3rd Street north to Buchanan, west on Buchanan to A Street; from Buchanan and 1st Street, south to Grant; From Grant and A Street to 3rd Street, south to the Arroyo Colorado (outfall)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,4000,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 4 to 5 phases to complete.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #6	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 004)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From 9th and Grimes, west on Grimes to 77 Sunshine Strip, west on 77 Sunshine Strip to outfall (3rd Street Ditch); From Marshall and 7th Street, south on 7th to 77 Sunshine Strip; Bowie and 7th Street, north on 7th Street to 77 Sunshine Strip
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,068,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 to 4 phases to complete project.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #7	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 005)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From 9th and Monroe, south on 9th to Pierce, east on Pierce to 11th Street, south to canal and east along canal to tie into existing system; from 13th and Tyler south to Pierce, west to 11th Street to tie into system
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,920,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 4 to 5 phases to complete project.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #8	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 007)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Along 21st St North of Theresa south tying into Washington then west about 750'; from that same tie in on Washington south to Jefferson outfall; from Van Buren along 21st St North to Jefferson outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,212,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 to 4 phases to complete.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #9	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 008)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From intersection of Haine and Treasure Hills running northward along 25th slightly north of Becky; from Treasure Hills and 25th fork east along Treasure hills slightly past Treasure Hills Cir then NW crossing over into outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$780,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 to 3 phases to complete.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #10	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 012)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing 30" on Alcott St eastward into 13th St outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$162,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #11	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 013)
BACKGROUND INFORMATION	
Jurisdiction/Location:	South of Arroyo Vista Cir heading North to opposite curve then NW to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$180,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #12	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 017)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Along Beck from New Combes outfall west about 250'
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$90,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #13	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 021)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Adams from A St to 3rd St; Jefferson from A St to 3rd St then south on 3rd to Madison; A street from Monroe Ave to Van Buren then along Commerce about 200'; 5th from Van Buren south to Commerce; 7th from Polk south to Commerce
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,680,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #14	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 022)
BACKGROUND INFORMATION	
Jurisdiction/Location:	1st St from existing on Davis south to Williamson
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$156,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #15	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 023)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Marjory from Kelly to Dennis; Kelly from existing on Davis north about 600'; Davis from existing about 750' eastward then south about 270' then eastward about 60' to outfall; On Pickens from the corner east of Kelly about 800' to the outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$780,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #16	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 027)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Buchanan from A St westward past F St ; Lincoln from D St eastward to B St; Grant Ave from E St to A St; Roosevelt from D St to B St then North slightly past Cleveland
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,560,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #17	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 100)
BACKGROUND INFORMATION	
Jurisdiction/Location:	South side of Ed Carey from existing south of Haine north 1,875' cross over NW about 200' to tie into existing then north 1,750' to tie into 77 Sunshine , branch off SE about 200' to cross over Ed Carey then north about 500' to tie into existing. From previous existing on 77 head north about 3,500' then cross over NE and tie into existing; from existing on Benwood about 150' north to Hiane drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,868,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #18	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 102)
BACKGROUND INFORMATION	
Jurisdiction/Location:	About 3660' west from emerald lake and Ted St intersection; from the same intersection north along emerald lake about 270; then east about 150' to outfall
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$516,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #19	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 103)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From intersection of Encino and Regency about 720' east to out fall; from intersection of Euno and Hoogland east about 600' to tie into existing
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$276,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #20	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 105)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing north of U St east about 1,020' to tie into existing then south then south about 1,100' to tie into existing; then east about 660'to tie into existing; from existing of Fair Park Blvd and O St SW about 720' the west about 300'
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,320,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 2; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #21	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 112)
BACKGROUND INFORMATION	
Jurisdiction/Location:	To replace existing 24" pipe with 36" pipe on Haine Drive North of Whalen to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$264,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #22	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 113)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing north of Haine drive and FM 509 intersection west about 240' crossing over FM 509 the SW about 120' then west along Haine Drive about 240'
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$138,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #23	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 115)
BACKGROUND INFORMATION	
Jurisdiction/Location:	North side of Houston St about 80' west of Falcon heading south about 80' then east to out fall; branch off that pipe at about 360' NW about 80' crossing over Houston; starting about 120' west of Falcon on Hale heading east to outfall; From NW corner of Sesame Circle heading NW about 120' then north about 160' then east about 20' to outfall; From NE corner of Live Oak heading SW about 120' then east 240' then NW about 240' to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$792,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #24	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 122)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing MH on NW corner of Jacaranda and Willowicke SE about 70' then SW about 550'
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$138,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #25	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes
BACKGROUND INFORMATION	
Jurisdiction/Location:	Starting about 150' from the back of curb on Monroe near 25th St then north about 60' then West to outfall; on North side of Jackson near 25th from existing west to outfall; starting about 150' from the back of curb on Van Buren near 25th St then north about 60' then West to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$108,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #26	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 124)
BACKGROUND INFORMATION	
Jurisdiction/Location:	On 5th from Monroe to Van Buren; on 13th from existing on Jefferson to Harrison Ave then east about 450'; from existing on Jefferson at intersection of Jefferson and 10th heading west along Jefferson to existing slightly east of 3rd St; from existing on Jefferson at the intersection of Jefferson and 6th north along 76 drive to existing east of Sul Ross
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,280,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #27	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on the NW of Estrellita heading SW about 340' crossing Lamb then slightly NW about 180' then SW to outfall
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$156,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #28	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 132)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Calle Princesa about 450' behind the houses then slightly SW about 300' then about 210' then slightly SW to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$480,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #29	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 135)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing at the intersection of Matz and Breedlove heading west about 1,300' slightly past Rose; from the intersection of Matz and Breedlove north about 650' then east about 550'
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$660,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #30	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 139)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Marshall heading west about 240' then SW to south corner of Marshal and 13th then south 1,020' then east 120' then south about 300' then to follow 77 Sunshine curve till corner south of Washington then SE about 120' then south to Jefferson outfall; From intersection on Crockett Ave and && Sunshine Strip along && to Austin then east to 13th St; from existing at the intersection of Morgan Blvd and Chaparral west about 900' to tie into the proposed following along 77 Sunshine Strip curve
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,280,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 4 or 5 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #31	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 141)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Start on Warren St then to follow Morgan Blvd heading south slightly to tie into existing storm sewer east of Morgan, High St east to Morgan Blvd Grimes south on 21st St to run along Citrus Terrace to Bowie, On Austin St from 25th St west half the street distance towards 21st St Susan St from 25th St to Whitehouse 25th St from Washington to Jefferson (existing)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,560,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 to 4 phases to complete.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #32	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 142)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Along 77 Sunshine Strip NW slightly past Markowsky to tie into existing, then north to cross 77, then SE to G St then North along G St two-thirds of the street distance. On Orange Heights from existing Eastward to tie into existing on 1St St. On 77 from existing on intersection of 1St and 77 NW to tie into existing on 77
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$960,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 to 3 phases to complete.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #33	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 145)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on the intersection of Jones St and Sam Houston in between the houses to run slightly NW along alley way crossing Lamar till the alley ends
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$360,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #34	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 148)
BACKGROUND INFORMATION	
Jurisdiction/Location:	New Hampshire Rd south of Bus 77 from the halfway point south to railroad tracks, from one safety end treatment to the other, then north on the opposite side of New Hampshire Rd to water entrance
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$300,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #35	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 149)
BACKGROUND INFORMATION	
Jurisdiction/Location:	End of Oregon St from the existing storm sewer north 2/3 length of the street towards Bus 77
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$252,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #36	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 153)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing storm sewer West of Rose St running through the subdivision North to tie into the existing on Loop 499
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$132,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #37	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 154)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Dilworth south about 500 ft.
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$120,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #38	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 157)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing located across Quail Run to cross Emerald Lake and end south of Quail Run opening the run across Quail Run opening
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$30,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #39	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 158)
BACKGROUND INFORMATION	
Jurisdiction/Location:	Along La Vaca from Colorado to Rangerville then turn north along Rangerville Rd to tie into existing south of Knox
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$516,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #40	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 159)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Rangerville Rd and Ponderosa intersection south 900 ft. from that same intersection west to Arroyo Colorado(outfall), from existing across Rangerville in front of Ponderosa straight through Outpatient clinic to back parking lot then run through across parking lot to field
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$180,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #41	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 161)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Davis and 7th St intersection to run south along 7th St and tie into existing in front of Calvary Baptist Church
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 240,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #42	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 200)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From outfall to run in between houses crossing Ebony Rd and Cenizo Rd to the alley between Cenizo Rd and Lantana Rd
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$ 240,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #43	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 204)
BACKGROUND INFORMATION	
Jurisdiction/Location:	250ft east of Hand Rd from the outfall north of Roosevelt Rd north across Lazy Palms Drive S then NE about 50ft
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$ 480,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #44	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 206)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on S Sesame Cir cross about 60ft then south about 300 feet the head west to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 180,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #45	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 207)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing east of Kratzer St north about 300ft to tie into the existing east of Burke Ct
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$ 120,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #46	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 216)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing north of Harrison on the intersection of Harrison and Bus 77 crossing Bus 77 westward to tie into existing manhole From existing MH on the intersection of Tyler (west of 77) and Bus 77 to head south to the intersection of Filmore Ave and 77 then 80ft west then south to the outfall near Little Creek
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$ 600,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #47	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 224)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing off US Highway 77 east 300' along north side of Fair Park Blvd then south about 200' then east about 300' to cross T St then north crossing over Fairpark Blvd to the corner
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 276,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 4; Politically Acceptable = 3; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #48	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 227)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing safety end treatment located in front of L&F Distributers headed east about 270' to tie into existing storm sewer
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$ 60,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #49	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 229)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From Tamm Lane N of USH 83 to run east about 700' to tie into existing, opposite of that existing to start proposed along US Highway 83 past Stuart Place Rd about 1000' then NE to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$ 3,000,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 3 or 4 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #50	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 230)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on US Bus 83 and Harrison Ave 240' west to existing across US 77 Frontage then south about 380' then east about 380' to tie into existing
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$ 276,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #51	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 233)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From corner block of the intersection on north side of Vinson and 77 Sunshine Strip following 77 Sunshine southward to existing sewer system
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$ 372,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #52	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 234)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Austin Ave (west of Ed Carey, north of the fields) 500' to the west slightly past Sonesta Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	Low
Estimated Cost:	\$ 138,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #53	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 237)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on Beck St east of 3rd heading east to about 275' to the outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 72,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #54	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 244)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing MH on Adam's Crossing between Karis Drive and Gabriel's Landing about 550' east then north about 500' to cross Christian Drive
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 360,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split in 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #55	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 245)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing on the north side of Summerfield at the intersection of Summerfield and 13th street heading NW crossing 13th St to the outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 48,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be completed in 1 phase.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #56	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 247)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing 30" on Mark Cir east of Thomas about 330' east crossing E Mark Cir then heading south about 150'; from existing 36" pipe North of Leggett about 1,000' to outfall tying into each 18" pipe along the way; off the opposite end of the same 36" pipe North of Leggett about 210' west to tie into existing 30" sewer system
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 660,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #57	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 248)
BACKGROUND INFORMATION	
Jurisdiction/Location:	East of Country Drive on 7th St from existing 36" pipe south about 80' to tie into existing; opposite end of that existing south about 140' to tie into existing 30" pipe coming off Tumbleweed; from that point about 200' south to tie into existing 42" pipe; opposite end of that 42" pipe about 220' south to the corner on Matz Ave; then west along Matz about 1,000' then cross over NW about 400' to outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 900,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #58	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 251)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From Breedlove straight across from Hoogland about 1500' north towards Loop 499 then across Breedlove behind the homes about 1,350' to the outfall
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 840,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 2 or 3 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #59	
Proposed Action:	Improve the existing drainage systems by increasing the capacity of the drainage pipes and replacing the inlets and manholes (Drainage System 252)
BACKGROUND INFORMATION	
Jurisdiction/Location:	From existing 18" pipe south of Sun Chase Drive east about 420' to tie into existing MH then about 60' NE crossing Sunnyside Drive then about 660' NE to Stuart Place Main Drain (outfall)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to infrastructure (streets and drainage systems), reduce risk to public health, safety, and welfare; reduce damage to structures (homes and businesses)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	Reduce drainage problems and potential flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$ 300,000
Potential Funding Sources:	Grants, General Fund
Lead Agency/Department Responsible:	Public Works/Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Plan, Floodplain Mgmt. Plan, CIP Budget

COMMENTS
The project can be split into 1 or 2 phases.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #60	
Proposed Action:	Develop and implement a Public Education Campaign to address extreme heat
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides education to the public on the dangers of extreme heat; reduces the risk to public health and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	None
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grant, General fund, CDBG
Lead Agency/Department Responsible:	Health Department, CDBG
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Partnering agreements with city depts.

COMMENTS
Develop a city web page with information regarding location of cooling stations, develop and distribute brochures in English and Spanish. Create and give presentations at local schools, daycares (adult and child), mobile home parks, public housing, boys & girls clubs. Involve care for pets in extreme heat and drought 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 = 4; Technically Feasible = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #61	
Proposed Action:	Expand artificial grass project in landscaped medians to include other areas within public right-of-ways
BACKGROUND INFORMATION	
Jurisdiction/Location:	Various locations throughout the city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Product has 15 year life span without need to irrigate medians; product is fire retardant, drought and heat-resistant, eliminates city personnel replacing grass following hurricane, tornado, or flood
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project not eligible for federal grant programs

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Wildfire, Hurricane Wind, Tornado, Flood
Effect on New/Existing Buildings:	None
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$7,230,000
Potential Funding Sources:	Grants, general funds, partnerships
Lead Agency/Department Responsible:	Public Works, Engineering Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Water District Plan, Harlingen Proud Plan

COMMENTS
Install artificial grass in landscape medians to reduce the amount of irrigated landscape and reduce the consumption of water. Also reduce the exposure of city personnel to high traffic areas while beautifying thoroughfares; Partner with Harlingen Proud, water works, irrigation districts.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #62 (NFIP)	
Proposed Action:	Join the Community Rating System Program
BACKGROUND INFORMATION	
Jurisdiction/Location:	City Wide
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce risk to public health, safety, and welfare; increase awareness and regulations
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Promote flood insurance and minimize flooding through higher regulatory standards
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Flood Plan, NFIP 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #63	
Proposed Action:	Increase drainage capacity of the retention ponds in the Treasure Hills area
BACKGROUND INFORMATION	
Jurisdiction/Location:	Treasure Hill area within Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to critical infrastructure (streets and drainage system); reduce risk to public health, safety, and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

COMMENTS
With increased growth in the area of Treasure Hills the existing retention ponds no longer provide adequate retention, the ponds need to be increased in depth (dredged) as the increase in size is limited due to their location.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #64	
Proposed Action:	Develop and implement a plan to construct Cooling Centers throughout the City of Harlingen
BACKGROUND INFORMATION	
Jurisdiction/Location:	Community centers, shelters, public buildings, library
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides an implementation method(s) for reducing and educating the public on the dangers of extreme heat and drought; reduces the risk to the public health and safety
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme heat
Effect on New/Existing Buildings:	None
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grants, donations, CDBG
Lead Agency/Department Responsible:	Health Department, Public Buildings
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations, Partnering Agreements with city depts.

COMMENTS
Create and develop a plan which identifies cooling centers in days of extreme heat. Identify public locations for cooling areas, notification for the public (TV, radio, public access stations, HCISD channels), provide free transportation to sites via bus lines; partner with nonprofit organizations such as Red Cross, Salvation Army, and churches to coordinate donation of fans or window AC units.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 3; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 3; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #65	
Proposed Action:	Develop and implement a Drought Mitigation Plan
BACKGROUND INFORMATION	
Jurisdiction/Location:	City limits and surrounding communities for implementation
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides an increase level of preparedness to reduce risk to public health, safety, and welfare, reduce risk to agricultural and wildlife; ensure continued essential water supply
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Xeriscape plantings protect exposure of buildings to extreme heat temperatures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grants, General funds
Lead Agency/Department Responsible:	Public Works, Planning Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise, Water Utilities

COMMENTS
Develop pre-disaster activities to increase the level of preparedness within the city; create mitigation actions to identify/address the slow on set nature of drought; Partner with fire department, water works, irrigation and drainage districts, agriculture groups, conservation groups, and wildlife groups; Look into alternate technologies and methodologies for water conservation.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #66	
Proposed Action:	Upgrade and expand access roads used during wildfire events
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide with primary focus on the area around the Arroyo Colorado and birding centers
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare; reduce damage to wildlife habitats when responding to emergencies
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Grant, General Fund, Texas Forest Service
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise, Wildfire Recovery Plan, Emergency Mgmt. 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #67	
Proposed Action:	Improve Baker Potts roadway for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Baker Potts from Business 83 to Drury Lane
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of caliche/dirt roadway to a 37' B-B curb & gutter road to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Reduce threat of flooding for new/existing construction
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #68	
Proposed Action:	Implement bi-annual or annual program to remove overgrown and dead brush from undeveloped/vacant land, city parkland
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare; reduce fuel for wildfire on vacant land or ranch land
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$80,000
Potential Funding Sources:	Grant, General Fund, Texas Forest Service
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise, Wildfire Response Plan, Parks/Rec. Regs.

COMMENTS
Develop a plan for brush and/or overgrown vegetation on undeveloped/vacant land which do not currently have brush pickup with the city
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #69	
Proposed Action:	Improve Dilworth Bridge crossing for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of bridge crossing to ensure safety for vehicles crossing drainage ditch; ensures access of responding vehicles to areas; provides for evacuation route
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$800,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #70	
Proposed Action:	Improve Drury Lane roadway for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Drury Lane from Beckham Road to Tamm Lane
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of caliche/dirt roadway to a 37' B-B curb & gutter road to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$3,000,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

COMMENTS
Partner with Cameron County on roadways.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #71	
Proposed Action:	Improve and upgrade the Emergency Operations Building
BACKGROUND INFORMATION	
Jurisdiction/Location:	Fire Station #3 on Loop 499
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provides for continuation of critical operations during emergency events
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm, Tornado, Hail, Wildfire, Dam Failure
Effect on New/Existing Buildings:	Reduce impact on critical facility in natural disasters
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,500,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operation Plan

COMMENTS
Retrofit building to house additional personnel in periods of emergency and improve outdate technological capabilities for monitoring, recording, and responding to disasters.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #72	
Proposed Action:	Conduct a public education campaign in the event of a necessary evacuation
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to public health, safety, and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Hurricane Wind, Tornado, Wildfire
Effect on New/Existing Buildings:	Educate residents on protecting structures pre-disaster
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$50,000
Potential Funding Sources:	Grant, General fund
Lead Agency/Department Responsible:	Public Works, Engineering, Public Information Officer
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS
Develop a public awareness campaign regarding evacuation routes, safety information, documentations needed for re-entry into evacuated areas, medical transportation, shelters, and animal care facilities and evacuations procedure for people with pets, etc. Will include development of brochures, fliers, T.V. and/or radio spots, webpage development; Requires coordination with multiple agencies and departments.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #73	
Proposed Action:	Work with area agencies to develop and implement evacuation / shelter-in-place plan (pre & post) to address multiple hazards
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to public health, safety, and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood, Hurricane Wind, Tornado, Wildfire
Effect on New/Existing Buildings:	Retrofit and protect structures for shelter in place
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grant, General fund
Lead Agency/Department Responsible:	Public Works, Engineering Department, Emergency Management Coordinator,
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan, Evacuation Plan

COMMENTS
Develop a plan regarding evacuation routes, safety information, documentations needed for re-entry into evacuated areas, medical transportation, shelters, animal care facilities and evacuations of animals, shelter-in-place facilities, and post event clean up procedures, etc.; Will require coordination with multiple agencies and departments.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #74	
Proposed Action:	Install mobile and permanent generators at critical facilities
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical facilities within the City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Services will continue to function in the event of an emergency
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Tornado, Thunderstorm, Hail
Effect on New/Existing Buildings:	Would provide backup power to existing building used for city services, evacuation centers, and/or staging areas
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000 - \$300,000 each generator
Potential Funding Sources:	Grant, General funds
Lead Agency/Department Responsible:	Public Works, Public Buildings, Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS
May require additional work to buildings for connection of the buildings to generators (electrical services, concrete pads, etc.) Locations of generators would be City Hall, Lon C Hill Building, Auditorium, Casa de Amistad, and Case del Sol.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #75	
Proposed Action:	Install hail guards on HVAC systems supporting critical facilities and to protect against severe Hail in excess of ½ inch diameter.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Key critical facilities within city
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce repairs and replacement of costly systems and continue essential service to facilities
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Reduce damage to structures/HVA C systems
Priority (High, Moderate, Low):	High
Estimated Cost:	\$250,000
Potential Funding Sources:	HMGP
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2015-2016
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 = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 5; Economically Sound 2= ; and Environmentally Sound = 3

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #76	
Proposed Action:	Improve Hughes Road roadway for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hughes Road from Tamm Lane west to F.M. 800 Bass Boulevard
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of caliche/dirt roadway to a 37' B-B curb & gutter road to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #77	
Proposed Action:	Improve Lipscomb Road roadway for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Lipscomb Road from Rangerville Road (F.M. 1479) east to Ed Carey (F.M. 801)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of roadway from caliche/dirt to 37' B-B curb & gutter to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,600,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #78	
Proposed Action:	Improve Morris Road roadway for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Morris Road from Rangerville Road (F.M. 1479) to Ed Carey (F.M. 801)
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of roadway from 18' asphalt rural section roadway to 37' B-B- curb & gutter rural section to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,600,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

COMMENTS
Partner with Cameron County on roadway as sections are in the county.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #79	
Proposed Action:	Purchase NOAA “all hazards” radios for early warning and post –event information and place in schools, critical facilities
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Dam Failure, Hurricane Wind, Hail, Tornado, Thunderstorm, Wildfire
Effect on New/Existing Buildings:	Protect area structures with warning
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$30,000
Potential Funding Sources:	Grant, General Fund, CDBG, Private and Public partnerships
Lead Agency/Department Responsible:	Emergency operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan

COMMENTS
Purchase of radios for distribution; cost of radios is approximately \$50.00 each radio; possible distribution to include public housing and mobile home parks.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #80	
Proposed Action:	Improve North Tamm Lane for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	North Tamm Lane from the frontage road on Expressway 83 north to Hick Hill Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of roadway from caliche/dirt road to a 37' B-B curb & gutter section to allow all weather access of emergency response vehicles and allow for evacuations, eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$1,500,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #81	
Proposed Action:	Install pump station at the North Floodway
BACKGROUND INFORMATION	
Jurisdiction/Location:	East of Expressway 77 along Ballenger Road. Location of pump will be along the south bank of the floodway
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the damage to critical infrastructure and reduce the risk to public health, safety, and welfare, and reduce the damage to structures (residential and commercial)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Thunderstorm, Hurricane Wind
Effect on New/Existing Buildings:	Would create a building to house the pump
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	Grants, General Funds, Partnerships
Lead Agency/Department Responsible:	Public Works, Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Flood Plan

COMMENTS
Pump would allow for continuous drainage when the floodgates to the North Floodway are closed due to flooding concerns. The project would include a pump, housing, security measures (fencing), remote access (via cellular service), elevation of structure, etc.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #82	
Proposed Action:	Install an area-wide telephone emergency notification system (Reverse 911)
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare; provide better communication for evacuations or instructions to the public in the event of an emergency
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm, Tornado, Hail, Wildfire, Dam Failure, Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$150,000
Potential Funding Sources:	Grant, General Fund, CDBG
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Emergency Operations Plan, coordination with other depts.

COMMENTS
Provide public with instructions or information regarding emergency situations.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #83	
Proposed Action:	Install a stream gauge monitoring station at the spillway
BACKGROUND INFORMATION	
Jurisdiction/Location:	Treasure Hills spillway located on Clifford Street
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damage to critical infrastructure (drainage system)
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam failure, Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Flood plan

COMMENTS
Install the monitoring station to ensure damage to spillway is minimized.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #84	
Proposed Action:	Improve Teege Road Bridge crossing for access into subdivisions in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Teege Road and Brazil Road
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of bridge crossing to ensure safety for vehicles crossing drainage ditch; ensures access of responding vehicles to areas; provides for evacuation route
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize flooding to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$800,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations; Cameron County
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

COMMENTS
Partner with Cameron County as bridge is in the county.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #85	
Proposed Action:	Improve Traxler Way roadway for access into subdivision in all weather conditions
BACKGROUND INFORMATION	
Jurisdiction/Location:	Traxler Way from the frontage on Expressway 83 west to F.M. 800
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improvement of roadway from 16' asphalt/caliche rural section to 37' B-B curb & gutter rural section to allow all weather access of emergency response vehicles and allow for evacuations and eliminate ongoing roadway repairs due to flooding
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Minimize damage to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000,000
Potential Funding Sources:	Grant, General Fund
Lead Agency/Department Responsible:	Public Works, Engineering, Emergency Operations
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	Stormwater Mgmt., Flood Plan, CIP Budget

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #86	
Proposed Action:	Create and implement a wildfire recovery plan to address soil erosion control and vegetative recovery
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide with primary focus on the area around the Arroyo Colorado
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce the risk to public health, safety, and welfare; protect natural habitat area
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Minimize wildfire damage to area structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000
Potential Funding Sources:	Grant, General Fund, Texas Forest Service
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2014 or upon funding
Incorporation into Existing Plans:	FireWise, Land Use 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #87	
Proposed Action:	Remove dead and downed trees to decrease fire fuels in Wildland Urban Interface (WUI) areas
BACKGROUND INFORMATION	
Jurisdiction/Location:	City wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Natural landform protection and reduced risk of loss of property due to wildfire
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Effect on New/Existing Buildings:	Reduce potential fire danger to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000
Potential Funding Sources:	Texas Forest Service, FireWise
Lead Agency/Department Responsible:	Parks & Recreation
Implementation Schedule:	2016
Incorporation into Existing Plans:	FireWise Plan, Fire 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 = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

City of Harlingen – Action #88	
Proposed Action:	Develop and implement a Drought Emergency Plan to include rainwater harvesting, water conservation measures and promoting drought-tolerant landscaping
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Conserve water for long-term availability for area residents
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	Reduce potential fire danger to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000
Potential Funding Sources:	Texas Forest Service, FireWise
Lead Agency/Department Responsible:	Parks & Recreation
Implementation Schedule:	2016
Incorporation into Existing Plans:	FireWise Plan, Fire 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 = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide

County-Wide – Action #1	
Proposed Action:	Secure Memorandum of Understanding (MOU) with Lower Rio Grande Flood Control agency regarding potential dam and levee failure of upstream flood control system
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce potential dollar losses and loss of life from Dam Failure from Anzalduas Dam and Falcon Reservoir
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood
Effect on New/Existing Buildings:	Prevent or minimize flood damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Lower Rio Grande Water User fee
Lead Agency/Department Responsible:	LRGFC, Cameron County Emergency Management
Implementation Schedule:	2014-2019
Incorporation into Existing Plans:	Emergency Response Plan, Emergency Management Plan, Partnering agreements

COMMENTS
For purposes of the HMAP, upstream dam failure would affect the majority of communities within Cameron County boundaries. Due to potential of dam failure, levee failure money is needed to maintain levees.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #2	
Proposed Action:	Develop and implement a public education program for evacuating residents downstream of the Lower Rio Grande Flood Control system in the event of dam or levee failure
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce loss of life from Dam Failure from Anzalduas Dam and Falcon Reservoir
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure, Flood
Effect on New/Existing Buildings:	Prevent or minimize flood damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	Lower Rio Grande Water User fee
Lead Agency/Department Responsible:	LRGFC, Cameron County Emergency Management
Implementation Schedule:	2014-2019
Incorporation into Existing Plans:	Emergency Response Plan, Emergency Management Plan, Partnering agreements

COMMENTS
For purposes of the HMAP, upstream dam failure would affect majority of communities within Cameron County boundaries. Due to potential of dam failure, levee failure money is needed to maintain levees.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #3 (NFIP)	
Proposed Action:	Construct a regional retention facility to reduce runoff and flooding for City of Harlingen and Cameron County, and capture secondary water supply for future drought events
BACKGROUND INFORMATION	
Jurisdiction/Location:	South of Hickory Hills subdivision, White Ranch, and Mariposa area
Risk Reduction Benefit (Current Cost/Losses Avoided):	Mitigate flooding and damage/displacement of residents
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm, Drought
Effect on New/Existing Buildings:	Reduce potential flooding of adjacent structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000,000
Potential Funding Sources:	Grants, HMGP
Lead Agency/Department Responsible:	County Engineering Dept.
Implementation Schedule:	3-5 years
Incorporation into Existing Plans:	Stormwater Management Plan, Floodplain Mgmt. Plan, partnering agreements

COMMENTS
The ponds will serve as a park facility when dry.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #4 (NFIP)	
Proposed Action:	Develop and implement a Master Flood Protection Plan for Cameron County Drainage District No. 5 to construct drainage features to mitigate flooding such as levees, widening, constructing channels, and detention ponds
BACKGROUND INFORMATION	
Jurisdiction/Location:	Encompassing most of the cities of Harlingen, Primera, and Combes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood risk to people and parcels
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Dam Failure
Effect on New/Existing Buildings:	Reduction of damage to new and existing buildings
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Revenue, Drainage fees
Lead Agency/Department Responsible:	Cameron County Drainage District No.5
Implementation Schedule:	2014
Incorporation into Existing Plans:	Stormwater Management Plan, Comprehensive Land Use, Flood 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #5 (NFIP)	
Proposed Action:	Conduct an NFIP public education program regarding availability of flood insurance, and promoting NFIP flood insurance protection
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduction of lives lost in the event of a levee failure, flood insurance protection of structures
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Thunderstorm
Effect on New/Existing Buildings:	Financial protection in the event of flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000-\$50,000
Potential Funding Sources:	General Revenues and Grants
Lead Agency/Department Responsible:	Cameron/Harlingen Floodplain Coordinator
Implementation Schedule:	2014-2015
Incorporation into Existing Plans:	Flood Ordinance, Flood Management Plan, Community Rating System

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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #6	
Proposed Action:	Conduct a public information campaign regarding hurricane and flood preparedness
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduction of lives and property lost during flood and hurricane events
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000- \$20,000
Potential Funding Sources:	Grants, General Revenues
Lead Agency/Department Responsible:	County/City of Harlingen Emergency Management
Implementation Schedule:	2014
Incorporation into Existing Plans:	Flood Management Plan, Emergency Operation Plan, 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #7	
Proposed Action:	Join the FIREWISE program
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (<i>Current Cost/Losses Avoided</i>):	Reduce fire fuels and mitigate wildfire and urban fire potential
Type of Action (<i>Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness</i>):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Protect structures by reducing fire fuels around structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000
Potential Funding Sources:	Texas Forest Service
Lead Agency/Department Responsible:	Fire Departments
Implementation Schedule:	2014
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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #8	
Proposed Action:	Work with South Padre Island to implement an evacuation plan for the proposed bridge connecting the mainland to South Padre Island
BACKGROUND INFORMATION	
Jurisdiction/Location:	Site of bridge undetermined
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce loss of lives during evacuation, particularly during a hurricane event and peak season.
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, Local Revenue
Lead Agency/Department Responsible:	County/City of Harlingen Emergency Management
Implementation Schedule:	2016-2017
Incorporation into Existing Plans:	Emergency Management Plan, Emergency Response Plan, Evacuation Plan

COMMENTS
The Rio Grande Valley's population continues to grow as does traffic on the Queen Isabella causeway, currently the only bridge connecting the island to Cameron County. On peak days, there have been more than 40,000 vehicle crossings the bridge. With only one bridge, estimate a 40 to 50 minute drive from hospitals in Brownsville or Harlingen through severe traffic jams.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #9	
Proposed Action:	Construct a bridge connecting the mainland to South Padre Island
BACKGROUND INFORMATION	
Jurisdiction/Location:	Site of bridge undetermined
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce loss of lives during evacuation, particularly during a hurricane event and peak season
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane Wind
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Portion of proposed \$16 - \$20 million project
Potential Funding Sources:	HMGP, Local Revenue
Lead Agency/Department Responsible:	County/City of Harlingen Emergency Management
Implementation Schedule:	2016-2017
Incorporation into Existing Plans:	Emergency Management Plan, Emergency Response Plan, Evacuation Plan

COMMENTS
The Rio Grande Valley's population continues to grow as does traffic on the Queen Isabella causeway, currently the only bridge connecting the island to Cameron County. On peak days, there have been more than 40,000 vehicle crossings the bridge. With only one bridge, estimate a 40 to 50 minute drive from hospitals in Brownsville or Harlingen through severe traffic jams.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #10	
Proposed Action:	Install color-coded street signs in evacuation zones throughout Cameron County, Harlingen, and other participating communities
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Assist in expediting evacuation of residents in the event of natural disasters, dam failure, reduce loss of lives
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Wildfire, Dam Failure
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	General Revenues and Grants
Lead Agency/Department Responsible:	Cameron/Harlingen Floodplain Coordinator
Implementation Schedule:	2014-2015
Incorporation into Existing Plans:	Annual Budget, Emergency Response Plan, Evacuation Plan

COMMENTS
Evacuation and shelter signs provide direction during emergency situations and identify designated evacuation areas during a power outage, fire, thunderstorm, or dam failure.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #11	
Proposed Action:	Conduct an educational program for residents on evacuation zones and location of shelters in conjunction with installing color-coded street signs
BACKGROUND INFORMATION	
Jurisdiction/Location:	Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Assist in expediting evacuation of residents in the event of natural disasters; reduce loss of lives
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Wildfire, Dam Failure
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000
Potential Funding Sources:	General Revenues and Grants
Lead Agency/Department Responsible:	Cameron/Harlingen Floodplain Coordinator
Implementation Schedule:	2014-2015
Incorporation into Existing Plans:	Emergency Response Plan, Evacuation Plan

COMMENTS
Evacuation and shelter signs provide direction during emergency situations and identify designated evacuation areas during a power outage, fire, thunderstorm, dam failure. Outreach to include leaflets, social media, public notices in local paper, etc.
ADDITIONAL CONSIDERATIONS: The following STAPLEE criteria were evaluated on a scale 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 = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 15: MITIGATION ACTIONS

County-Wide – Action #12	
Proposed Action:	Upgrade building codes and ordinances to require increased freeboard for new construction in areas of flood inundation as a result of dam failure and levee breach upstream of the Cameron County planning area
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated Cameron County and City of Harlingen
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood risk to people and parcels by elevating new construction
Type of Action (Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness):	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane Wind, Dam Failure
Effect on New/Existing Buildings:	Reduction of damage to new buildings
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	Local Revenue, Drainage fees
Lead Agency/Department Responsible:	Building Code and Inspection Dept.
Implementation Schedule:	2016
Incorporation into Existing Plans:	Stormwater Management Plan, Comprehensive Land Use, Flood 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 = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

SECTION 16: PREVIOUS ACTIONS

Overview	1
Cameron County	1
City of Harlingen	3

Overview

Cameron County and the City of Harlingen previously participated in the multi-county, regional ‘Cover the Border’ Hazard Mitigation Action Plan. Therefore, the Hazard Mitigation Action Plan, or the *Plan*, underway for unincorporated Cameron County and the City of Harlingen is considered a new, stand-alone Plan. However, each of the jurisdictions have deferred a number of the previous mitigation actions to the new Plan, and updated the actions to meet current State and FEMA requirements. The tables below reflect the status for all previous actions. The following factors were taken into consideration when developing new actions and reviewing mitigation actions from the 2008 ‘Cover the Border’ plan:

- Whether the goals address current and expected conditions;
- Whether the nature/magnitude of risks have changed;
- Whether there are current resources appropriate for implementing the Plan;
- Whether implementation problems, such as technical, political, legal, or coordination issues hinder development;
- Whether outcomes have occurred as expected; and
- How communities, agencies, and partners participated in the implementation process.

Cameron County

ACTION NO.	ACTIONS	PROJECT STATUS	PROJECT DEFERRED TO NEW PLAN
1	Develop and implement a Master Flood Protection Plan for Cameron County Drainage District No. 5, encompassing most of the cities of Harlingen, Primera, and Combes	Partially completed projects	X
2	Develop and implement a long-range Capital Improvement Plan	Now Regional Mobility Authority Plan	X
3	Examine alternatives and establish an Alternate Emergency Operations Center (EOC) at a higher elevation and with enhanced wind protection		X

SECTION 16: PREVIOUS ACTIONS

ACTION NO.	ACTIONS	PROJECT STATUS	PROJECT DEFERRED TO NEW PLAN
4	Work with Mexican officials across the border to mitigate the impact of a possible hazardous materials incident at the Quemica Flour chemical plant	Withdrawn from HMAP (man-caused)	
4	Provide information to citizens about levee safety and how they can protect their lives and property	New County-wide action	X
6	Conduct an assessment the need for back-up generators to maintain critical facilities and services in the event of disaster and purchase generators based on assessment	Partially completed	X
7	Design and execute a public information campaign to inform the public about hurricane preparedness, evacuation methods and routes, and what to do in the case of flooding	Revised as multiple actions	X
8	Conduct studies to determine the precise locations of wild land fires, and dam breach inundations and implement the findings of the studies inundations and implement the findings of the studies	Language reworked; multiple actions	X
9	Develop a restoration plan in order to remove hazardous debris from beaches in a quick and safe manner		X
10	Prepare a study and dune restoration plan to prevent repetitive loss to roads and utilities		X
11	Conduct a study to assess the needs of county's Emergency Management Services. Identify potential location of Emergency Operations and Dispatch Center in the Harlingen area equipped with video conferencing capability	Ongoing	X
12	Implement a regional communication, centralized dispatch EOC with video teleconferencing capability in Harlingen area	Pending funding	

SECTION 16: PREVIOUS ACTIONS

City of Harlingen

ACTION NO.	ACTIONS	PROJECT STATUS	PROJECT DEFERRED TO NEW PLAN
22	Develop and implement a Master Flood Protection Plan for Cameron County Drainage District No. 5, encompassing most of the cities of Harlingen, Primera, and Combes	New County-wide action; some projects completed	X
23	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: US 77 crossing existing drainage ditch improvements	Project revised and completed under NW Drainage project	
24	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: Reconstruction of Tamm Lane from N. US 83 to Hick Hill and from Bus. 83 to US 83	Partially completed; ongoing	X
25	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: Downtown drainage project (laterals on various streets)	Partially completed; ongoing	X
26	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: Construction of Dixieland Extension from N. Bus. 83 to Spur 54 and from S. FM 1479 to FM 801	Partially completed; ongoing	X
27	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: Central system drainage improvements	Withdrawn. More viable project proposed	X
28	Evaluate and improve capabilities to undertake a 5 year capital improvement program for localized flooding: 13th drainage ditch widening project	Updated and submitted as new action	X
29	Identify repetitive loss properties, assess the cause of flooding and mitigate through buyouts, elevations or other structural means for 41 structures		X
30	Conduct studies to determine the precise locations of wildfires, and dam breach inundations and implement the findings of the studies	Revised into multiple actions	X

SECTION 17: PLAN MAINTENANCE

Plan Maintenance Procedures.....	1
Monitoring and Evaluation.....	1
Monitoring.....	2
Evaluation.....	2
Updating.....	2
Plan Amendments	2
Five Year Review.....	3
Incorporating the Plan into Other Planning Mechanisms	3
Continued Public Involvement	5

Plan Maintenance Procedures

The following is an explanation of how the Planning Team will implement the Hazard Mitigation Action Plan, and continue to evaluate and enhance it over time. In order to ensure that the Plan remains current and relevant, the following plan maintenance procedures will be addressed:

- Monitoring and Evaluating the Plan
- Updating the Plan
- Incorporating the Plan into other Planning Mechanisms
- Continued Public Involvement

Monitoring and Evaluation

Periodic revisions of the Plan are required to ensure that the goals, objectives, and mitigation action plans are kept current. More importantly, revisions may be necessary to ensure that the Plan is in full compliance with federal regulations and state statutes. This section outlines the procedures for completing such revisions, updates, and Plan review. Table 17-1 indicates the department and title responsible for this action.

Table 17-1. Team Members Responsible for Plan Monitoring, Updating and Review of the Plan

ORGANIZATION	TITLE
Cameron County	Deputy Emergency Management Coordinator
Cameron County	Planner

SECTION 17: PLAN MAINTENANCE

ORGANIZATION	TITLE
City of Harlingen	Assistant City Manager
City of Harlingen	Engineer-in-Training

Monitoring

Both Cameron County and the City of Harlingen are responsible for monitoring components of the HMAP that pertain to their respective jurisdiction. Each jurisdiction has designated one person or department responsible for monitoring, evaluating, and updating the Plan. The team member's title is listed in Table 17-1, above. Each jurisdiction will review their community's mitigation actions included in the Plan and develop a brief report if any changes are needed, such as recommending an action for funding or adding additional mitigation actions. If changes are required, the person designated by title, above, will provide an update to the Planning Team annually and maintain a schedule for prioritizing and implementing any changes to the Plan. A written summary of meeting notes will report the status of particulars involved in turning an action into a project.

Cameron County and the City of Harlingen will integrate implementation of their mitigation action plans with other, existing planning mechanisms such as capital improvement plans, long range growth plans, master storm-water and drainage plans. The report described in the paragraph above reflecting any changes or updates to the Plan will also include the process of integrating other planning efforts as part of the Plan's monitoring and updating requirements. Cameron County and the City of Harlingen will ensure that the actions contained in the Hazard Mitigation Action Plan are reflected in these other planning efforts. These other planning efforts will be used to advance the mitigation strategies of the jurisdictions.

Evaluation

As part of the evaluation process, each jurisdiction will assess any changes in risk, determine whether the implementation of mitigation actions is on schedule, or if there are any implementation problems (such as technical, political, legal, or coordination issues), and reflect changes in land development or programs that affect mitigation priorities in their respective department or organization.

The Cameron County and City of Harlingen Planning Team will meet on an annual basis to identify any needed changes in the Plan, based upon their evaluation activities. This yearly evaluation process will help determine if any changes are necessary.

Updating

Plan Amendments

At any time, minor technical changes may be made to the Cameron County Hazard Mitigation Plan to keep it updated. However, any material changes to the 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 Cameron County.

SECTION 17: PLAN MAINTENANCE

Cameron County will then review the proposed amendment 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 following factors will be considered:

- 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 Year Review

The Plan will be thoroughly reviewed by the appointed Planning Team at the end of three years from the approval date to determine whether there have been any significant changes in the area that may necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, disaster declarations, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the content of the Plan.

The Plan review provides Cameron County and the City of Harlingen an opportunity to evaluate those actions that have been successful, and to explore documenting potential losses avoided due to the implementation of specific mitigation measures. The Plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. It is recommended that the Planning Team meet to review the Plan at the end of three years, as grant funds may be necessary for the development of a five-year update. Due to the timelines for grant cycles, it is wise to begin planning grant options in advance of the five-year deadline.

Following the review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and Plan amendment process outlined herein. Upon completion of the review and update/amendment process, the revised Plan will be submitted to TDEM for final review and approval in coordination with FEMA.

Incorporating the Plan into Other Planning Mechanisms

Upon formal adoption of the Plan, team members will work to integrate the hazard mitigation strategies into other planning mechanisms. Team Members will conduct reviews of plans and policies on an annual basis, and analyze the need for amendments in light of the approved Plan. The Planning Team will ensure that future planning of capital improvement, disaster recovery, historic preservation, flood response plans, and other planning mechanisms will be consistent with the goals of the Plan.

Key Planning Team members from both the County and the City, shown in Table 17-1, will meet bi-annually, and more often if warranted, to ensure mitigation actions prioritized as high to moderate are tracked and monitored based on federal Disaster Declarations, PDM funding cycles, and other non-federal funding sources. For HMA grant programs, grant applications will be developed for submittal to TDEM and FEMA accordingly.

SECTION 17: PLAN MAINTENANCE

The potential funding sources listed for each identified action may be used when the Planning Team member begins to seek 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.

Existing plans for the County and the City will be reviewed in light of the Plan, and Team Members will incorporate any mitigation policies and actions into these plans as appropriate. Table 17-1 indicates Planning Team member roles for incorporating actions, method of incorporation, and approving authority. Table 17-2 identifies planning mechanisms available for the County and City, and provides examples of how the Plan will be incorporated into current efforts.

Table 17-2. Team Member(s) Responsible for Incorporating Planning Mechanisms into the Plan

ENTITY	POINT(S) OF CONTACT <i>(Contact will vary based on Type of Action to be Implemented)</i>	METHOD OF INCORPORATING MITIGATION ACTIONS INTO LOCAL PLANNING MECHANISMS
Cameron County	County Judge (approving authority for Plan), Emergency Management Office, Floodplain Manager, Drainage District(s) Manager, VFD	Annual budget review, FIREWISE program and Fire Management Plan, Comprehensive Plan, Flood Damage Ordinance, Emergency Operations Plan, Disaster Response and Recovery Plan, Master Drainage Plan, NFIP Program
City of Harlingen	City Manager (approving authority for Plan) and City Administration, City Engineering Dept., Floodplain Manager, Fire Dept.	Annual budget review, Flood Damage Ordinance, Emergency Operations Plan, Building Codes, Flood Damage Ordinance, Emergency Operations Plan, Disaster Response and Recovery Plan, Master Drainage Plan, Stormwater Management Plan, NFIP Program

Table 17-3. Current Planning Mechanisms and Method to Incorporate Into the Plan

PLANNING MECHANISM	METHOD OF INCORPORATION
Annual Budget Review	Each Planning Team Member that participated in the planning process will review the Plan and mitigation actions therein when conducting their annual budget review. When allocating funds for upcoming operating and construction budgets, high priority mitigation actions will be reviewed during City Council, Commissioner Court meetings, or other approval Boards for the participating entity. Each Planning Team Member will be

SECTION 17: PLAN MAINTENANCE

PLANNING MECHANISM	METHOD OF INCORPORATION
	responsible for bringing mitigation actions to their respective Board to discuss feasibility of the potential project in terms of the availability of funds, grant assistance, and a preliminary cost benefit review.
Emergency Planning	Based on the results of the Capability Assessment Survey, the Cameron County Planning Team has adopted an Emergency Operations or Management Plan. The Plan will be consulted during updates to each jurisdiction’s local emergency and/or disaster recovery plan. Risk assessment and vulnerability data will be pulled from the plan and reviewed in conjunction with the review, renewal, or re-writing of an Emergency Operations or Management Plan. This data will either be included within the new emergency planning mechanism or included as an appendix. Mitigation projects that relate to prevention and protection will also be reviewed for relevance to determine if they should be included.
Capital Improvements	Before any updates to Capital Improvement Plans (CIP) are conducted, each jurisdiction will review the risk assessment and mitigation strategy sections of the Plan, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments. Profile information and data regarding NFIP compliance and maintenance will be reviewed in conjunction with any CIP that is developed. If new census or land use data is available, this information should be added to the Plan.
Floodplain Management and Fire Protection	The Plan will be utilized in updating and maintaining floodplain management and fire protection plans, as the goals of both planning mechanisms are similar. In updating or maintaining these plans, the Plan will be consulted for NFIP compliance and flood risk, and wildfire risk and extent. Information from these sections will be reviewed for inclusion. In addition, mitigation actions that address wildfire and flood will be reviewed for inclusion by jurisdictions.

The Plan will also be discussed at annual budget planning meetings so that proposed funding sources for mitigation actions are taken into consideration.

Continued Public Involvement

Input from the stakeholders and public was an integral part of the preparation of this Plan and will continue as the Plan grows and changes.

SECTION 17: PLAN MAINTENANCE

This Plan will be posted on the Cameron County and the City of Harlingen's website where local officials and the public will be invited to provide ongoing feedback. Copies of the Plan also will be kept for public review at Cameron County Headquarters.

The Planning Team may also designate voluntary citizens from Cameron County and City of Harlingen community, or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. Stakeholders and the immediate community have an interest in preserving the functionality of Cameron County and the City during natural hazard events as they depend on the flow of domestic product and commerce to continue uninterrupted.

The task of notifying stakeholders and community members on an annual basis will be held with the identified Cameron County and City of Harlingen Planning Team members tasked with updates and annual Plan review. The Planning Team will have the added task of maintaining the Plan as a part of their job description. Media such as the local newspaper and radio stations will be used to notify the public of any maintenance or periodic review activities taking place. Local News 12 will broadcast regular updates regarding any changes or updates to the Plan, via their community public video segments. This media outlet, along with Facebook and Twitter will keep the public and stakeholders apprised of mitigation projects for which HMGP or PDM funding is made available for implementation of mitigation projects identified in the Plan.

APPENDIX A: PLANNING TEAM

Planning Team Members 1
 Stakeholders..... 1

Planning Team Members

The Cameron County Plan was organized using a direct representative model. Cameron County acted as the direct representative for participating jurisdictions in this effort. At the beginning of the process Cameron County sent notices to jurisdictions asking for input and participation in the process, with the City of Harlingen responding and formally participating. Table A-1 represents the Executive Committee by organization and title, and Table A-2 represents the formal approving body for both jurisdictions by organization and title.

Table A-1. Executive Committee – Organization and Title

ORGANIZATION	TITLE
Cameron County	Deputy Emergency Management Coordinator
Cameron County	Planner
City of Harlingen	Assistant City Manager
City of Harlingen	Engineer-in-Training

Table A-2. – Approving Body by Department/Title

ORGANIZATION	TITLE
Cameron County Judge’s Office	County Judge
City of Harlingen	City Manager

Stakeholders

The following groups listed in Table A-3 represent a partial list of organizations invited to stakeholder meetings, public meetings and workshops throughout the planning process and include: non-profit organizations; private businesses; hospitals; and school districts. The following list of persons, by Title, were sent an email and/or contacted by phone requesting their input into the HMAP planning process, and an

APPENDIX A: PLANNING TEAM

invitation to participate at each of the Stakeholder meetings. Many did attend and were integral to providing comments and data for the Plan. For a list of attendance at meetings, please see Appendix E¹.

Table A-3. Stakeholders and Contact Title

Brownsville I.S.D	BISD Superintendent
Los Fresnos C.I.S.D.	LFCISD Superintendent
Rio Hondo I.S.D.	RHISD Superintendent
San Benito C.I.S.D.	SBCISD Superintendent
Texas Department of Transportation	Regional Director
Texas Department of Public Safety	District Engineer
Texas Commission on Environmental Quality	Senior Engineer
Environmental Protection Agency	Director, Environmental Health
Railroad Commission of Texas	Risk Manager
AEP Texas	Director
East Rio Hondo Water Supply	General Manager
Cameron County Drainage District #1	Manager
Cameron County Drainage Districts.#2 & #3,#4,#5	Manager
Texas Gas Service	Director

¹ Information contained in Appendix E is exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX B: PUBLIC SURVEY

Overview	1
Public Survey Results	2

Overview

Cameron County and the City of Harlingen conducted public surveys that asked a wide range of questions concerning the opinions of the public regarding natural hazards. This fifteen-question survey was made available on the Cameron County website and City of Harlingen website. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

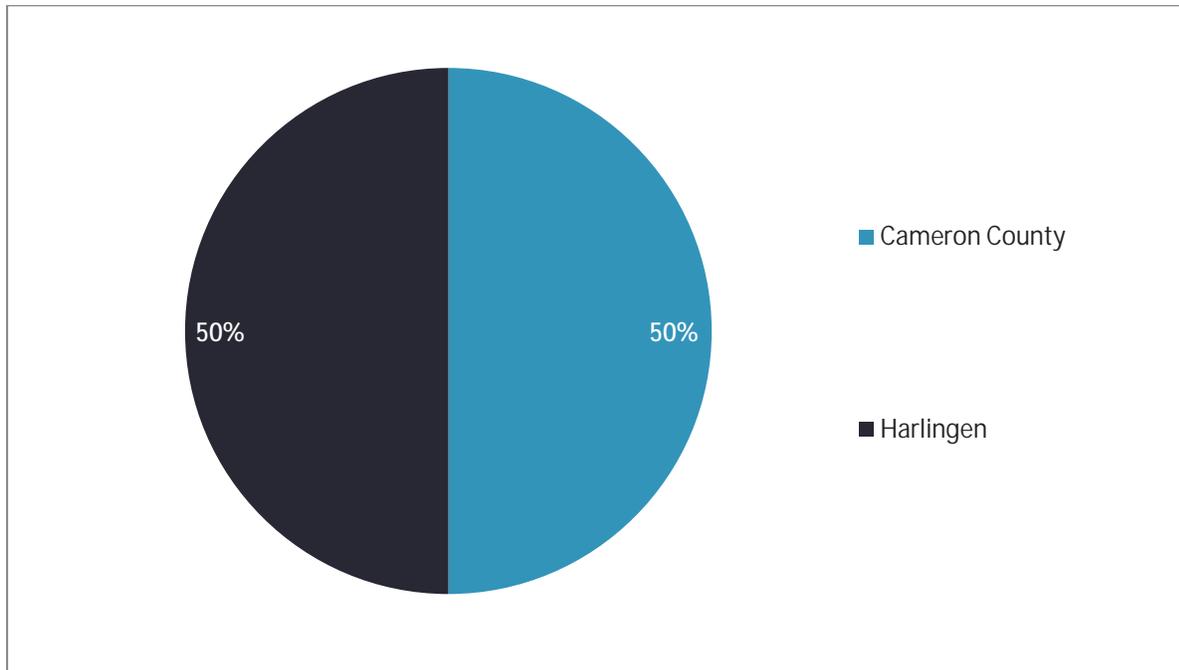
A total of 16 surveys were collected, the results of which are analyzed in this Appendix. The purpose of the survey was twofold: 1) to solicit public input during the planning process and 2) to help the jurisdictions identify any potential actions or problem areas.

Survey results are depicted on the following pages, showing the percentage of responses for each answer. For questions that did not provide a multiple-choice answer, or that required an explanation, comments are summarized where similar.

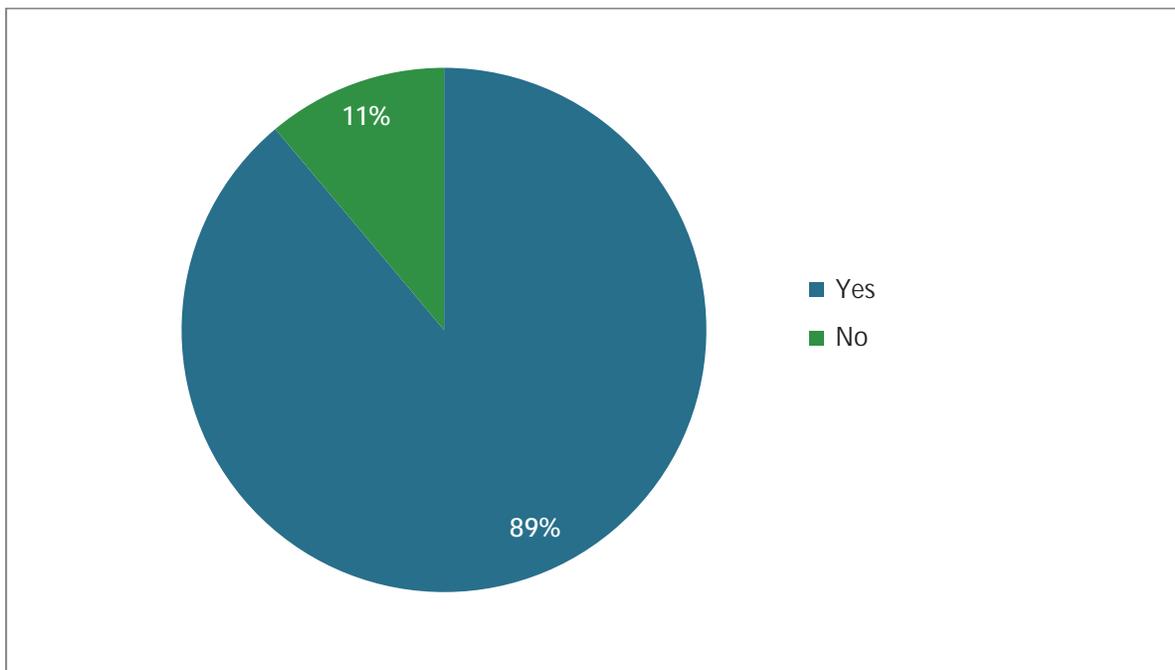
APPENDIX B: PUBLIC SURVEY

Public Survey Results

1. Please state the jurisdiction (city and community) where you reside.

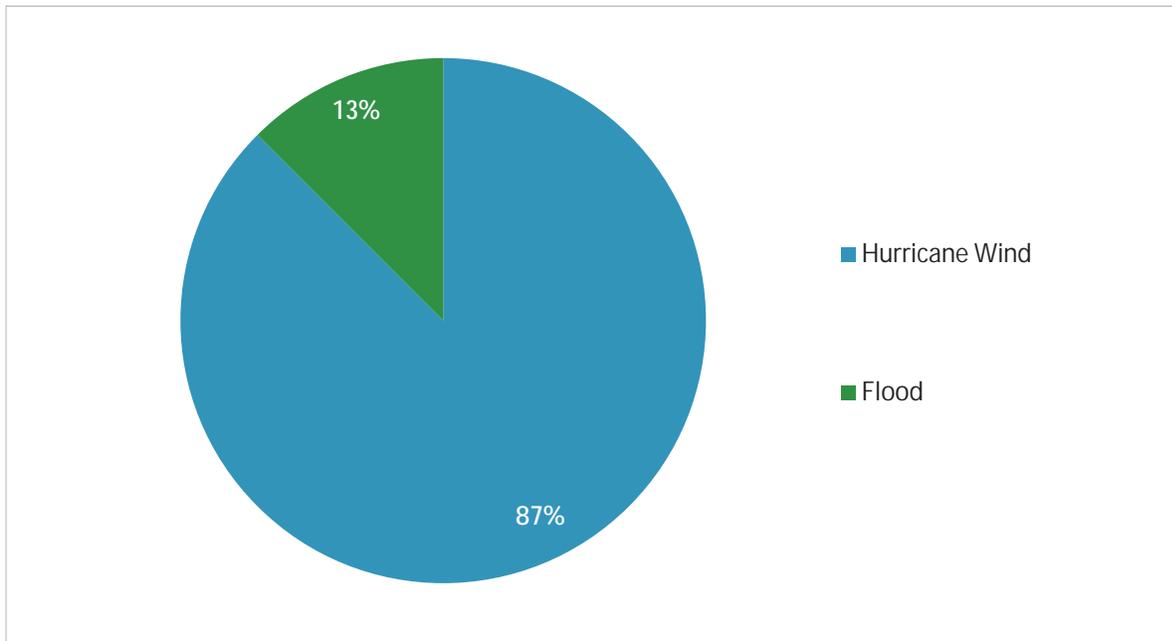


2. Have you ever experienced or been impacted by a disaster?

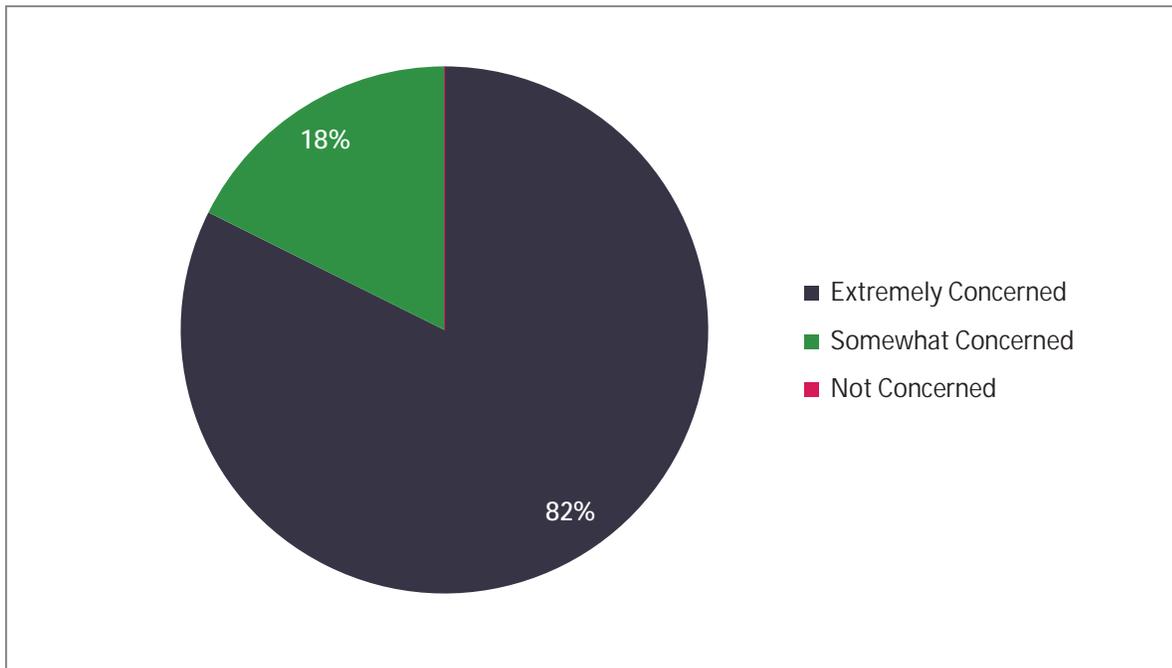


APPENDIX B: PUBLIC SURVEY

2. B. If "yes", please explain:

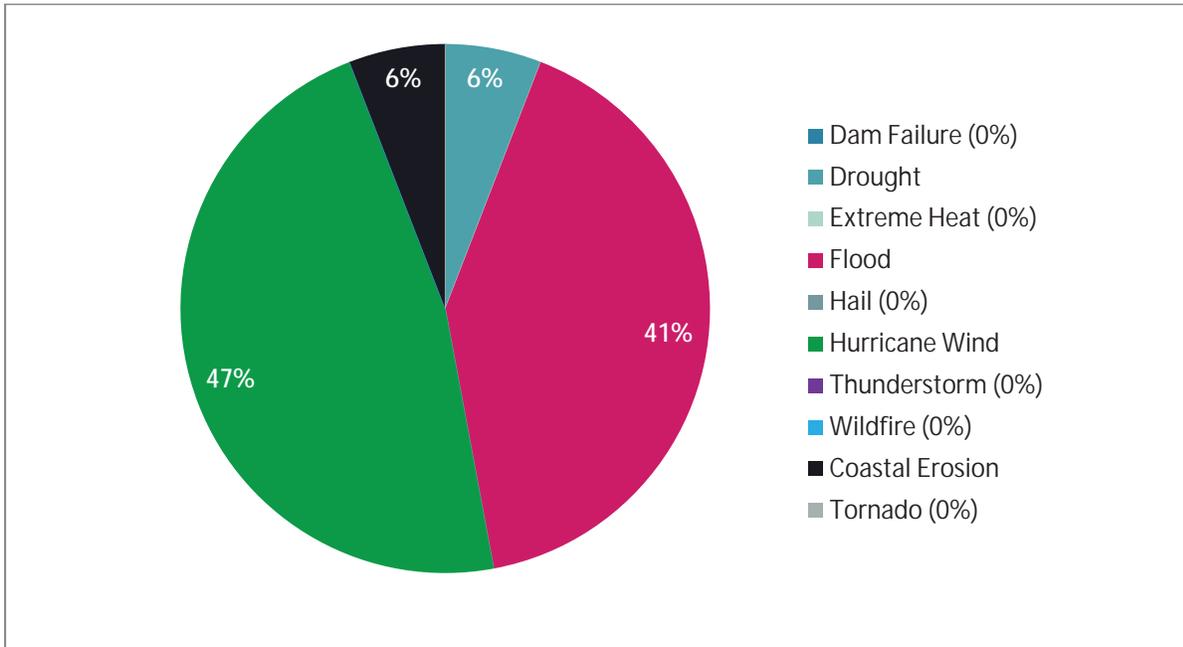


3. How concerned are you about the possibility of your community being impacted by a disaster?

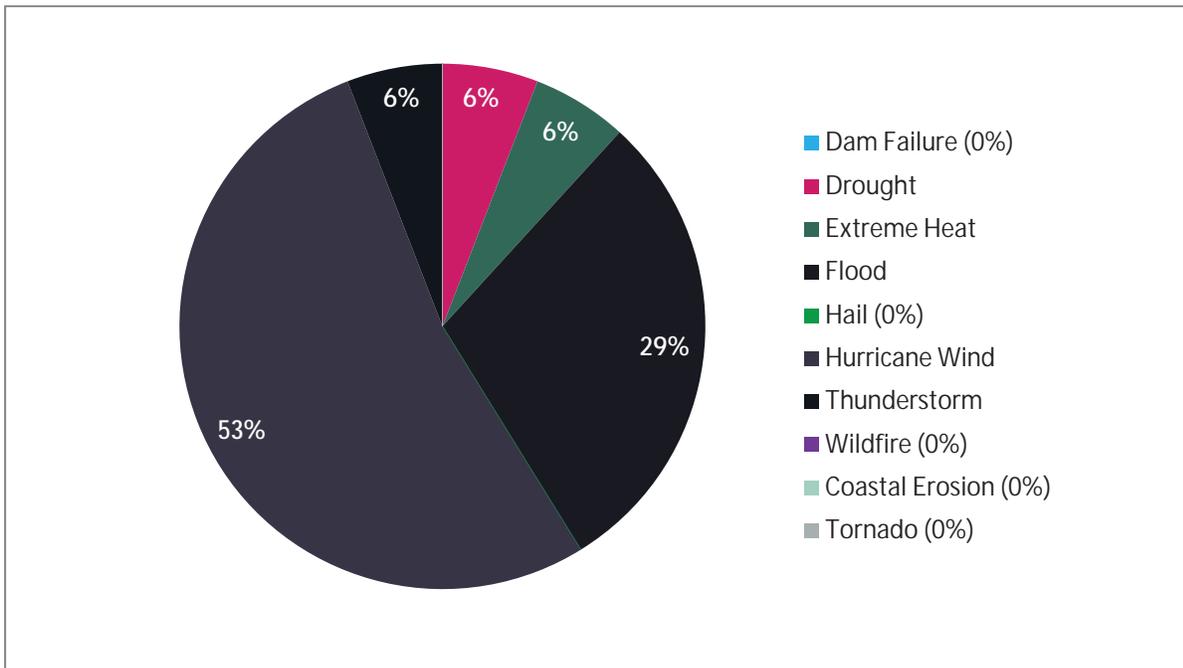


APPENDIX B: PUBLIC SURVEY

4. Please select the one hazard you think is the highest threat to your neighborhood:

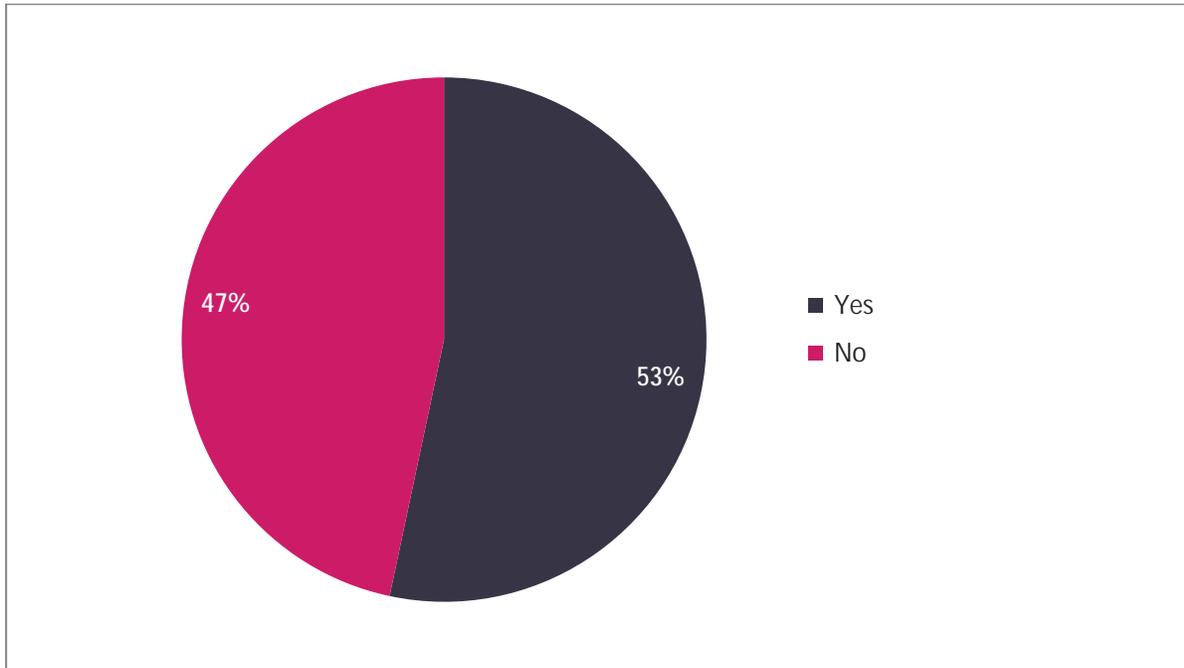


5. Please select the one hazard you think is the second highest threat to your neighborhood:

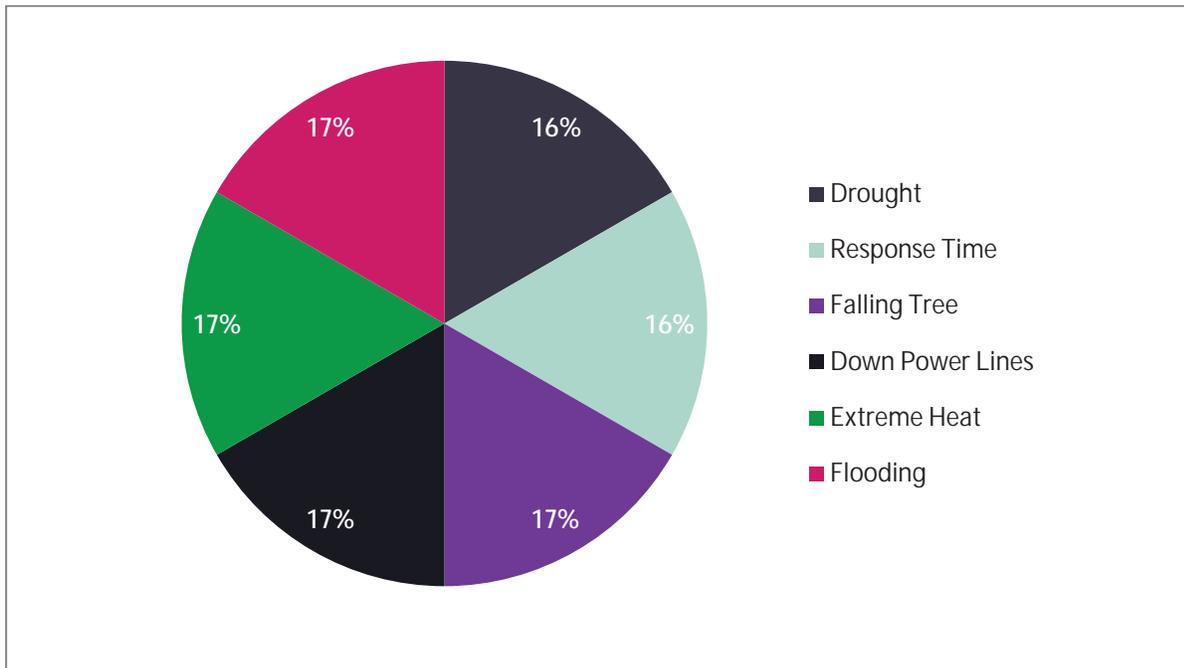


APPENDIX B: PUBLIC SURVEY

6. Are there hazards not listed above that you think are wide-scale threats to your neighborhood?

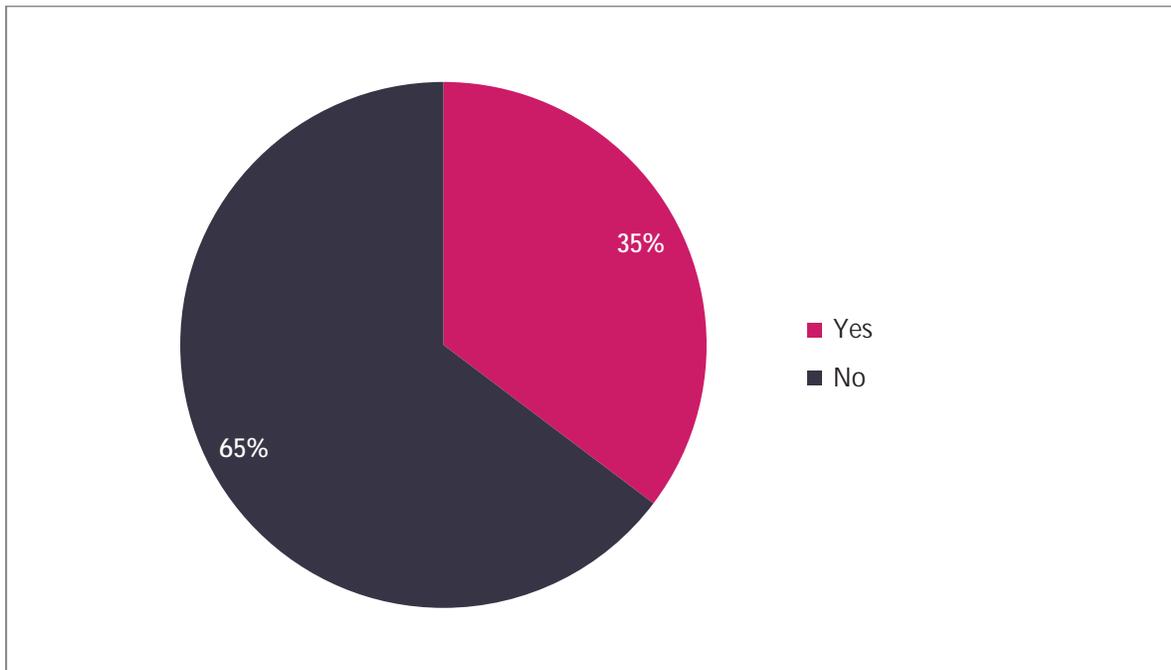


6. B. If "Yes," please explain.

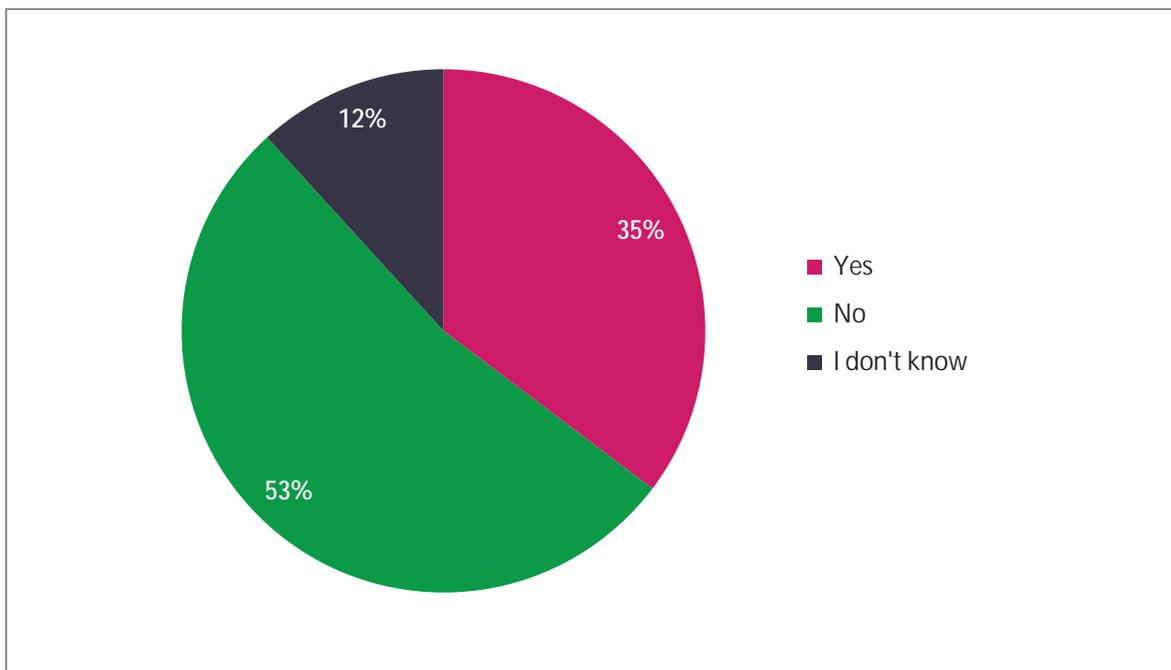


APPENDIX B: PUBLIC SURVEY

7. Is your home located in a floodplain?

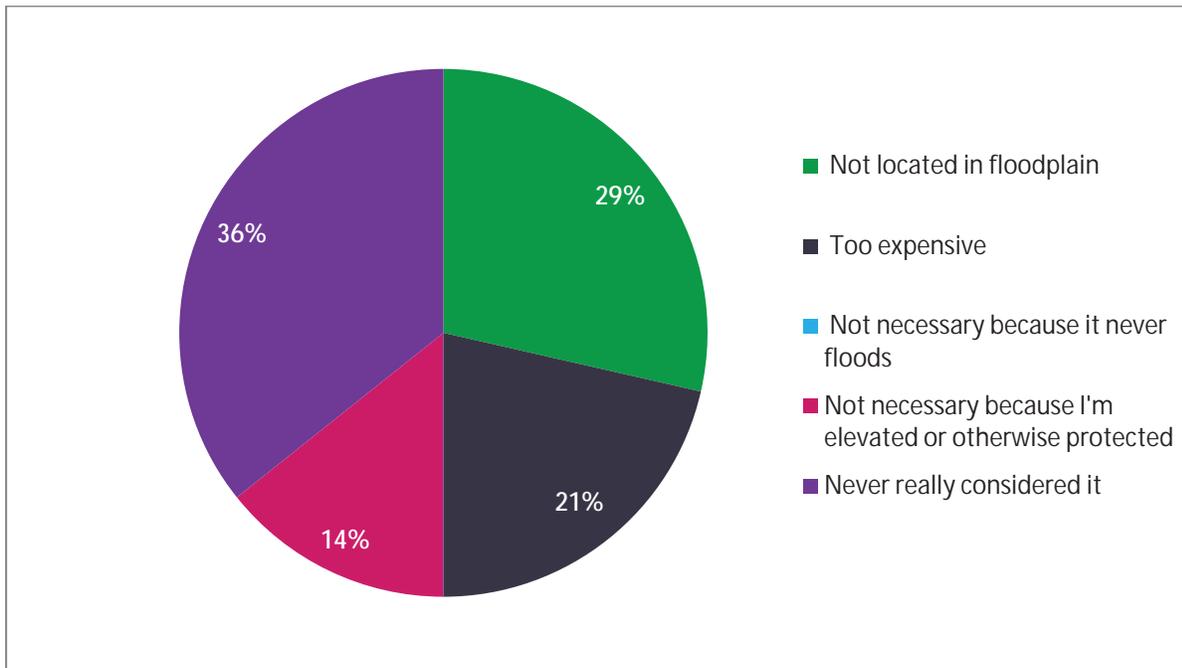


8. Do you have flood insurance?

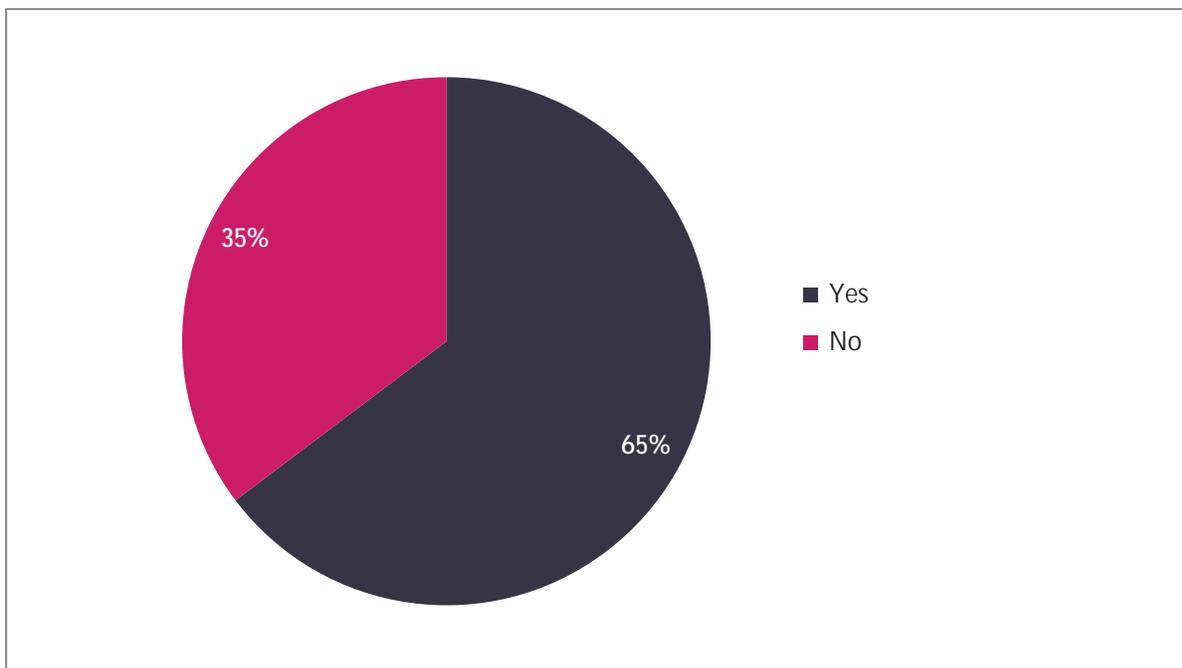


APPENDIX B: PUBLIC SURVEY

9. If you do not have flood insurance, why not?

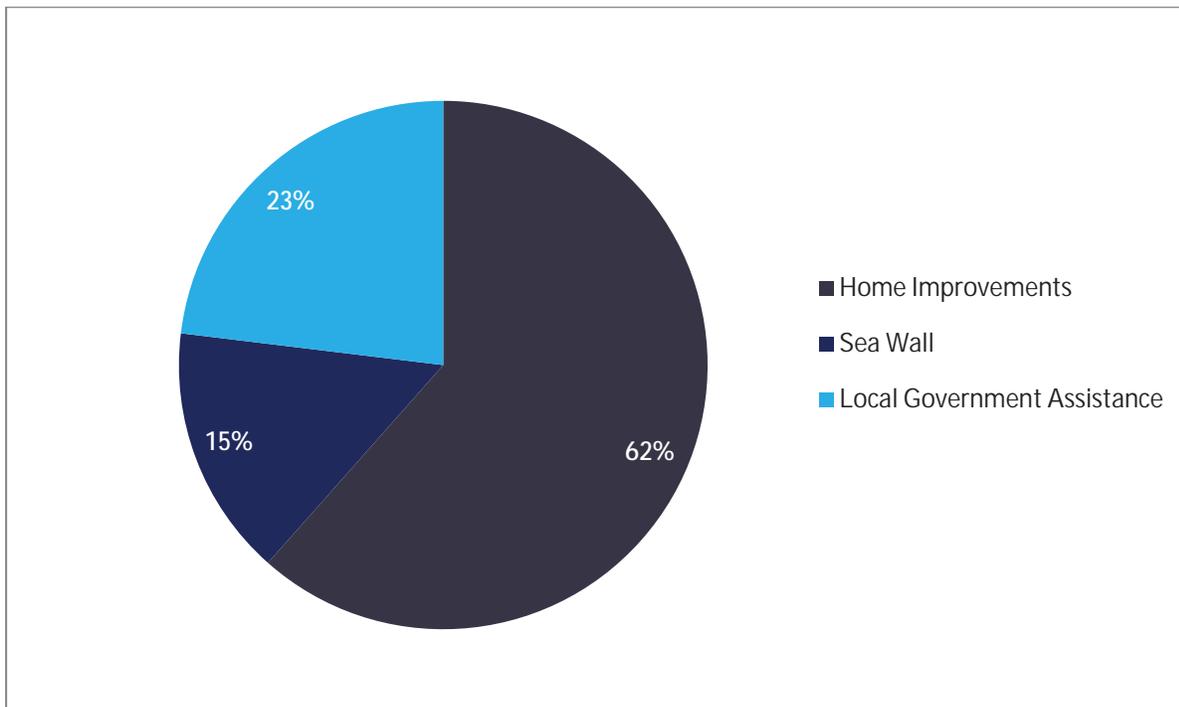


10. Have you taken any actions to make your home or neighborhood more resistant to hazards?

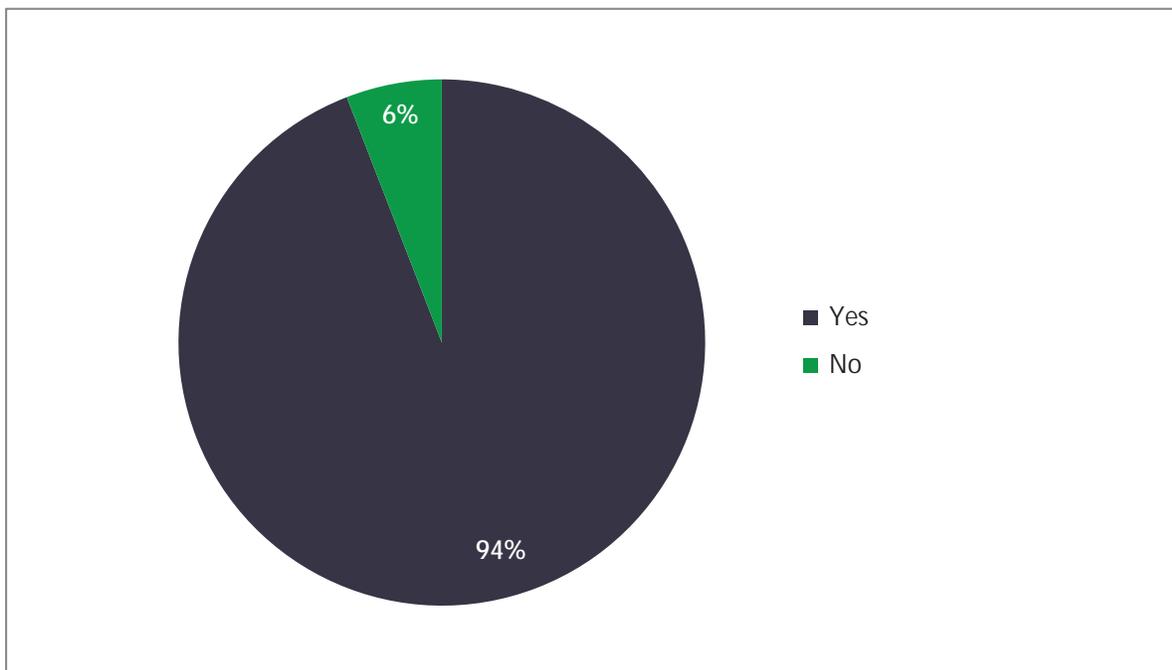


APPENDIX B: PUBLIC SURVEY

10. B. What have you done?

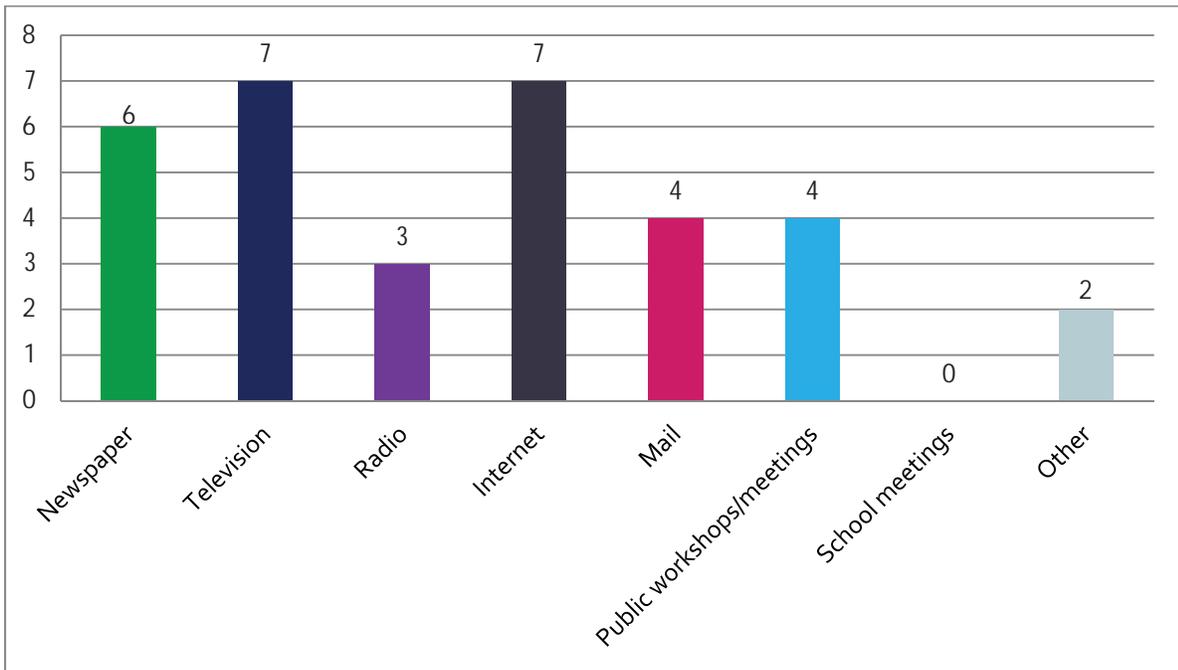


11. Are you interested in making your home or neighborhood more resistant to hazards?

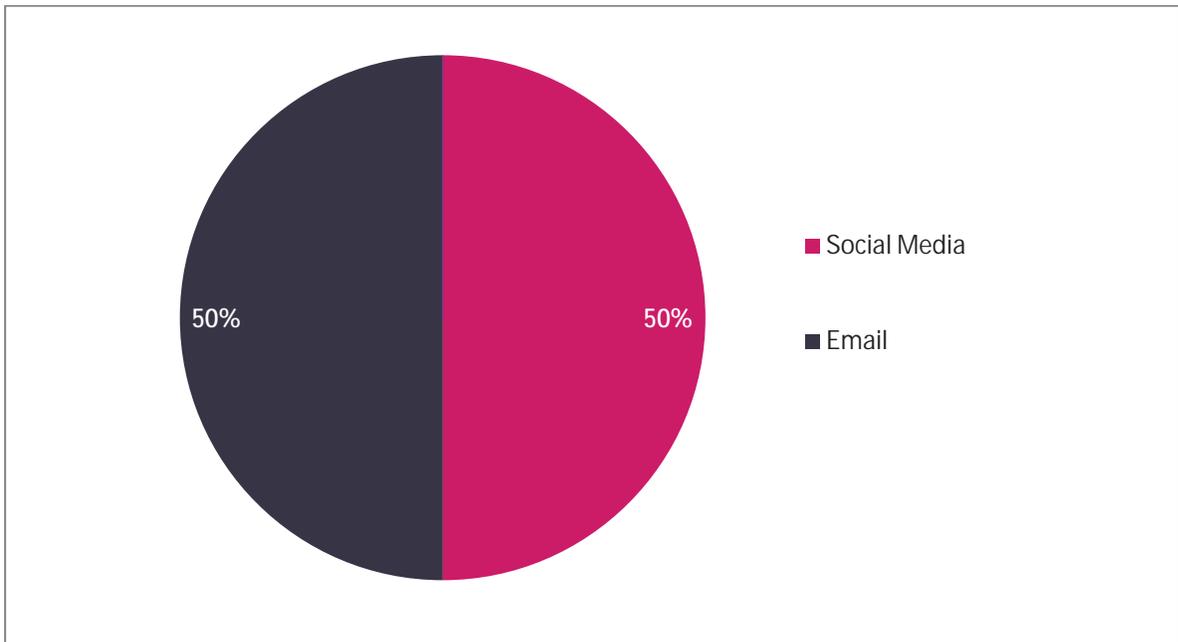


APPENDIX B: PUBLIC SURVEY

12. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

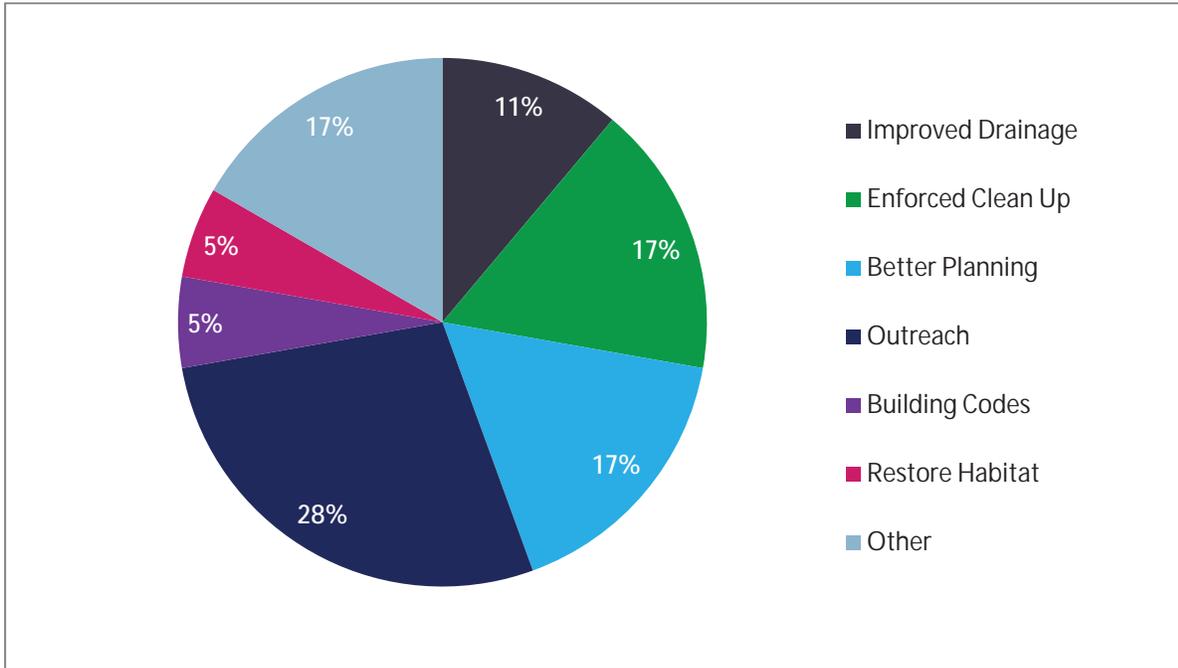


12. B. If other, please specify.

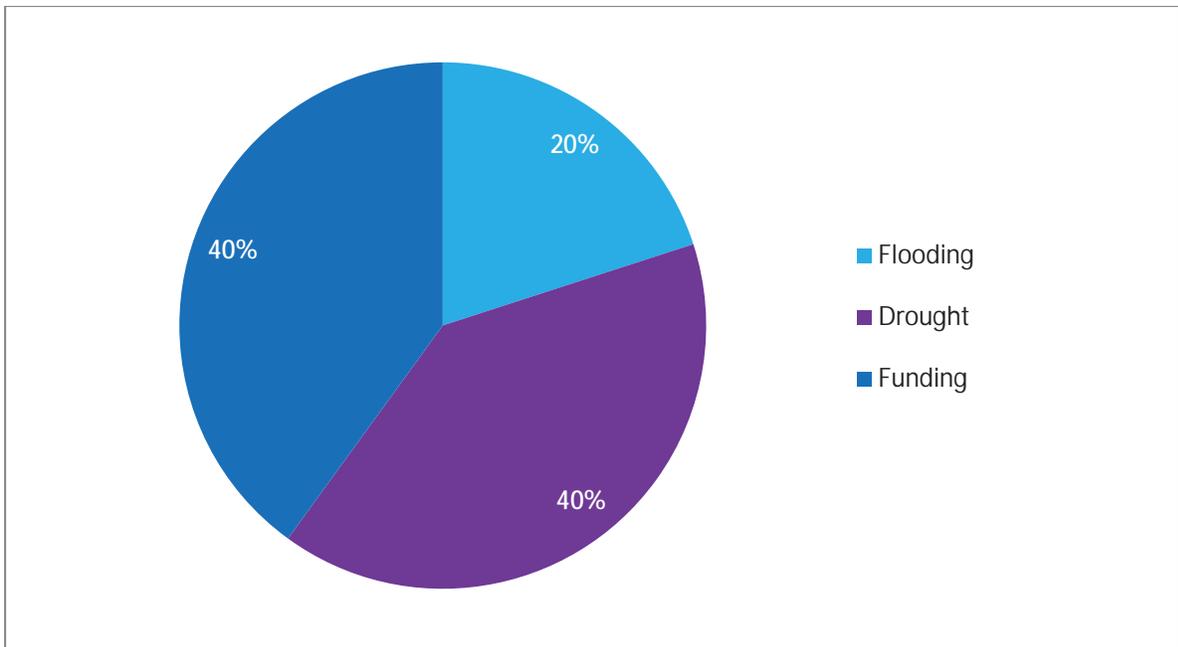


APPENDIX B: PUBLIC SURVEY

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?

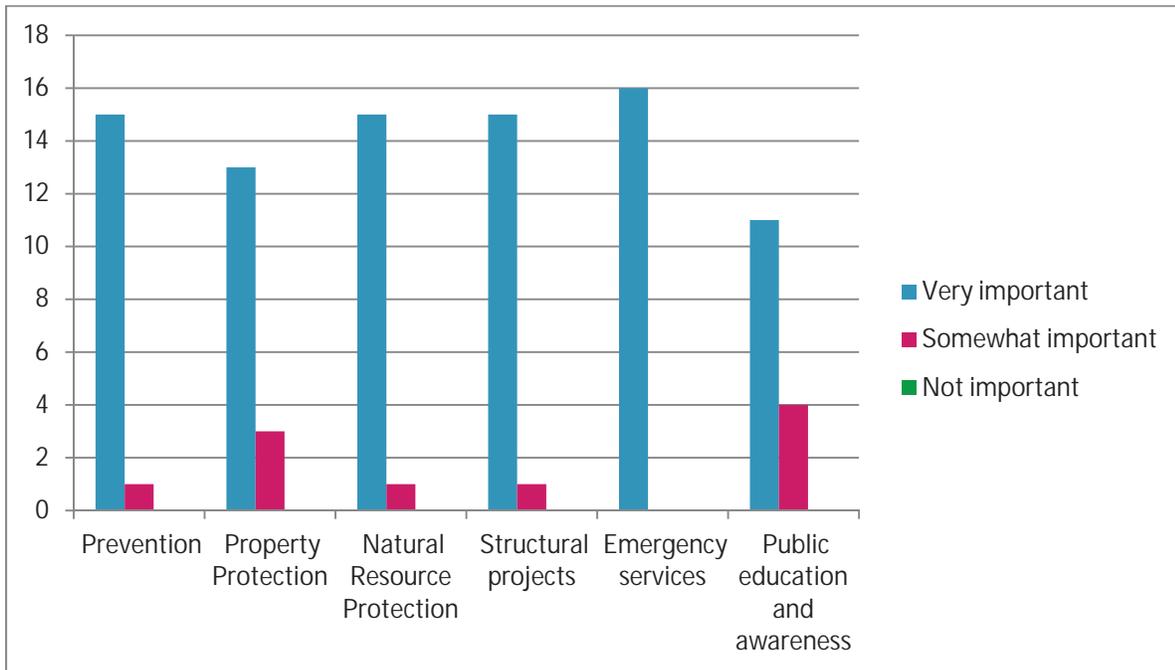


14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?



APPENDIX B: PUBLIC SURVEY

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 - 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

This Appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act FOIA.

APPENDIX D: DAM LOCATIONS

This Appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX E: MEETING DOCUMENTATION

Workshop Documentation	1
Public Meeting Documentation	5
Public Notices	6

Workshop Documentation

This Appendix is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX F:

CAPABILITY ASSESSMENT

Community Capability Assessments 2

Incorporating Mitigation Actions into Local Planning Mechanisms 4

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. Information is denoted with an "X" on the Checklist. For jurisdictions that do not have specific documents or programs in place, Cameron County works with communities to provide essential service support to facilitate implementation of mitigation activities. Cameron County services that may include:

Emergency Management – maintains and administers an integrated Emergency Management program designed to assure a safe environment through training, prevention/mitigation, readiness, response, and recovery to natural and/or human-caused disasters. This office also currently oversees the administration of the county Homeland Security Program and Health and Safety Program.

Real Property Tax Information – provides tax services and property valuation information.

Geographic & Property Information – data resources include GIS/map inventory, geology, hazardous materials, infrastructure, managed lands, agricultural, wetland areas, hydrography, watersheds, and other GEOData inventory.

APPENDIX F: CAPABILITY ASSESSMENT

Community Capability Assessments

COMMUNITY CAPABILITY CHECKLIST	Cameron County	City of Harlingen
PLANS		
Master or comprehensive plan		X
Land use plan		X
Capital improvement plan	X	X
Economic development plan		X
Stormwater Management plan		X
Post-disaster recovery plan		
Open space plan		
Master Drainage plan	X	X
Local waterfront revitalization plan (LWRP)		
Watershed protection plan		
College campus plan		
Comprehensive emergency management plan	X	X
Emergency response/evacuation plan	X	X
POLICIES/ORDINANCE		
Building codes	X	X
Zoning ordinance/land use restrictions		X
Subdivision regulations		X
Steep slope ordinance		
Property set-back ordinance (water/wildfire/other hazard)		
Watershed ordinance		
Storm water ordinance	X	X
Site plan review requirements		X
Real estate disclosure requirements		
PROGRAMS		
National Flood Insurance Program	X	X
NFIP Community Rating System		
Property acquisition program		

APPENDIX F: CAPABILITY ASSESSMENT

COMMUNITY CAPABILITY CHECKLIST	Cameron County	City of Harlingen
Public education/awareness programs	X	X
Stream maintenance program		
Storm drainage systems maintenance	X	X
STUDIES/REPORTS		
Floodplain maps/flood insurance studies	X	X
Hydrological/hydraulic studies	X	X
STAFF/DEPARTMENTS		
Development planner	X	X
Building code official		X
GIS and/or HAZUS specialist	X	X
Engineer/public works official	X	X
Local floodplain administrator	X	X
Environmental conservation specialist		
Geographic information system	X	X
Grant writer		X

APPENDIX F: CAPABILITY ASSESSMENT

Incorporating Mitigation Actions into Local Planning Mechanisms

The table below provides further analysis of how Planning Team members will incorporate identified mitigation actions in the Hazard Mitigation plan into other planning mechanisms, and the point of contact for each entity.

ENTITY	POINT(S) OF CONTACT <i>(Contact will vary based on Type of Action to be Implemented)</i>	METHOD OF INCORPORATING MITIGATION ACTIONS INTO LOCAL PLANNING MECHANISMS
Cameron County	County Judge, Emergency Management Office, Floodplain Manager, Drainage District(s) Manager, VFD	Annual budget review, FIREWISE program and Fire Management Plan, Comprehensive Plan, Flood Damage Ordinance, Emergency Operations Plan, Disaster Response and Recovery Plan, Master Drainage Plan, NFIP Program
City of Harlingen	City Manager and City Administration, City Engineering Dept., Floodplain Manager, Fire Dept.	Annual budget review, Flood Damage Ordinance, Emergency Operations Plan, Building Codes, Flood Damage Ordinance, Emergency Operations Plan, Disaster Response and Recovery Plan, Master Drainage Plan, Stormwater Management Plan, NFIP Program