
Nueces County Hazard Mitigation Action Plan

6/24/2024



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Section 1: Overview

Introduction 1
Scope 3

Introduction

Planning Area

Nueces County is located on the south-central coast of Texas, has a land area of 842 square miles, and a water area of 360 square miles.

Figure 1-1. Nueces County Location Map

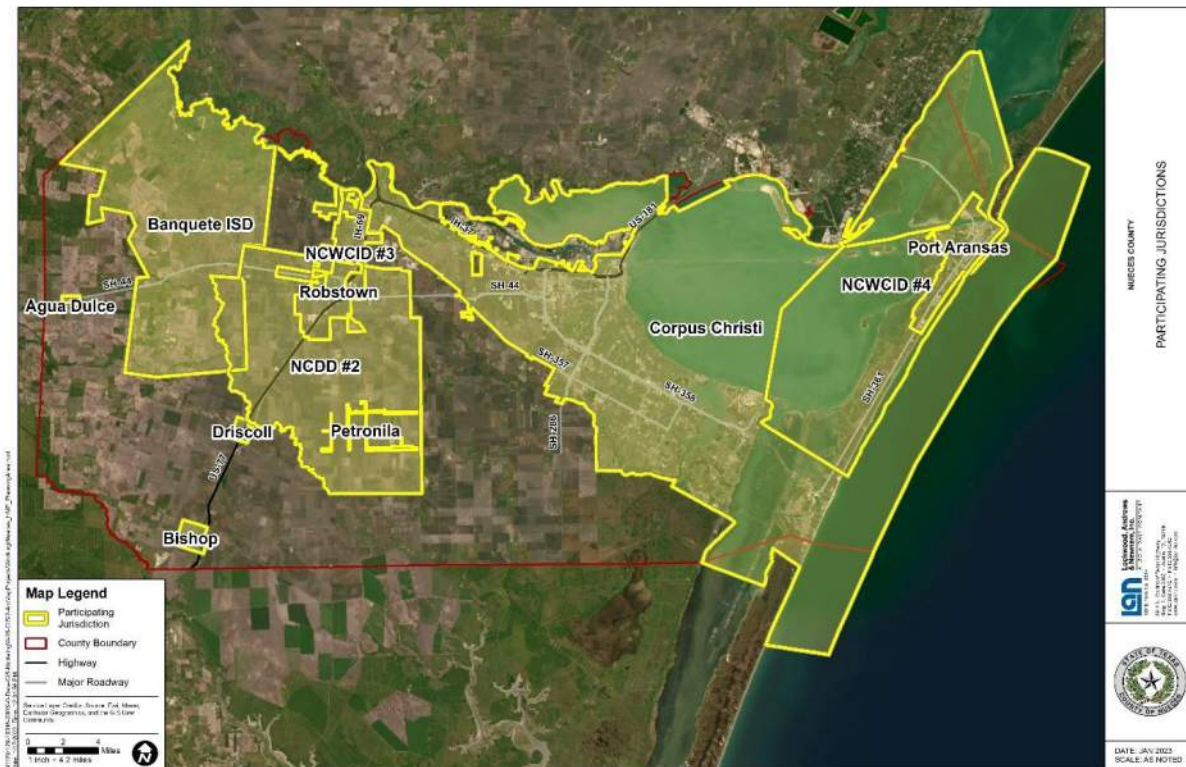


Nueces County’s previous Hazard Mitigation Action Plan, or Plan, was part of the regional plan sponsored by Coastal Bend Council of Governments (CBCOG). Due to state preference that plans may not include more than two counties, Nueces County chose to prepare a countywide multi-jurisdictional Plan for 2017. To be eligible for FEMA post-disaster mitigation funding, including Hazard Mitigation Grant Program funding, hazard mitigation plans must be updated every five years. Therefore, Nueces County has chosen to update their countywide multi-jurisdictional Plan for 2022. Participating jurisdictions in the Nueces County Multi-Jurisdictional Plan, as seen in Figure 1-2, are:

- Unincorporated Nueces County,
- City of Aqua Dulce,

- Banquete Independent School District,
- City of Bishop,
- City of Corpus Christi,
- City of Driscoll,
- City of Petronila,
- City of Port Aransas,
- City of Robstown,
- Nueces County Drainage District #2,
- Nueces County Water Control and Improvement District #3, and
- Nueces County Water Control and Improvement District #4.

Figure 1-2. Planning Area Map



The multi-jurisdictional plan approach is effective in addressing natural hazard risk because the participating jurisdictions generally face the same natural hazards, have similar assets, and have successfully partnered in the past.

Plan Participants

At least one representative and one staff member from each participating jurisdiction forms the Planning Team. For purposes of defining roles, stakeholders are individuals or groups that are vested in and affected by a mitigation action or policy. Examples of stakeholders include business owners, chamber of commerce, neighborhood associations, Red Cross, hospital districts, and private organizations. Public outreach also plays an important role in the Plan development. Stakeholders and the public were encouraged to participate in the development of the Plan. Section 2 includes a list of Planning Team members and activities and meetings held that involved the Planning Team and the public.

Hazard Mitigation Action Planning

Nueces County and the jurisdictions therein are susceptible to a wide range of natural hazards, including floods, hurricanes and tropical storms, drought, extreme heat, lightning, coastal erosion, hailstorms, tornados, levee failure, land subsidence, expansive soils, and wildfire. These life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for residence. The impact of hazards can be lessened in terms of their effect on people and property through effective hazard mitigation action planning and implementation. This Plan provides an opportunity for Nueces County and the other participating jurisdictions to evaluate successful mitigation actions and explore opportunities to reduce future disaster loss.

Scope

The focus of the mitigation plan is to reduce future losses within Nueces County by identifying mitigation strategies based on a detailed hazard risk analysis, including an assessment of both regional hazards and vulnerability. The mitigation strategies seek to identify potential loss-reduction opportunities. The goal of this effort is to work towards more disaster-resistant and resilient communities throughout Nueces County.

The scope of the hazards considered herein are those associated with natural hazards. Other planning frameworks exist in the region for hazards not addressed here, including man-made hazards such as security concerns, critical infrastructure protection, hazardous materials response, medical and public health response to terrorism. Agencies and organizations who may be contacted for further information on these topics include local emergency management agencies, Local Emergency Planning Committees (LEPCs), law enforcement agencies, fire departments, state and public health departments, the Port of Corpus Christi Authority, local drinking water suppliers, local offices of the Texas Commission on Environmental Quality, the U.S. Coast Guard, the Corpus Christi Metropolitan Planning Organization, and the Coastal Bend Council of Governments.

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Plan Development

Mitigation planning involves bringing together community leaders to identify natural hazards threatening their community and define key actions to implement with the goal of achieving a more disaster-resistant community. 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.

Planning Team

A conference call was held on May 19, 2022, with participating jurisdictions, and Lockwood, Andrews and Newnam (LAN) to identify Planning Team members. The Planning Team members identified include one member from each of the participating jurisdictions (see Table 2-1). Additionally, the call included identifying Plan stakeholders, discussing options for engaging the public, and setting a date for the plan kickoff meeting. The group also reviewed and discussed the previous hazards and mitigation actions included in the 2017 Nueces County Multi-Jurisdictional Hazard Mitigation Action Plan.

Planning Team members were asked to attend all workshops during the planning process. Planning Team members that did not attend workshops were contacted by phone or email and given a recording of the conference call. Some of the responsibilities of the Planning Team included: completing Capability Assessment Surveys, providing a public survey to the public, providing input regarding the identification of hazards, ranking hazards, identifying mitigation goals, developing new mitigation strategies, and identifying critical facilities.

The Nueces County Multi-Jurisdictional Plan was organized using a direct representative model, as Nueces County acted as the direct representative for participating jurisdictions in this effort. Each participating jurisdiction also had a local planning team to execute planning tasks at the local level.

Table 2-1. Planning Team

JURISDICTION	POSITION OR TITLE	AGENCY
Nueces County*	Emergency Management Coordinator/Deputy Coordinator, Community Services Director, Coastal Parks Director	Emergency Management
City of Agua Dulce	Mayor	Office of the Mayor
City of Bishop	City Secretary	Office of the Mayor
City of Corpus Christi	Emergency Management Coordinator, Asst Director of Public Works	Emergency Management, Development Services Department
City of Driscoll	City Administrator	Office of the Mayor
City of Petronila	City Secretary	City of Petronila
City of Port Aransas	Emergency Management Coordinator	Emergency Management
City of Robstown	Fire Chief / Emergency Management Coordinator	Fire Department
Banquete ISD	Superintendent of Banquete ISD	Banquete ISD
Nueces County Drainage District #2	Vice-Chairman	Nueces County Drainage District #2
Nueces County Water Control and Improvement District #3	District Manager	Nueces County Water Control and Improvement District #3
Nueces County Water Control and Improvement District #4	Information Technology	Nueces County Water Control and Improvement District #4

* County Emergency Management Coordinator serves the unincorporated areas of Nueces County and the cities of Agua Dulce, Bishop, Driscoll, and Petronila

Planning Process

In 2012 the Coastal Bend Council of Governments coordinated a regional HMAP process and secured FEMA approval for participating Counties (including Nueces) and Cities (including Agua Dulce, Bishop, Corpus Christi, Driscoll, Port Aransas & Robstown). Recognizing the need for a new plan because of a state preference for plans no larger than one county, then Nueces County Emergency Management Coordinator began informal discussions between other Emergency Management Coordinators within Nueces County on their jurisdiction's interest in participating in a joint HMAP process. Based upon the shared interest in planning together Nueces County submitted a Hazard Mitigation Grant Program (DR-4223) to support the cost of hiring a consultant to assist

with the planning process/plan development. Each participating jurisdiction included a letter of support for the grant. FEMA/TDEM awarded the grant in August 2016 and the process to create an Inter-local agreement also took place to share the cost and define responsibilities across the jurisdictions. All participating jurisdictions had their governing boards approve the Inter-local agreement and sign onto the planning process in fall of 2016 (including appointment of their HMAP planning team representatives and their local planning team). Also, during fall 2016 a request for proposals for consultant services to develop a hazard mitigation action plan. Several proposals were received/evaluated, and LAN was selected/awarded the contract. The 2017 plan has since expired. LAN was chosen again to develop the updated countywide multi-jurisdictional plan for 2022.

The process used to prepare this Plan included following steps outlined in the Local Mitigation Plan Review Guide (FEMA, 2011, Effective until 2023). After the Planning Team was organized, a Capability Assessment Survey was developed and distributed at the Kick-Off Workshop on June 24, 2022/August 3, 2022. Both the Planning Team and residents ranked hazards. Specific mitigation strategies were discussed at the Mitigation Workshop on August 30, 2022. Finally, Plan Maintenance and implementation procedures were developed and are included in Section 20. A schedule of planning activities is included as Table 2-2.

Table 2-2. Schedule of Planning Tasks

Timeline	Service/Deliverable
June 24, 2022, August 3, 2022, January 31, 2023	Conduct Kickoff Meeting, Capability Assessment; identify and evaluate hazards; begin drafting MAP
August 30, 2022, May 25, 2023	Conduct Risk Assessment WebEx Workshop for Planning Team; begin drafting Risk Analysis; review upcoming Mitigation Strategy objectives, Conduct Mitigation Strategy WebEx Workshop for Planning Team, work with planning team to complete mitigation worksheets.
August 4, 2023	Provide MAP Draft to Planning Team at public meeting for review and comment
September 9, 2023	Submit MAP Draft to TDEM for review and edits
TBD (assuming FEMA review completed)	FEMA Approval of PLAN; participating jurisdictions adopt PLAN by resolution

Kickoff Workshop

The Planning Team Kickoff Workshop was a Public Meeting that was held virtually on June 24, 2022. A second Kickoff Workshop was held on August 3, 2023. A third Kickoff Workshop was held on January 31, 2023. Adjacent jurisdictions were invited to attend by the Nueces County Emergency Management Coordinator. Nueces County served as the coordinating jurisdiction on behalf of the planning team. The initial meeting provided an opportunity to inform participating jurisdictions officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities, and also to involve stakeholder groups and the general public. In addition to the kickoff presentation, participants received the following information:

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

A hazard ranking exercise was conducted at the Kickoff public meeting to get input from residents and rank natural hazards affecting the planning area. Participants ranked hazards in terms of level of risk, frequency of occurrence, and potential impact. Overall, residents ranked Drought and Hurricanes/Tropical Storms as the highest hazard risks followed by Floods, Windstorms, Extreme Heat, Lighting, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Dam/Levee Failure, Land Subsidence, Wildfire, and Severe Winter Storms.

The Planning Team Kickoff Workshop was well-attended, with members from each of the participating jurisdictions present. Efforts were made to document key participants. The following table highlights participants for each jurisdiction. For a comprehensive list of meeting attendees, meeting handouts, and documentation refer to Appendix C.

Table 2-3. Kickoff Workshop Participation Summary

JURISDICTION	KEY PARTICIPANTS		PARTICIPATION
	POSITION OR TITLE	AGENCY	
Unincorporated Nueces County	Emergency Management Coordinator	Office of Emergency Management	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
City of Agua Dulce	Mayor, City Secretary	Office of Mayor	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
City of Bishop	Mayor, Mayor Pro Tem	Office of Mayor	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment

Table 2-3. Kickoff Workshop Participation Summary (cont.)

JURISDICTION	KEY PARTICIPANTS		PARTICIPATION
	POSITION OR TITLE	AGENCY	
City of Corpus Christi	Floodplain Manager, Emergency Management Coordinator	Department of Developmental Services, Office of Emergency Management	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
City of Driscoll	Mayor, Consultant Administrator	Office of Mayor	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
City of Petronila	Mayor, City Secretary	Office of the Mayor	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
City of Port Aransas	Emergency Management Coordinator	Office of Emergency Management	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment

Table 2-3. Kickoff Workshop Participation Summary (cont.)

JURISDICTION	KEY PARTICIPANTS		PARTICIPATION
	POSITION OR TITLE	AGENCY	
City of Robstown	Fire Chief, Emergency Management Coordinator, Mayor	Fire Department, Office of the Mayor	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
Banquete ISD	Community	N/A	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
Nueces County Drainage District #2	Vice Chairman	Nueces County Drainage District #2	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
Nueces County Water Control and Improvement District #3	District Manager	Nueces County Water Control and Improvement District #3	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment
Nueces County Water Control and Improvement District #4	District Manager	Nueces County Water Control and Improvement District #4	<ul style="list-style-type: none"> ✓ Present for Plan Overview ✓ Received Public Survey Access Information ✓ Participated in Hazard Ranking Exercise ✓ Received Capability Assessment

Following the Plan Kickoff Workshop, many of the participating jurisdictions posted a link to the public survey on their websites to solicit public outreach and input for the Plan.

Hazard Identification

Hazard identification and ranking was a major component of the Plan Kickoff Meeting. Following the Kickoff Meeting the Planning Team reviewed the public input received concerning the hazard ranking and formulated the final ranked list of natural hazards to be incorporated into the Plan. Hazards identification is documented in detail in Section 3 of this Plan.

G-318 Local Mitigation Planning Workshop

On August 30, 2022, the Texas Department of Emergency Management held a G-318 Local Mitigation Planning Workshop. Members from the participating jurisdiction and LAN attended the workshop.

Risk Assessment

A preliminary risk assessment for the Nueces County Multi-Jurisdictional Plan was completed in August 2022 and the results were presented to Planning Team members via webinar on August 30, 2022. A second risk assessment presentation was held on May 25, 2023. 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 natural hazards can be found in Sections 5 through 18 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 2017 county plan were reviewed as a baseline for new actions, goals, and objectives. The Planning Team reviewed their respective mitigation actions from the previous plan to determine projects that are still viable and may be included in the new Nueces County Multi-Jurisdictional Plan.

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

1. Potential mitigation actions were developed, and the list narrowed down to those that were most likely to be implemented, most cost-effective in reducing risk, and most likely to receive political and community support.
2. A Problem Statement was developed for each hazard to determine actions to mitigate the specific problem or risk, background information on why the action is needed was documented as well as who (by title) will oversee implementation of the project. Timeframe for implementation was defined and any obstacles to implementation such as local environmental groups opposing the project or lack of community support was identified.
3. Participants were provided an inventory of federal and state funding sources that could potentially assist in implementing the proposed mitigation actions. Planning Team Members considered benefits that would result from the mitigation actions versus the cost of those projects. Economic impact of implementing one action over another was a consideration.
4. Planning Team Members identified and prioritized proposed actions, costs and benefits, effects on existing buildings and future development, implementation schedules, and potential funding sources.

Table 2-4. Planning Team Meeting Attendance Summary

Jurisdiction	Kickoff & Public Meeting	Mitigation/Risk Assessment Strategy Workshop	Provide MAP Draft to Planning Team for Comments
Meeting Date	June 24, 2022 August 3, 2023 January 31, 2023	August 30, 2022 May 25, 2023	August 4, 2023
Unincorporated Nueces County	X	X	
City of Agua Dulce	X	C	
Banquete ISD	X	C	
City of Bishop	X	C	
City of Corpus Christi	X	X	
City of Driscoll	X	C	
City of Petronila	X	C	
City of Port Aransas	X	C	
City of Robstown	X	X	
Nueces County Drainage District #2	X	C	
Nueces County Water Control and Improvement District #3	X	X	
Nueces County Water Control and Improvement District #4	X	X	

X = Attended. Detailed attendance records are included in Appendix C.
C = Did not attend.

Resources and Existing Plans

Resources

A variety of resources were utilized in compiling the data needed to perform the hazard analysis. Resources included FEMA, the United States Army Corps of Engineers (USACE), Texas A&M Forest Service, National Oceanic and Atmospheric Administration (NOAA), the 2021 National Land Cover Database, the Texas Water Development Board (TWDB), the Texas Geographic Society, the Texas State Data Center, the Texas Division of Emergency Management (TDEM), the 2021 Census Bureau Population Estimate, The Nueces County Appraisal District, the USDA Nueces County Census of Agriculture, the Bureau of Economic Geology, and local hazard event reports.

Review of the Nueces County Beach Management and Coastal Erosion Response Plan, Nueces County Coastal Parks Master Plan, Texas Coastwide Erosion Response Plan, Floodplain Management Plan, Storm Water Management Plan, and Nueces County Community Wildfire Protection Plan provided essential data for developing actions to implement and incorporate into the mitigation plan.

Incorporation of Existing Plans

Current projects and studies were utilized as a starting point for discussing mitigation actions and how to incorporate the Plan into other local planning mechanisms such as budgetary, administrative, and development initiatives. Previous hazard events, occurrences, and hazard risk data were identified through NOAA's National Climatic Data Center (NCDC), Texas Geographic Society, U.S. Geographic Society, U.S. Department of Agricultural, local reporting, and other sources. The preliminary results were presented at the Risk Assessment webinar in order to facilitate a discussion to help participants develop actions for their jurisdiction. Furthermore, these studies were used as a starting point for suggesting grant and mitigation activities based on local and FEMA's Hazard Mitigation Assistance (HMA) funding.

Assessing Future Community Capabilities

Local capability to implement identified mitigation actions can be challenging. Communities can benefit from Mutual Aid Agreements with their neighboring County. This increases their capability to undertake and implement mitigation actions. Executing future cooperative agreements with the County and neighboring jurisdictions to maximize budget and grant monies was discussed at the Mitigation Strategy workshop.

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 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. Neighboring communities as well as local and regional stakeholders were invited via email and phone and provided an overview of the planning process and how they may work with participating jurisdictions to apply for future project funding to implement mitigation projects relative to their specific hazard risks.

It is essential that stakeholders involve underserved communities in the planning process to better understand the mitigation actions that are needed within the planning area. Input from all citizens, including underserved communities, was sought using three methods: open public meetings; public survey; and the draft Plan was made available for public review on the Nueces County website, as well as other social media platforms and community websites of other jurisdictions and related organizations.

Stakeholders

The following groups represent a partial list of organizations invited to provide input into the Plan.

Table 2-5. Plan Stakeholders

JURISDICTION / ENTITY	TITLE
Unincorporated Nueces County	Emergency Management Coordinator
City of Corpus Christi	Floodplain Manager, Asst Director of Public Works, Emergency Management Coordinator
City of Port Aransas	Emergency Management Coordinator
Banquette ISD	Superintendent of Banquette ISD
City of Robstown	Fire Chief/ Emergency Management Coordinator, Assistant Fire Chief

JURISDICTION / ENTITY	TITLE
City of Bishop	Emergency Management Coordinator, Mayor, City Secretary
City of Driscoll	Emergency Management Coordinator, Mayor, City Administrator
City of Agua Dulce	Emergency Management Coordinator, Mayor, City Secretary
City of Petronila	Emergency Management Coordinator, Mayor, City Secretary
Nueces County Coastal Parks Department	Parks Director
Local Emergency Planning Committee	Program Administrator
Corpus Christi Regional Transportation Authority	Managing Director of Operations
Fire Department/Fire Chief Assoc.	Fire Chief
UTMarine Science Institute, Port Aransas	Communications Coordinator
Coastal Bend Council of Governments	Director of Regional Economic Development
GIS/Public Works/SWPPP	Public Works Director
Regional Transportation Authority	Director of Planning

Stakeholders’ involvement in the planning process provided opportunities, via their resources, for citizens, underserved communities, nonprofit organizations, and vulnerable populations to be better educated about hazards and also to have access to avenues of transportation to provide input at public participation events.

Corpus Christi Regional Transportation Authority has created the 5310 program and the Disadvantaged and Small Business Enterprise Program. These programs aim to provide equal opportunity to communities in the planning area to be better involved in the community, including input for the plan through public participation.

The Local Emergency Planning Committee is dedicated to educating the public on hazard awareness. The Local Emergency Planning Committee aims to provide resources to the community in the planning area in order to educate members of the community by supporting hazard education in schools, providing educational resources on their website, and using their own avenues of outreach to keep the community up to date on important events in the community. Stakeholders have worked with, and supported, underserved communities in the planning area to provide equal opportunity for input on the hazard mitigation plan.

Public Participation

Public involvement in the development of the plan included two public meetings prior to Plan approval and adoption. Public input was sought using three methods: open public meetings; public survey; and the draft Plan was made available for public review on the Nueces County website, as well as other social media platforms and community websites of other jurisdictions and related organizations. The three methods of outreach were provided to give an equal opportunity to citizens, underserved communities, and vulnerable populations in the planning area to review the draft plan and provide input in public participation avenues.

Public Participation Survey

In addition to the open public meetings, Nueces County Multi-Jurisdictional Plan participants were able to solicit input from citizens and stakeholders through the use of a Public Survey. The survey was designed to obtain data and information from the residents of participating jurisdictions. Participating communities solicited surveys through their websites, social media, and utility bills. Copies of the survey were distributed by local officials and at public meetings. A total of 14 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.

Public feedback assisted in driving the direction of hazard profiling, developing mitigation actions for areas of concern expressed in the survey, and allowed for the community to voice their concerns and involve those interested in the HMP for the participating jurisdictions future involvement. Public feedback was also used in the cost-benefit analysis and prioritization of mitigation actions by factoring public opinion into the ranking criteria.

Section 3: Hazard Identification and Risk Assessment Overview

Hazard Identification 1
 Risk Assessment Overview 5

Hazard Identification

The purpose of this section is to provide background information for the hazard identification process, as well as descriptions for the natural hazards identified.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating jurisdictions identified fourteen hazards that are to be addressed in the Plan. These hazards were identified 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, fourteen hazards were identified as significant, as seen in Table 3-1.

Table 3-1. Hazard Descriptions

HAZARD	RANKING	DESCRIPTION
Drought	1	Droughts can be classified as meteorological, hydrological, agricultural, or socioeconomic droughts. A meteorological drought is a reduction of precipitation from the expected average or typical precipitation patterns. A hydrologic drought occurs when below average rainfall impacts streams, lakes, reservoirs, and groundwater levels. Agricultural droughts are brought on by insufficient moisture in the soil, typically impacting crops. Socioeconomic droughts occur when water demand exceeds supply due to a precipitation-related supply shortfall. Droughts may initiate or exacerbate other hazards, such as extreme heat or wildfires.
Hurricanes/ Tropical Storms	2	Hurricanes and tropical storms are intense tropical weather systems that produce damaging winds, generate storm surge, and heavy rainfall.

Table 3-1. Hazard Descriptions (Cont.)

HAZARD	RANKING	DESCRIPTION
Flood	3	A flood is 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 susceptible to flooding. Flooding is the partial or complete inundation of otherwise normally dry land. Types of flooding include riverine, coastal, and shallow flooding.
Windstorms	4	A windstorm is a storm with high winds or violent gusts with little or no rain. The windstorm hazard excludes extreme wind events that occur with other wind-related natural hazards such as hurricanes, tropical storms, and tornados which are addressed elsewhere in this plan.
Extreme Heat	5	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. If extreme heat conditions persist, it may be considered a heat wave.
Lightning	6	Lightning is a sudden electrostatic discharge during an electrical storm between electrically charged regions of a cloud, between that cloud and another cloud, or between a cloud and the ground.
Coastal Erosion	7	Coastal erosion is the “loss of land, marshes, wetlands, beaches, or other coastal features within the coastal zone because of the actions of wind, waves, tides, storm surges, subsidence, or other forces” ¹ . Coastal erosion may result in the temporary redistribution of coastal sediments, or the long-term loss of coastal sediments and sediment accumulation.

¹ Texas Natural Resources Code, Section 33.601

Table 3-1. Hazard Descriptions (Cont.)

HAZARD	RANKING	DESCRIPTION
Tornado	8	A tornado is a violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes have wind speeds of 250 miles per hour or more. Damage paths can be more than one mile wide and fifty miles long.
Hailstorm	9	Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. Nearly all severe thunderstorms produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually large hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general hail two inches (5 cm), a little larger than golf ball, or larger in diameter is associated with supercells. Non-supercell storms can produce golf ball size hail. In all cases, the hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft the larger the hailstone can grow ² .
Expansive Soils	10	Expansive soils contain minerals such as clay that are prone to large volume changes (swelling and shrinking). Soils with a high content of expansive minerals can shrink in drier seasons forming deep cracks. This shrinkage can remove support from buildings or other structures and result in damaging subsidence.
Levee Failure	11	A levee is an embankment built to prevent overflow from a body of water. A levee failure is when a levee embankment fails, or is intentionally breached, causing the previously contained water to flood the land behind the levee.

² NOAA

Table 3-1. Hazard Descriptions (Cont.)

HAZARD	RANKING	DESCRIPTION
Land Subsidence	12	Land subsidence is the decrease in the lands surface elevation due to the loss of subsurface support. Land subsidence can be caused by both natural processes and manmade actions. Land subsidence caused by natural processes typically occurs over a long period of time, usually thousands to millions of years. Short-term land subsidence is generally the result of manmade actions such as: excessive ground-water withdrawal, oil and gas drilling, mining operations, collapse of buried infrastructure like pipelines for water, sewer and storm or the leakage of underground pipes that erode adjacent soils. Subsidence from groundwater withdrawal and oil and gas production usually occur over large areas, while subsidence from collapsed or leaking pipelines is generally localized.
Wildfire	13	A wildfire is an uncontrolled fire almost exclusively fueled by natural vegetative fuels. Fuel may come in the form of grass, brush, or tress. Wildfire risk increases with high concentrations of connected fuels. Meteorological conditions such as high temperatures, low humidity, droughts, and high wind can also increase wildfire risk. Humans are the most common source of initial ignition in wildfires. Sparks from agricultural, industrial, or automobile activity may start a wildfire.
Winter Storms	14	A severe winter storm event is defined as a storm with snow, ice, or freezing rain. Severe winter storms are rare for the Texas Coastal area. Sever winter storms may include snowstorms, blizzards, cold waves, and ice storms. Snowstorms include four or more inches of snow in a 12-hour period. Blizzards are characterized by low temperatures and strong winds in excess of 35 mph with large amounts of drifting snow. A cold wave is a winter cold front with a drastic drop in temperature. An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground. ³

³ State of Texas Mitigation Plan Update 2018

Risk Assessment Overview

The risk assessment includes seven general parameters that are described for each hazard: description, location, extent, occurrence, probability, impact, and vulnerability.

Frequency of return, or probability, 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 recorded events.

Applicable hazard profiles include 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.

Section 4: Vulnerability Assessment Overview

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Vulnerable Assets Overview

Vulnerable assets are those that are susceptible to damage and loss from hazard events. A community’s vulnerability to a natural hazard is measured as a function of that community’s existing and future vulnerable assets including, but not limited to, populations, critical and non-critical infrastructure, property, and systems. Quantifying existing assets is the first step in defining a community’s vulnerability to natural hazards. Existing assets are defined below for the county and participating jurisdictions.

The City of Corpus Christi is the county seat and the largest city in the county. Populations for the unincorporated county and participating jurisdictions are included in the Existing Asset sections below. A description of the county land cover is shown in Table 4-1.

Table 4-1 – Nueces County Land Cover¹

Land Cover Type	Percent of Area
Residential	2.86%
Commercial and Industrial	8.98%
Agricultural	47.21%
Forested, Shrub, and Grassland	7.88%
Wetlands	4.09%
Unknown and Barren	2.06%
Water	26.97%

Critical Facilities

For the purpose of hazard mitigation, FEMA defines critical facilities as hospitals, fire stations, police stations, courthouse, communications, and similar facilities where essential programs/services are provided. Other facilities such as public schools may be deemed by a community to be a critical facility as well. These facilities should be given special consideration when formulating regulatory alternatives and floodplain management plans. A critical facility should not be located in a floodplain if at all possible. If located in a floodplain it should be provided a higher level of protection so that it can continue to function and provide services during and after a flood. Hazard mitigation actions to mitigate risk to critical facilities located in the 100-year floodplain, or potentially impacted by future flood conditions, are included in this Plan by jurisdiction. Critical Facilities are tabulated in Appendix D of the Plan.

¹ USDA Crop Land and National Land Cover Dataset, 2021

Unincorporated Nueces County Existing Assets

POPULATION*	
13,579 (Unincorporated)	

*Source: Census Bureau Population Estimate 2021. Unincorporated Nueces County figure represents the balance of the total population in the county, less each individual jurisdiction participating in the plan.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	816 Miles
Rail	90 Miles
Crop Land	280,817 Acres**; \$122,134,449 Value***

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
943	\$968,938,581	3,925	\$755,606,666

**** Nueces County Appraisal District, 2022

City of Agua Dulce Existing Assets

POPULATION*	
688	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	9 Miles
Rail	2 Miles
Crop Land*	2.45 Acres; \$1,066 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
71	\$15,251,504	255	\$19,726,169

**** Nueces County Appraisal District, 2022

Banquete ISD Existing Assets

POPULATION*	
3,862	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	185 Miles
Rail	7 Miles
Crop Land*	61,968 Acres; \$26,951,458 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
104	\$102,846,088	1,296	\$222,649,907

**** Nueces County Appraisal District, 2022

City of Bishop Existing Assets

POPULATION*	
3,155	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	31 Miles
Rail	2 Miles
Crop Land*	232 Acres; \$100,903 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
183	\$123,993,966	1,167	\$110,819,070

**** Nueces County Appraisal District, 2022

City of Corpus Christi Existing Assets

POPULATION*	
317,773	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	1,701 Miles
Rail	48 Miles
Crop Land*	21,392 Acres; \$9,303,924 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
12,148	\$16,744,675,468	91,026	\$16,266,319,691

**** Nueces County Appraisal District, 2022

City of Driscoll Existing Assets

POPULATION*	
673	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	13 Miles
Rail	2 Miles
Crop Land*	438 Acres; \$190,497 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
106	\$29,366,710	241	\$20,046,143

**** Nueces County Appraisal District, 2022

City of Petronila Existing Assets

POPULATION*	
87	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	22 Miles
Rail	0 Miles
Crop Land*	108 Acres; \$46,972 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
6	\$667,778	20	\$2,988,340

**** Nueces County Appraisal District, 2022

City of Port Aransas Existing Assets

POPULATION*	
3,105	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	50 Miles
Rail	0 Miles
Crop Land*	859 Acres; \$373,601 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
2,888	\$25,743,548,569	4,089	\$2,154,096,149

**** Nueces County Appraisal District, 2022

City of Robstown Existing Assets

POPULATION*	
10,157	

*Source: Census Bureau Population Estimate 2021.

CRITICAL INFRASTRUCTURE	
Type	Quantity
Major Roadways	116 Miles
Rail	12 Miles
Crop Land*	4,413 Acres; \$1,919,326 Value

**USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

NON-CRITICAL FACILITIES: PROPERTY****			
Commercial		Residential	
Parcels	Total Improvement Value	Parcels	Total Improvement Value
813	\$373,735,450	3,179	\$229,911,267

**** Nueces County Appraisal District, 2022

Nueces County Drainage District #2 Existing Assets

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #3 Existing Assets

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$7,255,507	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #4 Existing Assets

VULNERABILITY		
Population Served**		Infrastructure*
6,281		\$21,097,000
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Vulnerable Future Assets

Future growth and development in the county may affect hazard vulnerability. For identification of a community's future assets, it is useful to consider anticipated population growth, development trends, and planning and development management efforts. Based on population projections for the county planning area provided by the Texas State Data Center, the county, overall, is expected to grow approximately 1% annually from 2022 to 2040. Nueces County experiences steady growth in development including services to support the tourism industry, oil and gas industry, port activity, and agricultural land.

Future assets are another important matrix to assess a jurisdiction's vulnerability to natural hazards. With development comes the need to address the risk of natural hazards for larger populations and increased numbers of non-critical and critical facilities. Historically, hurricanes, tropical storms, and flooding has been a widespread problem for the Plan area; potential for these hazards creates limitations for urban land uses. A goal of community officials in the Plan area is to develop strategies to ensure that future development has reduced risk of impact by natural hazards while not inhibiting community growth. Vulnerability including potential dollar losses is defined for each hazard by jurisdiction in Sections 5 through Section 18 of this Plan.

Special Population Considerations

Some jurisdictions in the plan are tourist destinations. The Cities of Corpus Christi and Port Aransas have significant seasonal tourist populations. These non-permanent populations may be more hazard-vulnerable than resident populations. Unlike residents, tourists are not as familiar with the community and its hazards and may not know how the appropriate measures to take to protect themselves from natural hazards.

Section 5: Drought

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Drought Hazard Overview

Description

Droughts can be classified as meteorological, hydrological, agricultural, or socioeconomic droughts. A meteorological drought is a reduction of precipitation from the expected average or typical precipitation patterns. A hydrologic drought occurs when below average rainfall impacts streams, lakes, reservoirs, and groundwater levels. Agricultural droughts are brought on by insufficient moisture in the soil, typically impacting crops. Socioeconomic droughts occur when water demand exceeds supply due to a precipitation-related supply shortfall. Droughts may initiate or exacerbate other hazards, such as extreme heat or wildfires.

Location

The spatial extent of a drought tends to be relatively large, often stretching across multiple counties. Consequently, the entirety of Nueces County is vulnerable to the impact of a drought. Crops and livestock are vulnerable to drought. The overwhelming majority of agricultural land is found in the western portion of the county, mostly in unincorporated Nueces County. Additional information about agricultural vulnerability can be found in the jurisdictional tables.

Location Variability

Droughts are a widespread often affecting hazard and affect all jurisdictions with very minimal variance in magnitude. Droughts are not expected to affect participating jurisdictions differently. The widespread effect of Droughts on can be seen in **Figures 5-1 to 5-12**.

Extent

The Palmer Hydrologic Drought Index is a value calculated monthly by NOAA. The PHDI index takes the balance between environmental water supplies and demands. The index typically ranges between -6 to +6, as shown in Table 5-1. Negative numbers indicate a period of drought. Positive numbers indicate wet periods.

Table 5-1. Drought Extents (PHDI)

PHDI Value Range	Qualitative Drought Extent
0 - -0.5	Normal
-0.5 – -1.0	Incipient Drought
-1.0 – -2.0	Mild Drought
-2.0 – -3.0	Moderate Drought
-3.0 – -4.0	Severe Drought
< -4.0	Extreme Drought

The Texas A&M Forest Service (TFS) uses the Keetch-Byram Drought Index (KBDI), which is based on a daily water balance and is expressed in hundredths of an inch of soil moisture depletion. It is a closed system ranging from 0 to 800, where 0 represents a saturated soil, and 800 represents an absolutely dry soil. At any point along the scale, the KBDI value indicates the amount of precipitation it would take to bring the moisture level back to zero, or saturation. KBDI was developed to correlate the effects of drought on wildfire potential. This relationship is reflected in Table 5-2. The KBDI Index for each jurisdiction (estimated Sept. 23rd, 2022) may be viewed in Figures 1 through 12.

Table 5-2. Drought Extents (KBDI Index)

KBDI Value Range	Qualitative Drought Extent
0 – 200	Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity.
200 – 400	Fuels are beginning to dry and contribute to wildfire intensity. Heavier fuels will still not readily ignite and burn.
400 – 600	Lower litter and duff layers contribute to fire intensity and will burn actively. Wildfire intensity begins to increase significantly. Larger fuels could burn or smolder for several days.

KBDI Value Range	Qualitative Drought Extent
600 – 800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep-burning fires with extreme intensities can be expected. Live fuels can also be expected to burn actively at these levels.

Occurrences

Droughts in Nueces County can be long lasting, or short term. The longest period of drought recorded by the Corpus Christi International Airport station lasted a total of 78 months, from November of 1949 to April of 1956. In Nueces County, the months of December through February have the lowest average PHDI. PHDI values for Nueces County come from a NOAA North American Drought Monitoring station (USW00012924) located at the Corpus Christi International Airport.¹ A summary of drought occurrences recorded by this monitoring station may be viewed in Table 5-3. A list of the average monthly PHDI values from 1948 to 2021 may be viewed in Table 5-4. These monthly average PHDI index values were used for the occurrences, extent, and probability analyses present in the jurisdictional tables.

Table 5-3. Summary of Nueces County Drought Occurrences

Severity	Months on Record (1953 – 2021)	Percent of Total Time
Incipient Drought	37	4.2%
Mild Drought	167	18.8%
Moderate Drought	129	14.5%
Severe Drought	94	10.6%
Extreme Drought	44	5.0%
Total Months of Drought (PHDI <-1)	434	48.9%

¹ <https://www.ncei.noaa.gov/access/monitoring/nadm/indices/palmer/stn>

Table 5-4. Nueces County Historical PHDI Values (1948 – 2021)

Months of drought (PHDI <-1) indicated in red												
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1948	-0.02	0.01	0.63	0.67	-0.11	-0.67	-1.08	-0.87	-0.59	-0.92	-1.29	-1.85
1949	-1.87	-1.57	-1.39	0.82	-0.77	-1.35	-0.9	-1.31	-1.28	-0.71	-1.14	-1.17
1950	-1.75	-1.47	-1.6	-1.42	-1.89	-2.26	-2.48	-2.99	-2.96	-3.65	-3.99	-4.18
1951	-4.19	-3.95	-3.46	-3.7	-4.06	-3.72	-4.1	-4.54	-2.7	-2.52	-2.17	-2.43
1952	-2.77	-3.02	-3.01	-2.36	-2.02	-2.46	-2.02	-2.64	-2.37	-2.84	-2.29	-2.27
1953	-2.59	-2.45	-3.01	-3.5	-3.95	-4.47	-4.8	-2.24	-2.6	-1.95	-1.94	-1.74
1954	-1.99	-2.45	-2.62	-2.3	-2.6	-2.68	-3.12	-3.58	-3.62	-3.26	-3.58	-3.8
1955	-3.77	-3.53	-3.87	-4.42	-4.56	-4.95	-5.02	-5.17	-3.72	-3.39	-2.92	-2.96
1956	-3.03	-3.07	-3.22	-1.25	-0.67	-0.88	-1.15	-1.55	-2.15	-2.31	-2.34	-2.45
1957	-2.82	-2.84	-2.34	-2.13	-1.71	-1.28	-1.94	-2.12	-2.39	-2.88	-1.59	-1.67
1958	3.44	4.21	3.81	3.3	2.58	1.7	1.04	-1.84	-1.24	1.55	1.43	2.12
1959	2.13	2.81	2.4	2.32	2.64	3.1	3.11	3.44	2.59	3.11	2.8	2.54
1960	2.35	2.01	2.25	2.65	2.44	2.48	2.15	2.79	1.92	3.02	3.13	4.83
1961	4.77	4.4	3.65	4.01	3.09	3.25	3.41	3.12	2.42	1.36	0.94	-1.6
1962	-1.83	-2.41	-2.59	-2.78	-3.4	-3.34	-3.79	-4.09	-3.77	-4.36	-4.26	-3.54
1963	-3.51	-3.13	-3.37	-3.86	-4.24	-4.22	-4.45	-4.17	-4.53	-4.45	-4.29	-4.01
1964	-3.64	-3.17	-2.86	-3.34	-2.9	-3.38	-3.27	-3.69	-3.12	-3.36	-3.75	-3.17
1965	-3.1	-1.84	-1.6	-1.69	-1.31	-1.47	-1.69	-1.72	-2.15	-2.39	-2.49	-1.96
1966	-1.51	-1.4	-1.39	1.02	2.12	2.5	2.47	2.47	1.79	1	-1.62	-1.95
1967	-1.51	-1.05	-1.46	-2.09	-2.36	-2.94	-3.16	-2.4	2.81	2.9	2.47	2.11
1968	2.19	2.28	2.17	1.97	3.53	4.72	5.73	5.26	4.91	4.53	4.06	3.21
1969	2.38	2.49	2.2	2.24	1.81	0.86	-1.7	-1.75	-2.16	-2.23	-1.05	-0.85
1970	-0.58	-0.69	0.96	0.53	0.79	2.03	2.14	3.01	3.23	3.14	2.73	1.91
1971	1.1	-1.56	-2.07	-1.86	-1.45	-1.86	-2.35	-1.01	2.06	2.38	2.02	2.3
1972	2	2.28	2.18	2.03	2.66	2.65	2.64	2.53	2.84	2.05	2.14	1.59
1973	1.7	1.53	0.96	0.87	-0.99	2.06	2.19	2.66	2.71	3.85	3.2	2.46
1974	2.35	1.56	2.43	1.85	1.89	1.53	0.8	-1.3	-1.39	-1.38	-1.37	-1.51
1975	-1.43	-1.64	-2.19	-2.88	-3.29	-3.61	-3.08	-2.48	-2.02	-2.11	-2.35	-2.3
1976	-2.58	-3	-3.45	-2.93	-1.99	-2.37	2.2	1.95	1.29	1.98	2.93	3.02
1977	3.38	3.06	2.8	3.93	3.62	3.5	2.99	1.95	0.9	0.86	0.61	-1.91

Table 5-4. Nueces County Historical PHDI Values (1948 – 2021) (cont.)

	Months of drought (PHDI <-1) indicated in red											
1978	-1.54	-1.48	-1.71	-1.66	-2.13	1.66	2.32	1.78	2.4	2.26	1.67	1.56
1979	2.24	1.79	1.8	2.34	2.71	2.72	2.92	2.53	3.62	3.07	2.47	2.05
1980	1.68	1.32	0.77	-1.4	-1.38	-2.07	-2.29	2.58	2.6	2.37	2.88	2.35
1981	2.54	2.37	2.69	2.46	3.79	3.79	4.68	5.17	3.93	5	4.26	3.75
1982	2.96	4.68	4.06	3.64	3.71	2.91	1.95	1.03	-2.32	-2.6	-1.67	-1.71
1983	-1.74	-1.01	1.3	0.89	0.86	0.65	2.06	1.97	2.06	2.06	1.81	1.47
1984	2.73	2.05	1.61	1.06	0.78	-1.58	-2.08	-2.51	-2.6	-1.95	-1.69	-1.9
1985	-1.32	-0.7	0.96	1.44	1.42	1.54	1.18	0.95	1.28	1.21	0.93	0.86
1986	0.83	-0.26	-0.67	-1.15	-0.63	-0.71	-1.28	-0.84	-1.41	-1.08	0.83	1.73
1987	1.88	3	2.62	2.46	2.69	2.97	3.12	2.97	1.94	1.23	1	0.59
1988	-1.44	-1.44	-1.49	-1.94	-2.4	-2.7	-2.79	-3.03	-2.64	-2.67	-3.24	-3.24
1989	-3.04	-2.87	-3.03	-2.52	-3.38	-3.3	-3.5	-3.46	-3.68	-4.16	-3.98	-3.5
1990	-3.61	-2.7	-1.91	-1.3	-1.66	-2.16	-2.27	-2.75	-2.97	-3.23	-3.32	-3.4
1991	-3.08	-2.64	-2.49	-2.03	-1.28	1.29	0.64	0.79	1.21	0.79	-0.65	2.33
1992	3.32	3.76	4.45	4.84	5.83	5.31	4.67	4.24	3.57	2.46	3.05	2.54
1993	1.95	1.69	2	2.3	3.46	5.36	5.04	4.02	2.86	2.12	1.54	2.22
1994	1.82	1.46	2.04	2.58	2.26	2.12	1.47	0.75	0.87	1.55	0.93	2.65
1995	2.25	2.09	3.27	2.84	2.61	2.35	1.59	1.77	1.28	2.27	2.83	2.33
1996	1.71	0.99	0.6	0.56	-1.48	-1.71	-2.19	-0.84	-1.25	-1.85	-2.13	-2.31
1997	-2.39	-2.45	-1.34	1.98	2.19	1.94	1.27	0.57	-1.44	1.65	1.92	1.47
1998	1.16	1.32	1.77	1.42	0.69	-1.47	-2.04	-1.77	-1.19	1.36	1.68	1.35
1999	0.87	-1.02	-0.7	-0.93	-1.1	0.47	0.54	1.45	1.09	0.59	-1.07	-1.45
2000	-1.89	-2.31	-1.77	-2.08	-1.76	-1.92	-2.51	-2.9	-3.21	-3.35	-2.95	-2.53
2001	-2.18	-2.32	-1.69	-2.11	-2.4	-1.99	-2.09	-0.91	-0.59	-0.65	2.39	2.25
2002	1.67	1.13	0.65	-1.45	-1.46	-1.8	-1.53	-1.96	-1.65	1.25	1.58	2.02
2003	1.81	1.55	1.59	1.24	-0.9	-0.97	-0.57	-0.96	0.84	1.08	0.84	-0.4
2004	0.09	0.27	0.13	2.22	2.96	2.93	2.73	1.76	2.05	1.19	0.73	-1.3
2005	-1.61	-1.14	-0.67	-1.1	-1.39	-1.69	-1.85	-2.49	-2.51	-2.47	-1.46	-1.63
2006	-2.06	-2.43	-2.92	-3.53	-3.18	-1.35	2.42	1.85	1.9	1.42	-1.03	-0.85
2007	1.1	-0.47	-0.02	-0.12	-0.21	-0.37	3.66	4.54	3.99	3.16	2.44	1.64
2008	1.49	0.75	0.59	-1.43	-1.94	-2.48	-0.73	2.23	1.49	0.97	-1.31	-1.62

Table 5-4. Nueces County Historical PHDI Values (1948 – 2021) (cont.)

	Months of drought (PHDI <-1) indicated in red											
2009	-2.06	-2.53	-2.64	-3.25	-3.73	-4.1	-4.47	-4.82	-4.25	-4.18	-3.26	-2.09
2010	-1.4	2.37	2.29	2.36	1.66	2.19	3.25	2.54	3.88	3.25	2.82	2.24
2011	2.79	2.06	1.55	0.83	-1.47	-1.95	-2.52	-3.11	-3.63	-3.76	-4.07	-3.88
2012	-4.08	-3.06	-3.03	-2.93	-2.88	-3.17	-3.32	-3.86	-3.86	-4.43	-4.67	-4.95
2013	-4.74	-4.81	-5.07	-4.94	-5.17	-5.14	-4.78	-4.91	-4.38	-4.42	-3.57	-3.52
2014	-3.43	-3.49	-3.12	-3.48	-3.01	-3.34	-3.61	-3.07	-2.72	-2.24	-1.52	-1.55
2015	-1.17	-1.06	2.3	3.6	6.32	5.77	5.13	4.49	3.49	2.86	2.57	1.95
2016	1.81	1.11	2.31	2.46	2.87	2.52	1.65	1.56	0.9	-1.72	-2.15	-1.95
2017	-2.34	-2.2	-1.23	-1.19	-1.21	-1.58	-1.87	-1.18	-1.75	-1.93	-2.56	-1.5
2018	-1.35	-1.69	-1.53	-1.84	-2.4	-0.89	1.9	1.39	2.46	2.5	3.02	2.59
2019	2.47	1.85	1.72	2.08	1.75	1.38	0.71	-1.56	-1.72	-2.2	-1.29	1.33
2020	0.92	-0.7	-1.28	-1.6	-1.08	-0.79	0.73	-0.77	-0.74	-1.33	-1.69	-1.57
2021	-1.54	-1.67	-1.31	-1.43	1.69	1.92	3.61	3.36	3.32	3.68	3.18	2.34

Probability

Probability, or frequency of return, was calculated by dividing the number of months of drought in the recorded time period by the overall time period that the resource database has recorded. A drought may cover several jurisdictions; however, a drought event is recorded for the jurisdiction based on the levels of severity and the length in time of each occurrence. Table 5-5 provides a general overview of drought severity, probability, and return interval. Probability for future drought events is defined for the county and each participating jurisdiction in the following sections.

Table 5-5. Nueces County Drought Probability

Drought Extent	Estimated Annual Probability	Estimated Return Interval
Incipient Drought	4.2%	2.00 years
Mild Drought	18.8%	0.44 years
Moderate Drought	14.5%	0.57 years
Severe Drought	10.6%	0.79 years
Extreme Drought	5.0%	1.68 years

Probabilities of future drought events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too will the locations, frequencies, and range of anticipated intensities of droughts. In many parts of the United States and the world, climate change increases the odds of worsening drought. Regions such as the U.S. Southwest, where droughts are expected to get more frequent, intense, and longer lasting, are at particular risk.

Impact

Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. There is very low risk of loss of life or damage to structures associated with drought. Droughts may cause water shortages and require regulators to enact water rationing. The impacts of drought tend to be felt most by agriculture and related industries. Droughts can damage crops and pastoral lands and in severe cases, droughts may kill trees and cause loss of livestock. Dead vegetation from drought can serve as fuel for wildfires.

Crop insurance is purchased by agricultural producers such as farmers and ranchers to protect their investment in the event of natural disaster like drought, hail, or flood. The extent of crop loss due to drought occurrences is difficult to quantify because a drought during a growing season can impact the next two years of crop production. Documentation of agricultural losses due to drought is typically filed by the landowner directly with the policy holder and is not a matter of public record. For this reason, historical crop damages caused by drought is not quantified herein.

Economic impacts of droughts may be complex and far ranging. Water is required to produce many goods and services. If impacts are felt in basal levels of supply chains, there is potential for measurable downstream effects. The impacts of a drought may be felt by many interconnected industries and may reach well beyond the temporal or spatial extents of the drought.

An example of these economic impacts may be demonstrated by the 2011 Texas Drought, which had a total direct cost of agricultural loss estimated at \$5.2 billion with an estimated \$3.5 billion in indirect cost for a total of \$8.7 billion in losses statewide. Some of this cost is associated to the decreased park attendance, demanding \$4.6 million just to keep parks open to the public².

² Testimony at TWDB Work Session Meeting (October 21, 2014)

Vulnerability

Communities with a greater proportion of crop area may be more vulnerable to the economic impacts of drought. Cropland was calculated by using the 2021 USDA Crop Land and National Land Cover Dataset. This data is the most recent data of its type.

Droughts may potentiate the effects of other hazards. For example, droughts may remove water from vegetation, rendering areas more vulnerable to wildfires. Wildfire hazards are discussed elsewhere in this plan.

Unincorporated Nueces County Drought Hazard

LOCATION					
County Wide (Unincorporated)					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

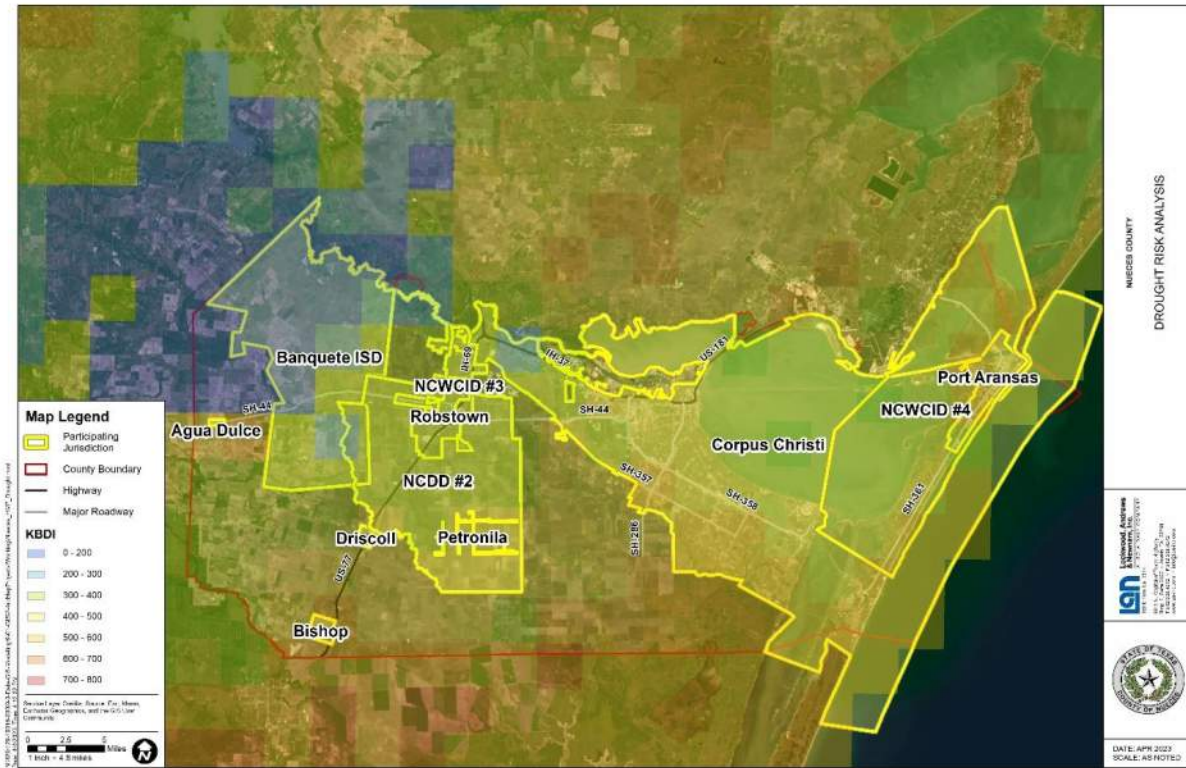
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
280,817	84.38%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-1. Unincorporated Nueces County Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Apr. 5th, 2023

City of Aqua Dulce Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
2.45	1.81%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-2. City of Aqua Dulce Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

Banquete ISD Drought Hazard

LOCATION					
District Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
61,968	79.31%

* USDA Crop Land and National Land Cover Dataset, 2021

City of Bishop Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
232	18.60%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-4. City of Bishop Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

City of Corpus Christi Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

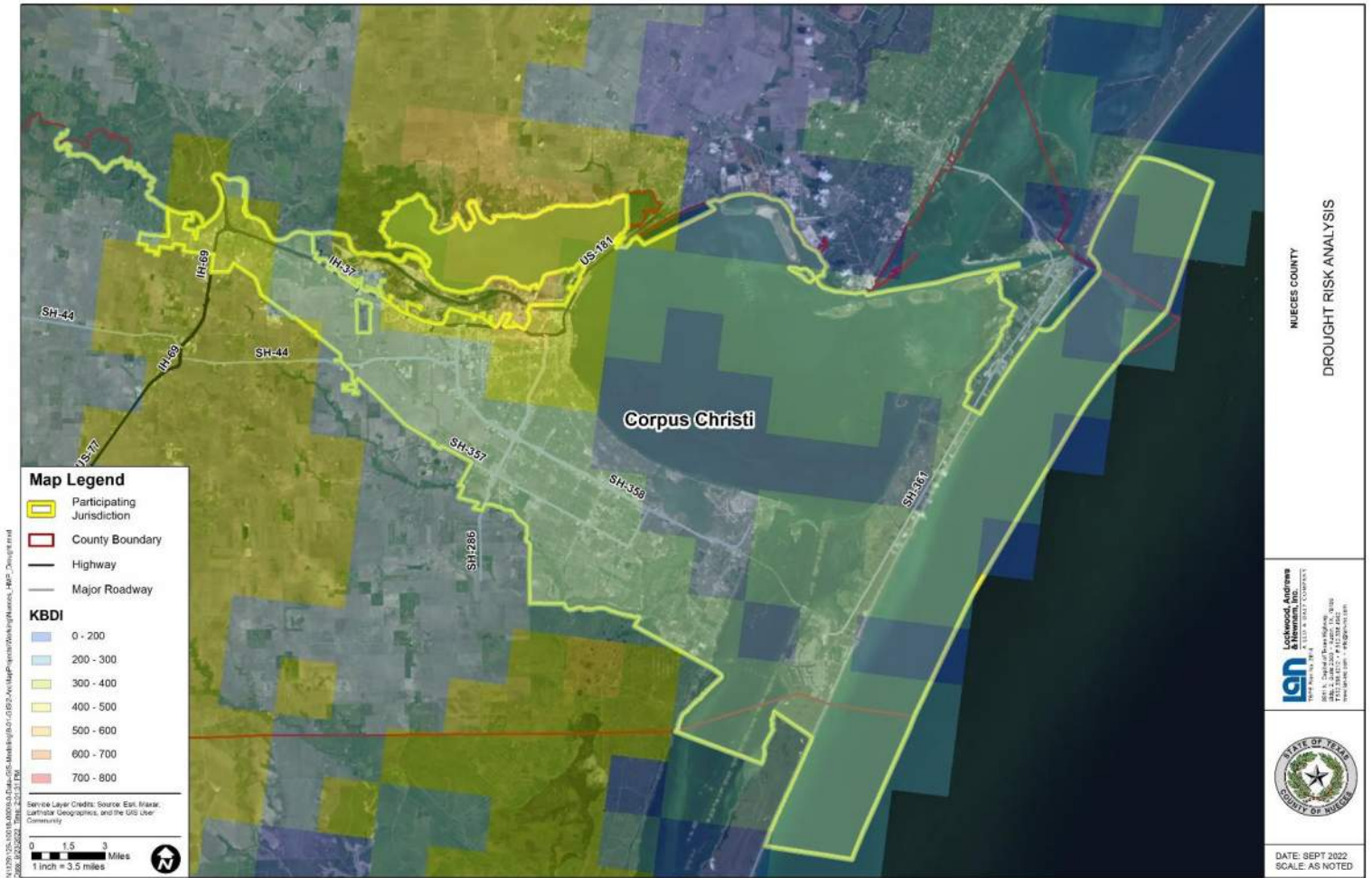
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
21,392	24.35%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-5. City of Corpus Christi Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

City of Driscoll Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
438	68.54%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-6. City of Driscoll Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

City of Petronila Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

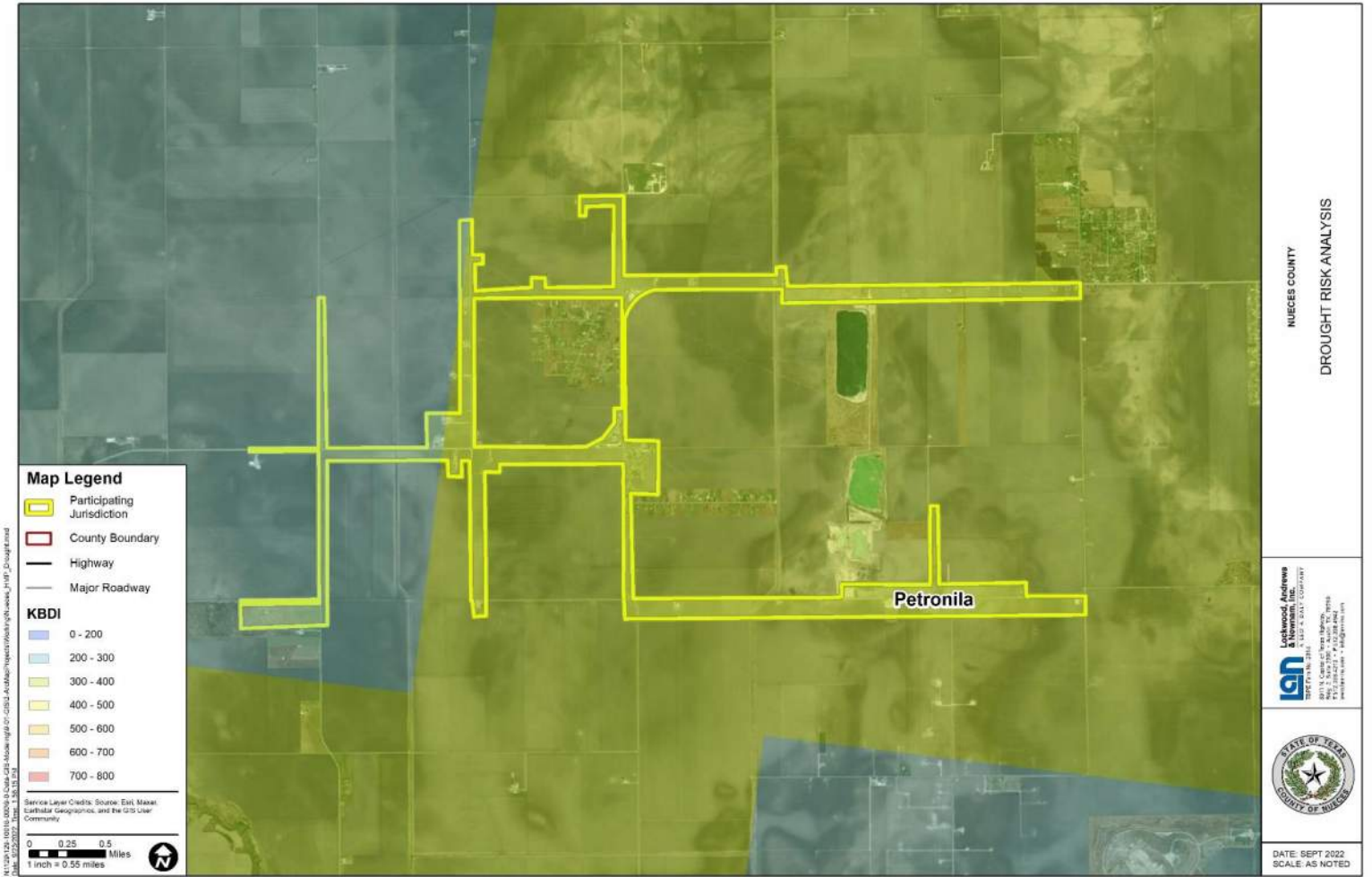
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
108	88.52%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-7. City of Petronila Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

City of Port Aransas Drought Hazard

LOCATION					
Jurisdiction Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
859	13.36%

* USDA Crop Land and National Land Cover Dataset, 2021

City of Robstown Drought Hazard

LOCATION					
City Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

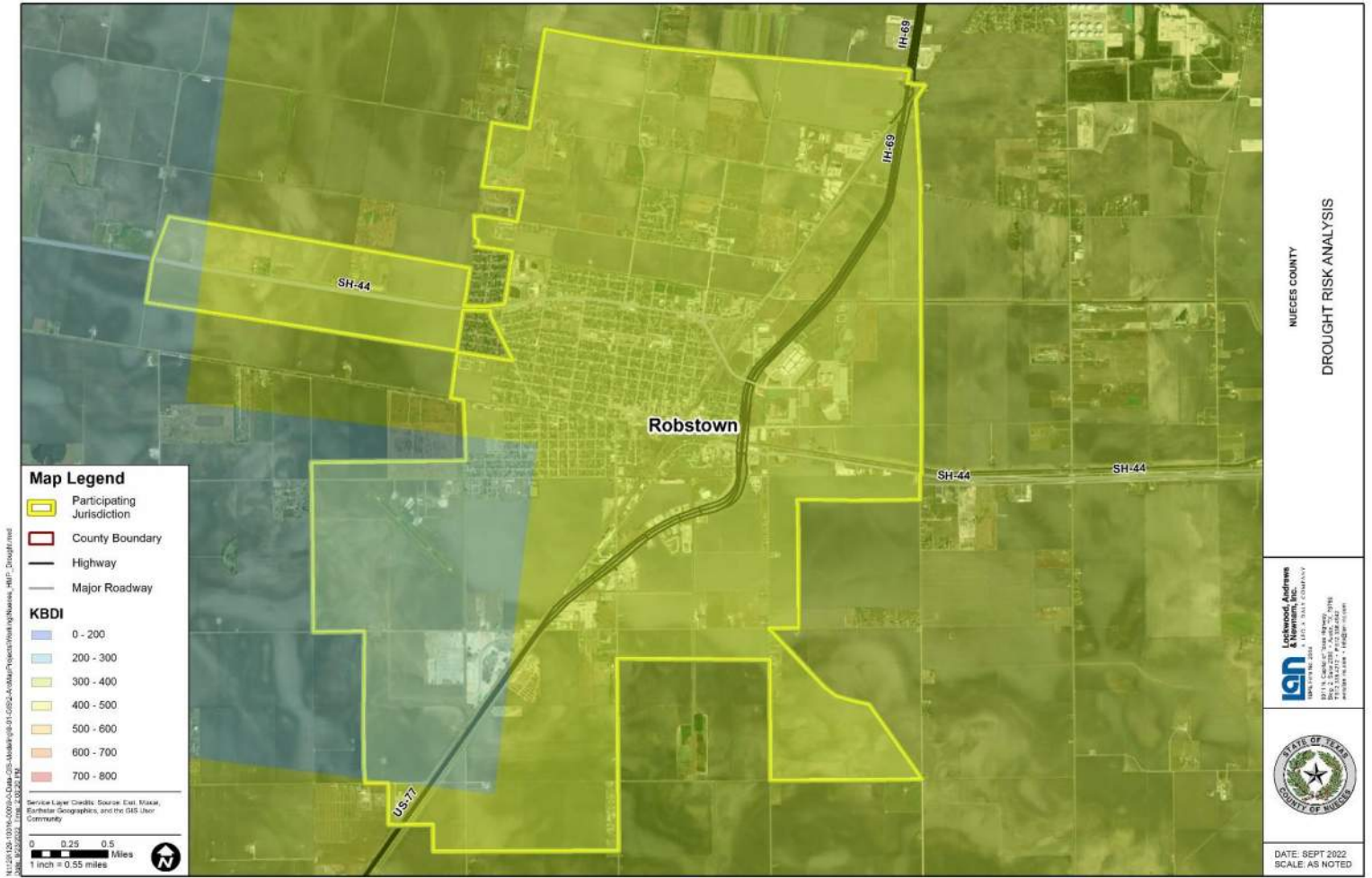
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT					
Crop and Pasture Damage					
Values of historical crop and pasture damages caused by drought are not available in the public domain by jurisdiction as confirmed by AgriLife and USDA Nueces County Farm Service Agency.					

VULNERABILITY	
Crop and Pastureland*	
Acres	Percent of Total Jurisdictional Area
4,413	48.78%

* USDA Crop Land and National Land Cover Dataset, 2021

Figure 5-9. City of Robstown Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Sept. 23rd, 2022

Nueces County Drainage District #2 Drought Hazard

LOCATION					
District Wide					

OCCURENCE	EXTENT				
	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
Months of Drought (PHDI <-1) 1953-2021					
434	37	167	129	94	44

PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%

IMPACT

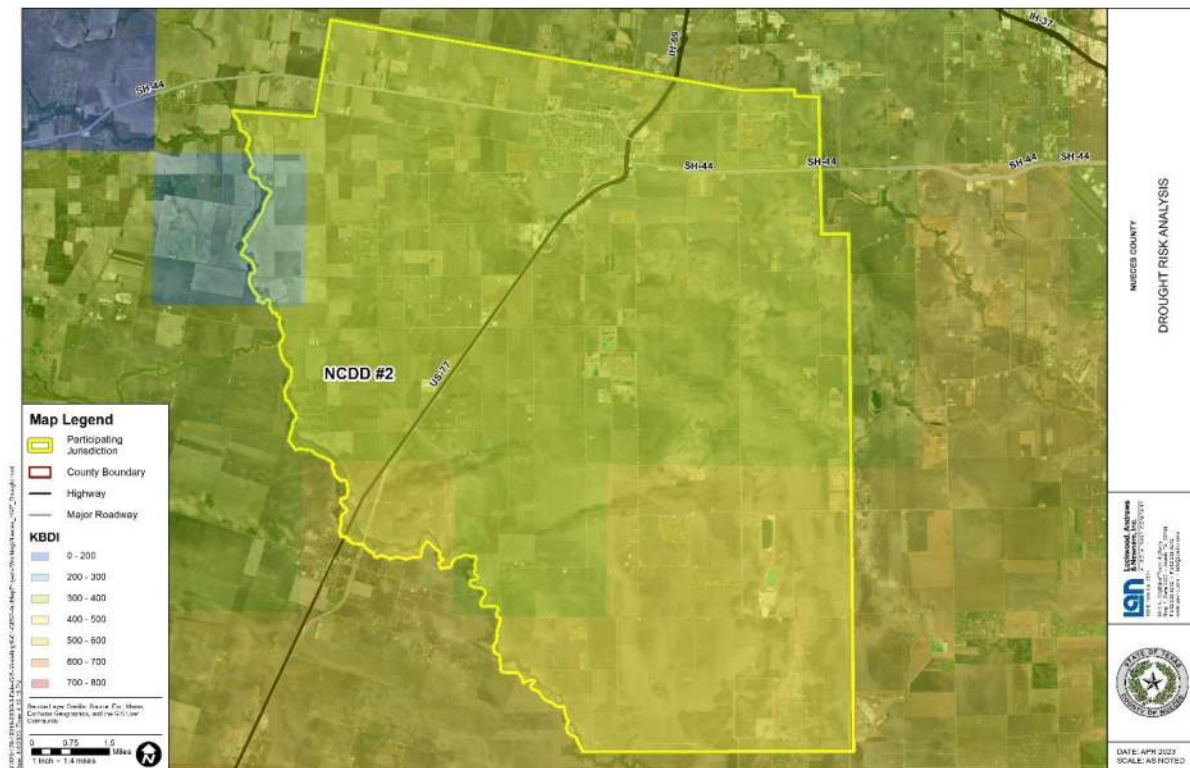
The district’s primary function is to provide quality drainage on the western portion of Nueces County. These efforts are fulfilled by the strategic maintenance of the district's facility along with monitored and controlled developments within its boundary. This function is not disrupted by drought hazard.

VULNERABILITY	
Population Served**	Infrastructure*
20,468	\$2,256,741

*NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 5-10. Nueces County Drainage District #2 Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Apr. 5th, 2023

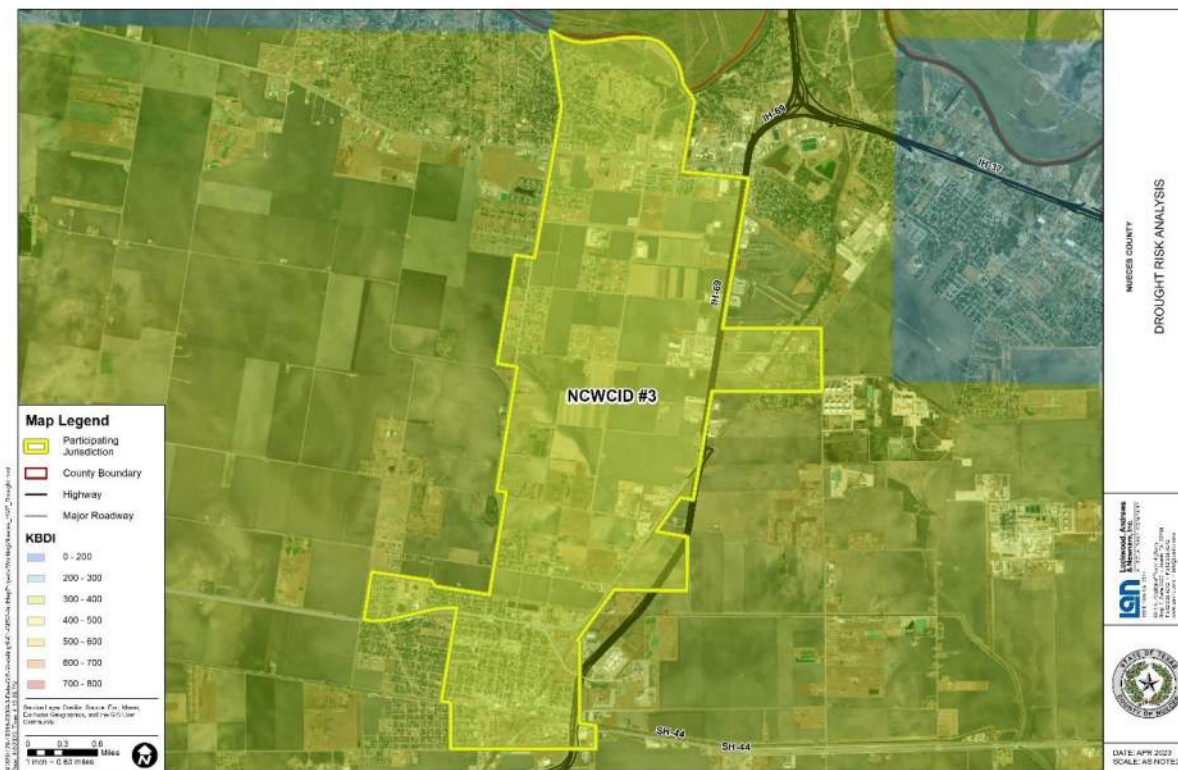
Nueces County Water Control and Improvement District #3 Drought Hazard

LOCATION					
District Wide					
OCCURENCE	EXTENT				
Months of Drought (PHDI <-1) 1953-2021	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
434	37	167	129	94	44
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%
IMPACT					
Service Disruptions					
VULNERABILITY					
Population Served**	Property Value*		Property Contents*		
18,799	\$17,013,842		\$529,000		
Infrastructure*	Vehicles and Machinery*		Mobile Equipment*		
\$7,255,507	\$438,239		\$389,033		

*NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 5-11. Nueces County Water Control and Improvement District #3 Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Apr. 5th, 2023

Nueces County Water Control and Improvement District #4 Drought Hazard

LOCATION					
District Wide					
OCCURENCE	EXTENT				
Months of Drought (PHDI <-1) 1953-2021	Magnitude (PHDI Description)				
	Months of Incipient Drought	Months of Mild Drought	Months of Moderate Drought	Months of Severe Drought	Months of Extreme Drought
434	37	167	129	94	44
PROBABILITY					
Annual Chance of Drought (PHDI <-1)	Magnitude (PHDI Description)				
	Annual Chance of Incipient Drought	Annual Chance of Mild Drought	Annual Chance of Moderate Drought	Annual Chance of Severe Drought	Annual Chance of Extreme Drought
48.9%	4.2%	18.8%	14.5%	10.6%	5.0%
IMPACT					
Service Disruptions					
VULNERABILITY					
Population Served**			Infrastructure*		
6,281			\$21,097,000		
Property Value*		Vehicles and Machinery*		Mobile Equipment*	
\$6,500,000		\$1,248,000		\$128,500	

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 5-12. Nueces County Water Control and Improvement District #4 Drought Hazard Map*



* Texas A&M Forest Service (TFS), estimated Apr. 5th, 2023

Section 6: Hurricane and Tropical Storms

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Hurricane and Tropical Storms Hazard Overview

Description

Hurricanes and tropical storms are intense tropical weather systems that produce damaging winds, generate storm surge, and heavy rainfall.

Location

Hurricanes and tropical storms do not have a specific geographic boundary and can occur throughout the county uniformly. It is assumed that the county planning area including all participating jurisdictions are uniformly exposed to hurricane and tropical storm activity. According to FEMA Wind Zones in the United States as shown in Figure 6-1, the entirety of Nueces County is identified as a Hurricane-Susceptible Region and is located in Wind Zone III, associated to winds as high as 200 mph.

The effects of a hurricane can be felt as far as 150 miles from the center of the storm. The most damaging effects of a storm, both in terms of wind damage and storm surge, are likely to be felt within the radius of maximum wind (RMW). The average RMW of Atlantic hurricanes has been observed to be about 30 miles¹. A 30-mile buffer applied to the storms that have occurred in the planning area encompasses the entire planning area.

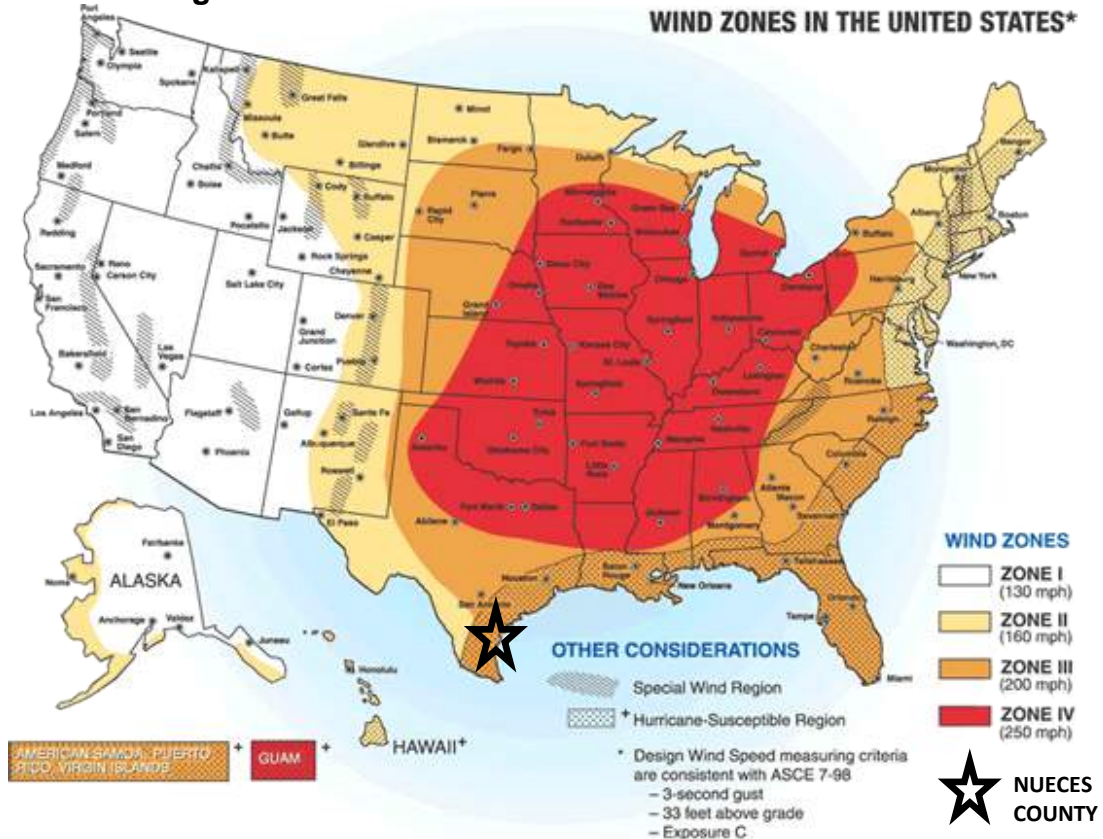
¹ Source: A Note on the Radius of Maximum Wind for Hurricanes, S.A. Hsu and Zhongde Yan, 1998

Consequently, the entire planning area should be considered at risk of hurricane or tropical storm damage.

Location Variability

Hurricane and Tropical Storms are a widespread affecting hazard and impact all jurisdictions with very minimal variance in magnitude due to the proximity of all jurisdictions. Hurricane and Tropical Storms impacting Nueces County are not expected to affect participating jurisdictions differently.

Figure 6-1. FEMA Wind Zones in the United States

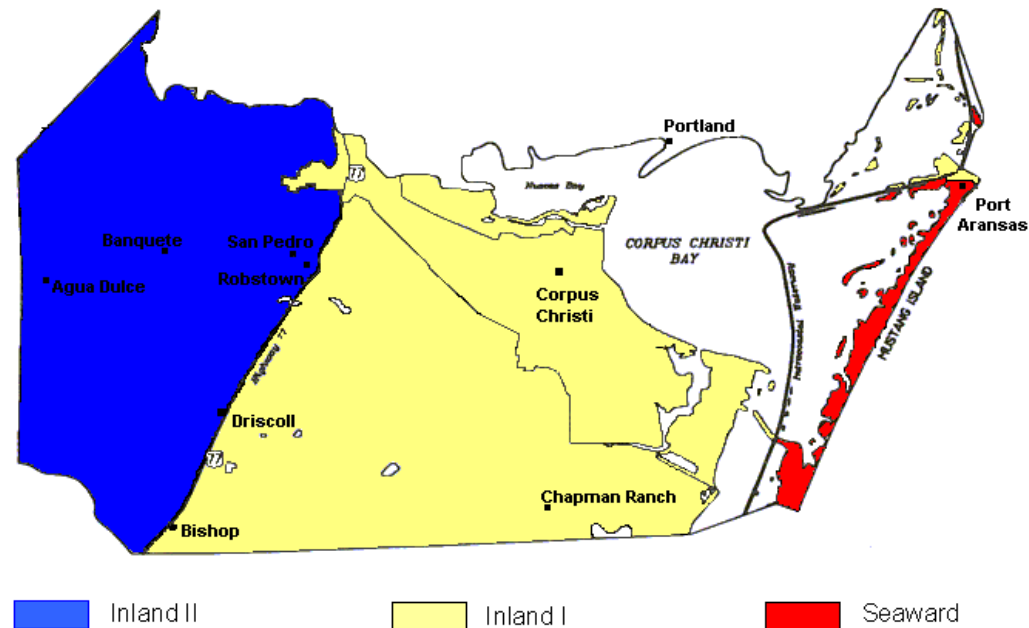


The Texas Windstorm Insurance Association (TWIA) was established under the Texas Department of Insurance (TDI) by the Texas Legislature in 1971 following Hurricane Celia. TWIA provides windstorm and hail insurance along the Texas seacoast. Recommended design and inspection requirements for structures along the coast have been developed by TDI based on historical damages. Three designated catastrophe areas have been defined for Nueces County. Designated catastrophe areas are established for territories subject to unusually frequent and severe damage resulting from windstorm or hailstorms. Designated catastrophe areas for Nueces County include Seaward, Inland I, and Inland II. Adopted design wind speeds for these designated catastrophe areas are shown in Figure 6-2 and defined below:

- Seaward: 130 mph 3-second gust design wind speed

- Inland I: 120 mph 3-second gust design wind speed
- Inland II: 110 mph 3-second gust design wind speed

Figure 6-2 TDI Designated Catastrophe Areas



Extent

Hurricane intensity is categorized by the Saffir-Simpson Scale, ranked 1 – 5, in order of lowest to highest wind speed. This scale, while it is based on a limited suite of characteristics of hurricane intensity, provides an informative framework with which hurricanes can be discussed. Category 3, 4, and 5 storms are considered to be the most dangerous hurricanes. There is a significant potential for property damage and loss of life associated with Category 3-5 storms. Only 20% of the total tropical hurricane landfalls are from Category 3-5 storms, yet Category 3-5 storms have caused 70% of the hurricane-related damage in the United States. Category 1 and 2 storms, while generally not as dangerous as Category 3-5 storms, still require consideration and preparation. For example, Hurricane Ike was a Category 2 storm, yet was the third most destructive hurricane to make landfall in the United States. Table 6-1 describes Saffir-Simpson Scale hurricane categories and associated storm surge estimates.

Historically strong Category 3 storms have occurred throughout the planning area as shown in Figure 6-3. Given the planning area’s coastal location, the participating jurisdictions could potentially experience a Category 5 storm in the future.

Table 6-1. Saffir-Simpson Hurricane Wind Scale²

Category	Maximum Sustained Wind Speed (MPH)
1	74-95
2	96-110
3	111-129
4	130-156
5	157+

Occurrences

The typical Atlantic hurricane season runs from June to October. While the majority of storms occur within this range, storms have occurred outside of this window. Between 1851 and 2021, a total of 55 unique storms crossed within 50 miles of the planning area. A detailed breakdown of storms by intensity and jurisdiction is presented in Table 6-2. No Category 5 Hurricanes crossed within 50 miles of the planning area during this time.

Table 6-2. Historical Occurrences³

Hurricanes and Tropical Storms Within 50 Miles of Planning Area (1851 – 2021)						
Jurisdiction	Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
Nueces County	55	31	13	4	6	1

Probability

The annual probability and reoccurrence intervals of tropical storms and hurricanes is presented in Table 6-3. Probability and reoccurrence intervals are calculated by dividing the number of events by the observation period. It should be noted that these probabilities reflect the previous occurrence of the center of a storm tracking within 50 miles of the jurisdiction. This is because the effects of a hurricane can be felt as far as 150 miles from the center of the storm, and the most damaging effects of a storm, both in terms of wind damage and storm surge, are likely to be felt within the radius of 30 miles. A 30-mile buffer applied to the storms that have occurred in the planning area encompasses the entire planning area. Consequently, the entire planning area should experience the same risk probability and recurrence intervals.

² Landsea, C.W., Pielke, R.A. Jr., Mestas-Nunez, A.M., Knaff, J.A. (1999) Atlantic Basin Hurricanes: Indices of Climatic Changes. *Climactic Change*, 42:89-129.

³NOAA

Table 6-3. Reoccurrence Probability

Annual Probability of Storms Within 50 Miles of Jurisdiction						
Jurisdiction	Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
Nueces County	32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

Probabilities of future hurricane and tropical storm events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns, average temperatures, and sea levels change, so too will the locations, frequencies, and range of anticipated intensities of hurricanes and tropical storms. Climate change worsens hurricane impacts in the United States by increasing the intensity and decreasing the speed at which they travel. There is uncertainty as to whether there will be an effect on the number of hurricanes, but the intensity and severity of hurricanes will continue to increase as the climate changes.

Impact

Nueces County is a coastal county; the entire planning area will be vulnerable to the impacts of wind brought on by hurricanes and tropical storms. While all jurisdictions are impacted by hurricanes and tropical storms, the impacts felt by each jurisdiction may vary depending upon the characteristics of a particular storm. Storm surge travels with the storm and may make landfall ahead of the center of the storm. Storm surge can cause severe flooding in coastal areas, impacting the jurisdictions along the coast.

Additionally, hurricanes and tropical storms produce large amounts of rain. This rain can overwhelm drainage systems. Even hurricanes or tropical storms that have weakened after making landfall can continue to drop significant quantities of water. This water can lead to flooding.

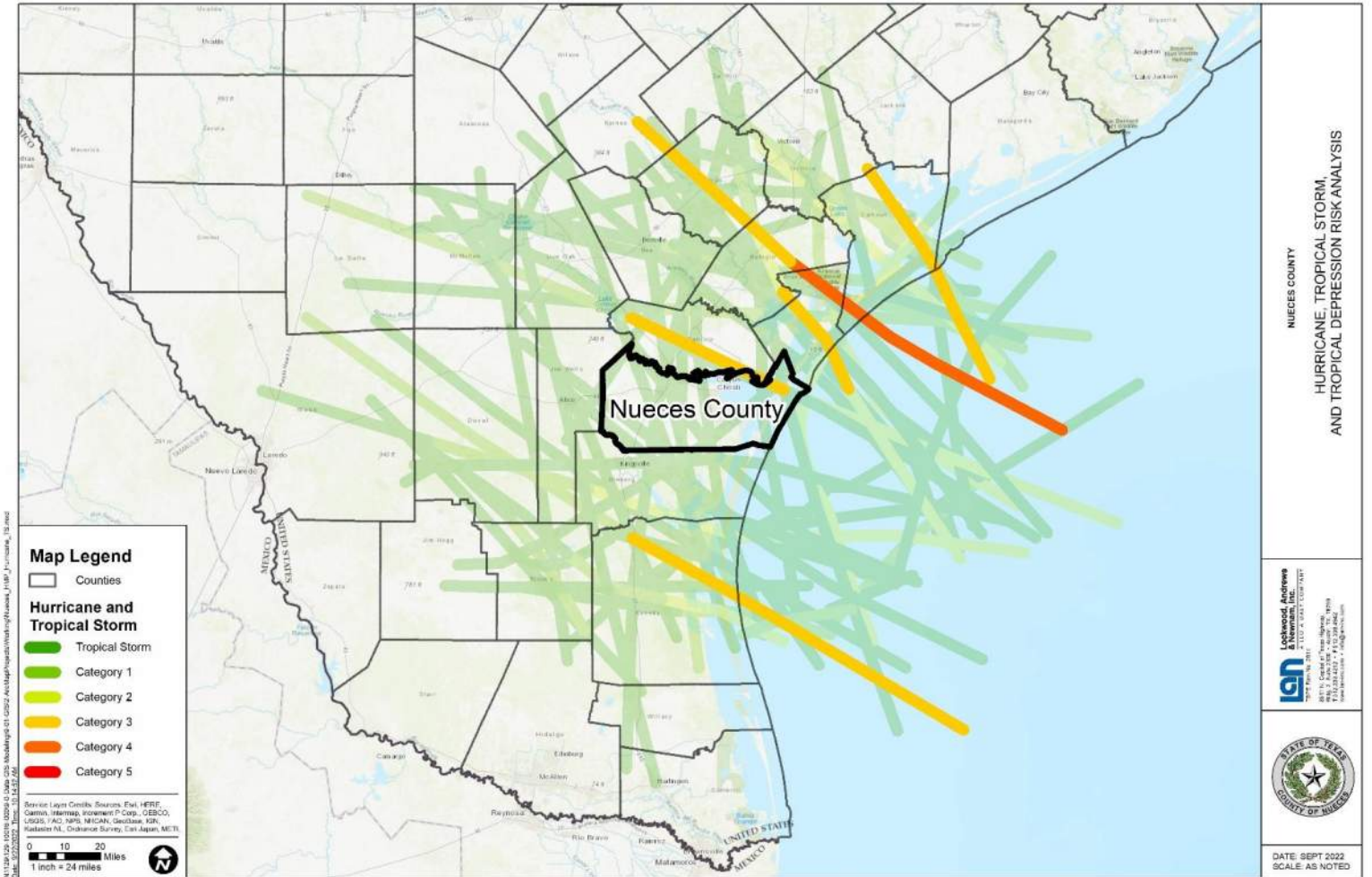
The impacts to communities from a category 5 storms could be near complete destruction of any and all assets. Houses and commercial property could be destroyed. In addition to the destruction of property, populations can be displaced if their homes are destroyed. Power and other utilities can be interrupted, even by lower category storms. Crops can be severely damaged, resulting in economic impacts.

Vulnerability

Due to Nueces County being located on the Texas coast and the size and power of hurricanes and tropical storms, particularly category 4 and 5 storms, all assets within the participating jurisdictions are vulnerable to potential damage by hurricanes and tropical

storms. A map of all hurricanes which passed within 50 miles of Nueces County from 1850 to 2021 may be seen in Figure 6-3. Figures 6-4 through 6-15 show direct hurricane paths through each jurisdiction during the same time span.

**Figure 6-3. Map of Hurricanes & Tropical Storms
Within 50 Miles of Nueces County (1851 – 2021)**



Unincorporated Nueces County Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
County Wide (Unincorporated)	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
13,579	332,820
Residential Parcels	Residential Total Improvement Value**
3,925	\$755,606,666
Commercial Parcels	Commercial Total Improvement Value**
943	\$968,938,581
Crop Area (Acres)***	Crop Value****
280,817	\$122,134,449
Major Roadway (Miles)	Railroad (Miles)
816	90

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-4. Map of Hurricane & Tropical Storms for Unincorporated Nueces County (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

City of Agua Dulce Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
688	135
Residential Parcels	Residential Total Improvement Value**
255	\$19,726,169
Commercial Parcels	Commercial Total Improvement Value**
71	\$15,251,504
Crop Area (Acres)***	Crop Value****
2.45	\$1,066
Major Roadway (Miles)	Railroad (Miles)
9	2

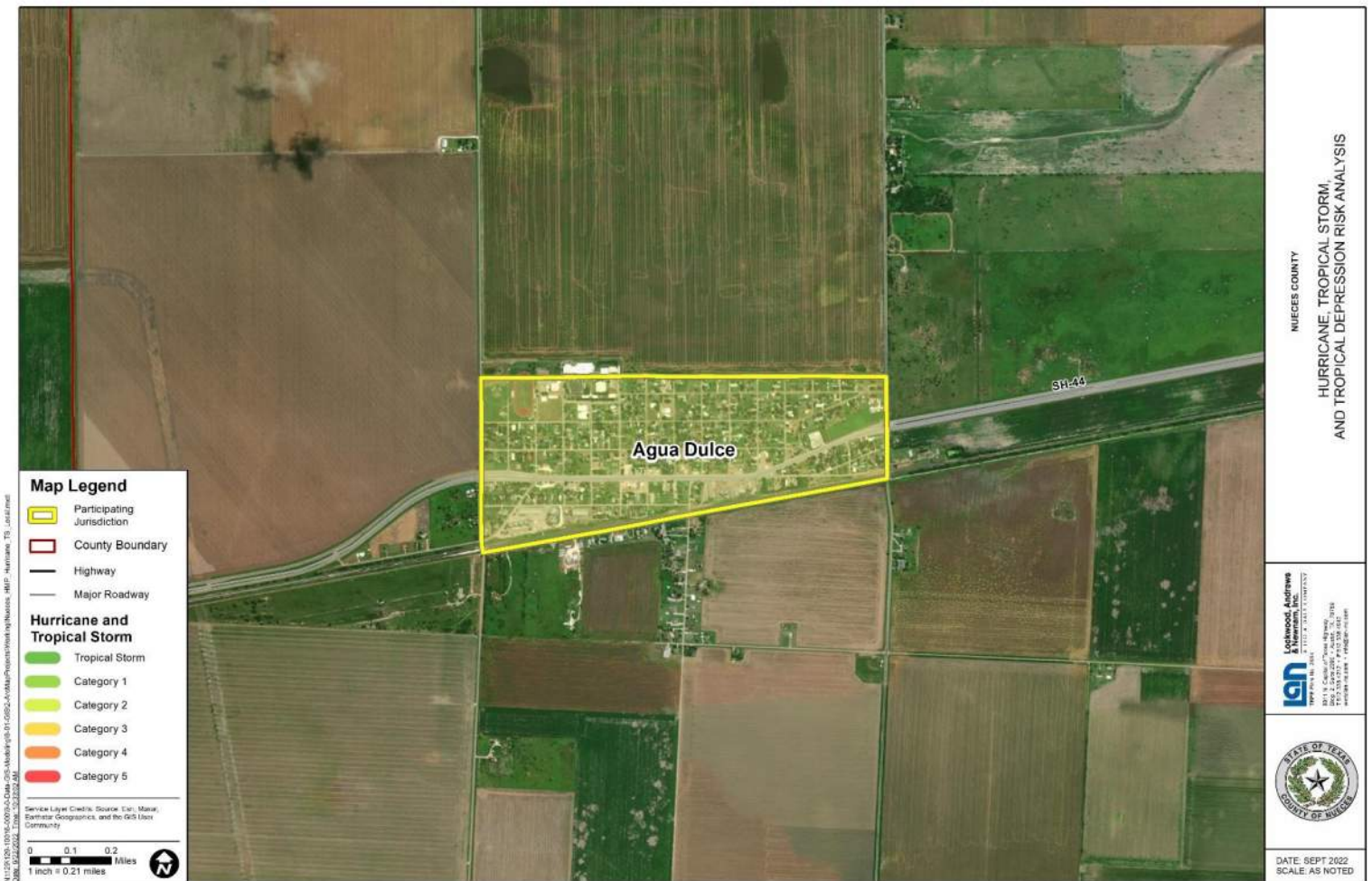
* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-5. Map of Hurricane & Tropical Storms for City of Agua Dulce (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3. While no hurricanes passed directly through this jurisdiction from 1851-2021, the jurisdiction is still vulnerable to hurricanes passing within 50 miles.

Banquete ISD Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
3,862	78,135
Residential Parcels	Residential Total Improvement Value**
1,296	\$222,649,907
Commercial Parcels	Commercial Total Improvement Value**
104	\$102,846,088
Crop Area (Acres)***	Crop Value****
61,968	\$26,951,458
Major Roadway (Miles)	Railroad (Miles)
185	7

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

City of Bishop Hurricane and Tropical Storm Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
3,155	1,247
Residential Parcels	Residential Total Improvement Value**
1,167	\$110,819,070
Commercial Parcels	Commercial Total Improvement Value**
183	\$123,993,966
Crop Area (Acres)***	Crop Value****
232	\$100,903
Major Roadway (Miles)	Railroad (Miles)
31	2

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-7. Map of Hurricane & Tropical Storms for City of Bishop (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

City of Corpus Christi Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Seaward, Inland 1, and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
317,773	87,835
Residential Parcels	Residential Total Improvement Value**
91,026	\$16,266,319,691
Commercial Parcels	Commercial Total Improvement Value**
12,148	\$16,744,675,468
Crop Area (Acres)***	Crop Value****
21,392	\$9,303,924
Major Roadway (Miles)	Railroad (Miles)
1,701	48

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-8. Map of Hurricane & Tropical Storms for City of Corpus Christi (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

City of Driscoll Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
673	639
Residential Parcels	Residential Total Improvement Value**
241	\$20,046,143
Commercial Parcels	Commercial Total Improvement Value**
106	\$29,366,710
Crop Area (Acres)***	Crop Value****
438	\$190,497
Major Roadway (Miles)	Railroad (Miles)
13	2

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-9. Map of Hurricane & Tropical Storms for City of Driscoll (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3. While no hurricanes passed directly through this jurisdiction from 1851-2021, the jurisdiction is still vulnerable to hurricanes passing within 50 miles of this jurisdiction.

City of Petronila Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
87	122
Residential Parcels	Residential Total Improvement Value**
20	\$2,988,340
Commercial Parcels	Commercial Total Improvement Value**
6	\$667,778
Crop Area (Acres)***	Crop Value****
108	\$46,972
Major Roadway (Miles)	Railroad (Miles)
22	0

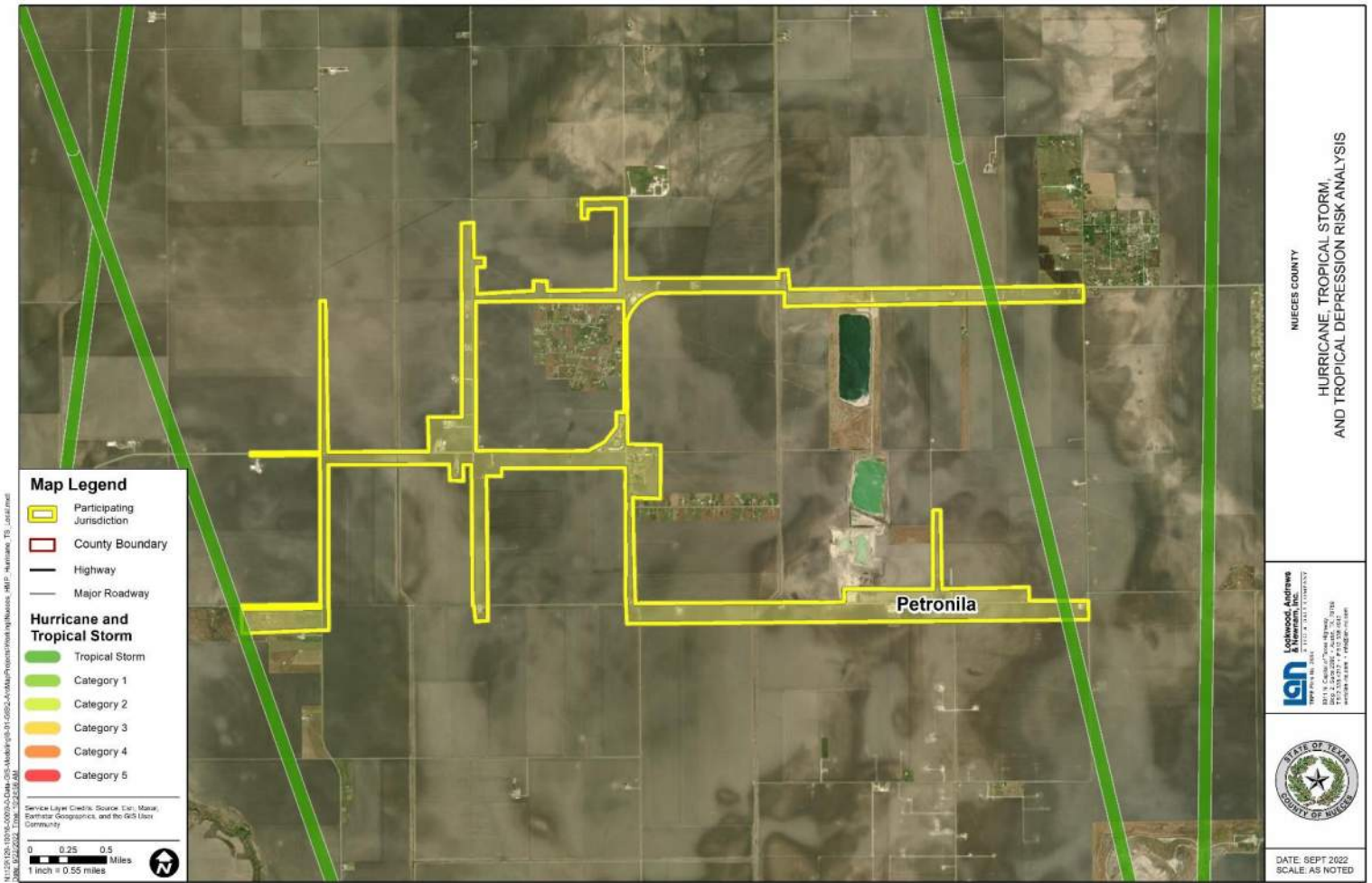
* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-10. Map of Hurricane & Tropical Storms for City of Petronila (1851–2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

City of Port Aransas Hurricane and Tropical Storm Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
Jurisdiction Wide	Seaward and Inland 1

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
3,105	6,429
Residential Parcels	Residential Total Improvement Value**
4,089	\$2,154,096,149
Commercial Parcels	Commercial Total Improvement Value**
2,888	\$25,743,548,569
Crop Area (Acres)***	Crop Value****
859	\$373,601
Major Roadway (Miles)	Railroad (Miles)
50	0

* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-11. Map of Hurricane & Tropical Storms for City of Port Aransas (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

City of Robstown Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY	
Total Population*	Land Area (Acres)
10,157	9,046
Residential Parcels	Residential Total Improvement Value**
3,179	\$229,911,267
Commercial Parcels	Commercial Total Improvement Value**
813	\$373,735,450
Crop Area (Acres)***	Crop Value****
4,413	\$1,919,326
Major Roadway (Miles)	Railroad (Miles)
116	12

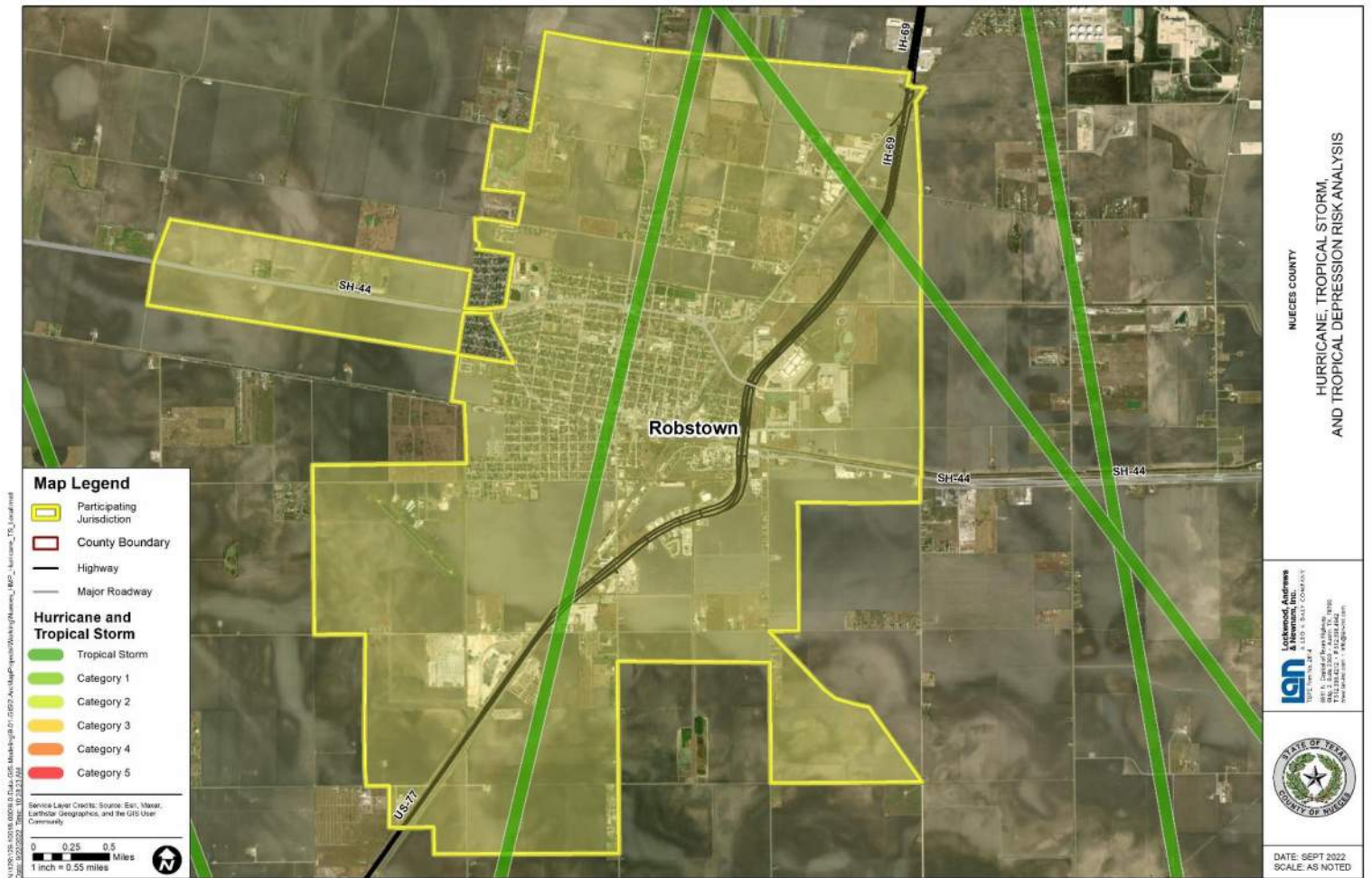
* Census Bureau Population Estimate 2021

***USDA Crop Land and National Land Cover Dataset, 2021

**Nueces County Appraisal District, 2022

****USDA Nueces County Census of Agriculture, 2017

Figure 6-12. Map of Hurricane & Tropical Storms for City of Robstown (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

Nueces County Drainage District #2 Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

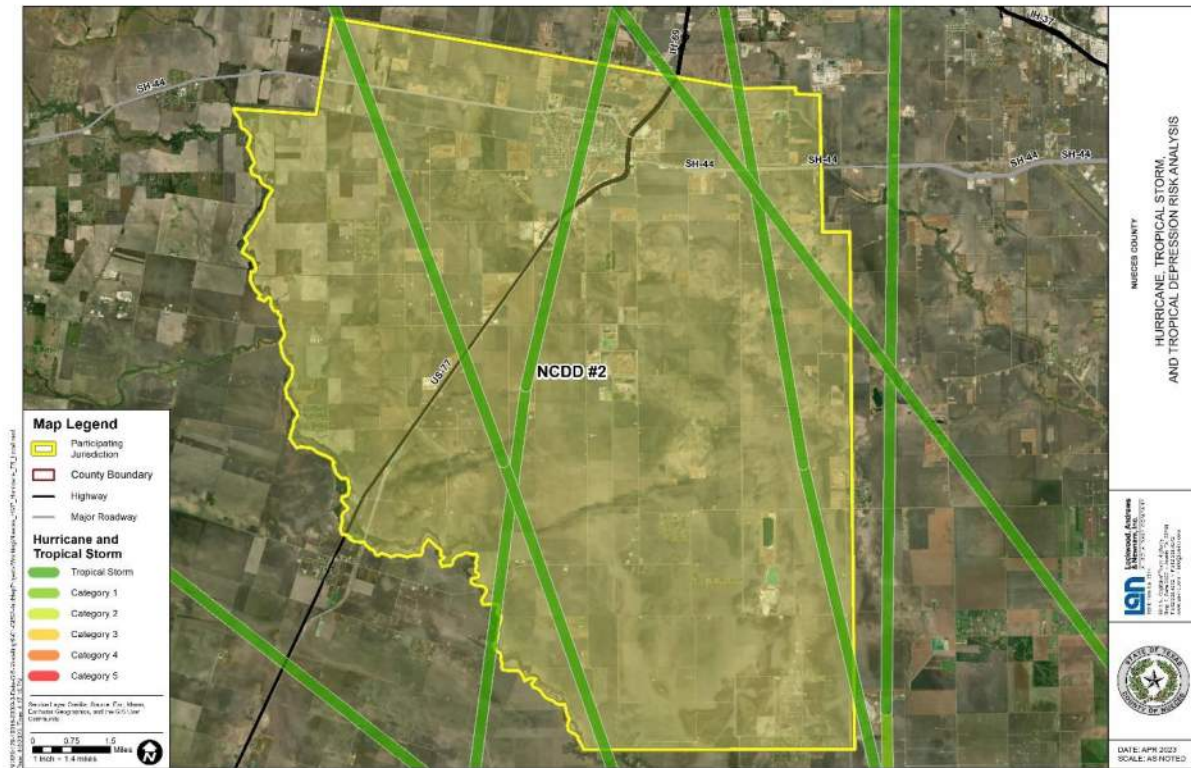
PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 6-13. Map of Hurricane & Tropical Storms for Nueces County Drainage District #2 (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

Nueces County Water Control and Improvement District #3 Hurricane and Tropical Storms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 1 and Inland 2

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$7,255,507	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 6-14. Map of Hurricane & Tropical Storms for Nueces County Water Control and Improvement District #3 (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

Nueces County Water Control and Improvement District #4 Hurricane and Tropical Storm Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Seaward and Inland 1

OCCURENCE	EXTENT				
Total Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
55	31	13	4	6	1

PROBABILITY					
Future Storms	Tropical Storms & Depressions	Category 1 Hurricanes	Category 2 Hurricanes	Category 3 Hurricanes	Category 4 Hurricanes
32.4%	18.2%	7.6%	2.4%	3.5%	0.6%

IMPACT & VULNERABILITY		
Population Served**		Infrastructure*
6,281		\$21,097,000
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 6-15. Map of Hurricane & Tropical Storms for Nueces County Water Control and Improvement District #4 (1851 – 2021)



NOTE: Figure 6-4 through 6-15 show direct hurricane paths through each jurisdiction. Jurisdictional occurrences and probabilities are based on hurricanes passing within 50 miles of the jurisdiction, as seen in Figure 6-3.

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Flood Hazard Overview

Description

A flood is 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 susceptible to flooding. Flooding is the partial or complete inundation of otherwise normally dry land. Types of flooding include riverine, coastal, and shallow flooding.

Location

Sources of flooding in the Nueces County area include coastal flooding, riverine flooding, and flooding resulting from poor drainage, otherwise referred to as localized flooding. Federal Emergency Management Agency (FEMA) flood maps are the number one resource for defining location of flood hazard for a community. Current effective FEMA flood maps for Nueces County are dated 1981 to 1985. An update to the FEMA Flood Insurance Study (FIS) and Nueces County Flood Insurance Rate Maps (FIRMS) for the Gulf Coast began in 2006. Preliminary FIRMS for Nueces County were released on 5/26/2016. They are expected to become effective 10/13/2022. This analysis is using the preliminary FIS data, as it will be effective as of this document’s adoption. The Flood Map project is part of a nation-wide effort to update coastal flood risk data. In Texas, this project includes 17 of 18 coastal counties. New FIS data and modeling will enable coastal

counties and communities to make informed decisions regarding land use development, risk identification, and mitigation and recovery as it pertains to reducing hazard risk from flood.

Adoption of updated flood maps in conjunction with development of a new county-wide Hazard Mitigation Plan provides Nueces County and its communities an opportunity to coordinate and implement these two planning mechanisms into land use policies, regulations, and ordinances, and to alter the built environment to build resiliency to natural hazards over time. Communities may also consider higher regulatory standards to be more aligned with the county's regulations, and to more effectively, and responsibly, manage the local National Flood Insurance Program (NFIP).

This report section includes floodplain maps for each participating jurisdiction with the proposed 2016 FEMA Flood Insurance Rate Maps (FIRMs) floodplain extents and the proposed floodplain extents which incorporate the latest hydrologic and hydraulic analysis of the area. They are expected to become effective 10/13/2022. This analysis is using the preliminary FIS data, as it will be effective as of this document's adoption. These jurisdictional floodplain maps may be seen in Figures 1 through 12.

Location Variability

Flood hazards are unique in comparison to hazards that affect the overall planning area due to the geographic variation of jurisdictions and their proximity to floodplains, floodways, and the gulf coast. In addition, changes in future tide conditions, average climate, and average temperatures can exacerbate flooding impacts on specific jurisdictions. Variability in flood hazards affecting participating jurisdictions in comparison to the entire planning area can be seen in **Figures 7-1 to 7-12**.

Extent

Magnitude of flood hazards is expressed in term of maximum flood depth experienced by the jurisdiction. Generally, homes that are impacted by more than four feet of flood depth are considered by FEMA as a complete loss. Therefore, flood depth combined with number of homes impacted by floods is one measure of a community's vulnerability to flood damage. FEMA flood maps designated Special Flood Hazard Areas that indicate areas of the County that have a 1% annual chance of inundation. A 0.2% annual chance of inundation floodplain has also been designated by FEMA, further detailing the extent of flood hazards in Nueces County.

Occurrences

Flood occurrences in Nueces County are documented in the National Climatic Data Center (NCDC) Storm Event Database. The NCDC data reports include event details

such as property damage, crop damage, injury, and death. Dates of floods recorded by the NCDC from 1996 to 2021 may be viewed in Table 7-1.

Table 7-1. NCDC flood records 1996 - 2021

Date	Date (cont.)	Date (cont.)	Date (cont.)	Date (cont.)	Date (cont.)
9/20/1996	9/17/2002	6/1/2006	9/19/2010	5/19/2015	9/15/2018
4/2/1997	9/19/2002	7/5/2006	9/20/2010	5/21/2015	9/16/2018
4/3/1997	10/28/2002	7/26/2006	2/5/2012	5/24/2015	10/27/2018
5/23/1997	12/9/2002	9/18/2006	4/16/2012	6/17/2015	11/1/2018
6/6/1997	6/10/2003	7/1/2007	4/29/2013	9/11/2015	5/10/2019
6/21/1997	7/18/2003	7/2/2007	7/17/2013	10/24/2015	5/10/2019
10/9/1997	9/12/2003	7/3/2007	9/20/2013	3/9/2016	5/16/2020
10/13/1997	9/17/2003	7/4/2007	9/29/2013	5/16/2016	6/1/2020
10/18/1998	9/18/2003	7/7/2007	5/13/2014	5/16/2016	4/30/2021
8/22/1999	9/19/2003	7/25/2007	9/27/2014	8/30/2016	5/1/2021
8/23/1999	9/23/2003	7/26/2007	10/11/2014	3/10/2017	5/16/2021
3/14/2000	10/24/2003	7/24/2008	10/11/2014	5/29/2017	5/19/2021
3/14/2000	4/6/2004	1/15/2010	10/18/2014	6/1/2017	7/6/2021
7/27/2000	4/25/2004	4/16/2010	10/31/2014	6/27/2017	7/8/2021
11/4/2000	5/13/2004	4/17/2010	3/21/2015	10/1/2017	9/13/2021
8/31/2001	6/22/2004	4/18/2010	4/14/2015	1/27/2018	9/30/2021
9/2/2001	6/25/2004	4/19/2010	4/22/2015	6/18/2018	10/1/2021
9/9/2001	9/2/2004	7/2/2010	5/12/2015	6/19/2018	10/14/2021
11/16/2001	7/28/2005	9/17/2010	5/12/2015	6/20/2018	
8/14/2002	10/11/2005	9/18/2010	5/13/2015	9/12/2018	
9/16/2002	5/31/2006	9/19/2010	5/15/2015	9/14/2018	

Additionally, five non-hurricane, flood-related FEMA disaster declarations took place in Nueces County between 1996 and 2021. Disaster declarations are made at the county level without published detail of impacts to each jurisdiction. Consequently, these disasters are not described within the jurisdictional tables. Disaster Declarations are shown in Table 7-2.

Table 7-2. Nueces County Flood-Related Disaster Declarations¹

Disaster Number	Declaration Date	Incident Begin Date	Incident End Date	Public Assistance Grants
313	9/18/1971	9/18/1971	9/18/1971	Information Not Provided
603	9/25/1979	9/25/1979	9/25/1979	Information Not Provided
727	10/30/1984	10/30/1984	10/30/1984	Information Not Provided
1257	10/21/1998	10/17/1998	11/15/1998	\$33,279,674
1425	7/4/2002	6/29/2002	7/31/2002	\$27,960,004
1439	11/5/2002	10/24/2002	11/15/2002	\$57,974,742
1709	6/29/2007	6/16/2007	8/3/2007	\$25,706,394
4223	5/29/2015	5/04/2015	6/23/2015	\$57,635,747

Probability

Probability and frequency of return were calculated by dividing the number of flood events in the recorded time period for flood hazard by the overall time period that the resource database has recorded events. Estimated probability of future flood events has been calculated for each participating jurisdiction. The probabilities shown in the jurisdictional tables are based on previous occurrences documented by the NCDC database.

Probabilities of future flood events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. Climate change exacerbates several weather-related factors that contribute to floods, such as rainfall, snowmelt, sea levels, etc. As long-term weather patterns, average temperatures, and sea levels change, so too will the locations, frequencies, and range of anticipated intensities of floods.

Impact

Impacts of flooding frequently include damage to people, property, buildings, and infrastructure. Flooding may cause bridge and road closures, service disruptions, and injuries and fatalities. Flood impacts are summarized in the jurisdictional tables. Disaster Declarations at the county level are detailed in Table 7-2.

¹ <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

Vulnerability

Asset vulnerability to flood for each jurisdiction can be found in the jurisdictional tables below. Major infrastructure is defined as critical utility lines (gas, water, etc.), highway, and rail access.

NFIP Participation

One of the most powerful tools businesses and homeowners have to protect themselves from flooding is flood insurance through the National Flood Insurance Program (NFIP). Nueces County and the participating jurisdictions, with the exception of Petronila, participate in the NFIP.

Nueces County and participating jurisdictions have a total of 288 repetitive loss properties, having received a total of \$25,706,633.16 in flood insurance payments. Repetitive Loss properties are properties that have received two or more payments of \$1,000 within a ten-year period. Of those 288 repetitive loss properties, 19 are severe repetitive loss properties. Severe repetitive loss properties are properties that have received four NFIP payments of over \$5,000 each. A jurisdictional breakdown of repetitive and severe repetitive loss properties can be found in the summary table for each jurisdiction.

With the exception of Petronila, which does not participate in the NFIP, all participating jurisdictions have developed mitigation actions related to NFIP compliance and maintenance. These mitigation actions can be seen in Section 19. All participating communities identified flooding as a hazard of particular relevance. Consequently, numerous mitigation actions were developed that will help mitigate the impacts of floods. Many of these actions relate to continued compliance with the NFIP and public outreach projects that exceed the NFIP minimum standards. As a whole, the participating jurisdictions recognize the flood mitigation benefits of exceeding the NFIP minimum standards.

Communities	Location in ordinance language of the:				
	Adoption of NFIP criteria in local regulation	Adoption of the latest effective FIRM	Latest Effective FIRM Date	Implementation/enforcement of local regulations to develop in SFHAs	Designee/agency responsible of implementing requirements of the NFIP
Unincorporated Nueces County	Article 4, Section A	Article 3, Section B	10/13/2022	Article 3, Section C	Article 4, Section A
City of Agua Dulce	Article 4, Section A	Article 3, Section B	10/13/2022	Article 3, Section C	Article 4, Section A
Banquete ISD	Does not participate in the NFIP				
City of Bishop	Article 4, Section A	Article 3, Section B	10/13/2022	Article 3, Section C	Article 4, Section A
City of Corpus Christi	Footnote 3	Sec. 14-532	10/13/2022	Sec. 14-533	Sec. 14-541
City of Driscoll	Article 4, Section A	Article 3, Section B	10/13/2022	Article 3, Section C	Article 4, Section A
City of Petronila	Does not participate in the NFIP				
City of Port Aransas	Sec. 8-13	Sec. 8-7	9/30/1992	Sec. 8-8	Sec. 8-13
City of Robstown	3.05.004(a)	3.05.003(b)	10/13/2022	3.05.003(c)	3.05.004(a)
Nueces County Drainage District #2	Does not participate in the NFIP				
Nueces County Water Control and Improvement District #3	Does not participate in the NFIP				
Nueces County Water Control and Improvement District #4	Does not participate in the NFIP				

*Ordinances for each community are in Appendix G

*Nueces County Floodplain Ordinance also covers the cities of Agua Dulce, Bishop, and Driscoll

The City of Corpus Christi has a Substantial Damage Management Plan, attached in Appendix H, which outlines how substantial improvement/substantial damage determinations are made. The implementation of post-event substantial improvement/substantial damage (SI/SD) review starts with an assessment of the damage, by conducting windshield inspections to identify affected structures and collected data is uploaded to the city's GIS system. Following the assessment of damage, notices are posted on structures that are deemed Major or Destroyed, and letters are mailed to property owners notifying them of permitting procedures and substantial damage/improvement requirements. A market value determination will be made on the property using the Nueces County Appraisal District, value is based on the structure and not land value. If property owners do not agree with the SI/SD determination they can appeal the decision, otherwise owners can move forward with the permitting process.

All NFIP participating jurisdictions, excluding the City of Corpus Christi, use the following procedures to make substantial improvement/substantial damage determinations:

The implementation of post-event substantial improvement/substantial damage (SI/SD) review starts with an assessment of the damage, to determine the impact and magnitude of the damage/improvement from an event. That assessment may be performed by local, State or Federal personnel using FEMA's Preliminary Damage Assessment Guide. Based on the information collected, if a structure was damaged to an extent that triggers SI/SD, then when repaired, it will have to meet all current building codes and regulations (including current elevation requirements). The SI/SD determination is based on the value of the damaged structure and not land value, which is determined by examining Nueces County Appraisal District data. Upon request, a notice letter will be sent to property owners stating what the determination was. If the letter states there was SI/SD the property owner can appeal the decision, otherwise the owner can continue the permit application review process. From the permit review process, permits can begin being issued to the property owner and inspections can be performed.

Unincorporated Nueces County Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized Coastal	Nueces River Nueces Bay Corpus Christi Bay Gulf of Mexico	6.19

OCCURENCES	
Number of Floods (Range: 1996-2021)	Risk to Health and Safety (No. Incidences by Type)
69	2 deaths, 0 injuries

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
36% annual chance	1 flood every 2.76 years

IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
3,197	\$1,000,551,176	816	90

VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
712		\$5,529,124	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
42	\$2,165,860.17	1	\$111,994.94
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		41	
2-4 Family Residential		1	
ASSET CLASS	ASSETS IN SFHA		
Dam	Belvy Lake Dam		
	Gertrude Lubby Lake Dam		
	Chapman Ranch Lake Dam		

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

Figure 7-1. Map of FEMA Floodplains for Unincorporated Nueces County



City of Agua Dulce Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Localized Riverine	Localized Nearby creek	1*

*Video Documentation of 2015 Flood Event: <https://www.youtube.com/watch?v=kx7IXaO1Lw>

OCCURENCES	
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)
5	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
20% annual chance	5 years

IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
384	\$33,877,581	9	2

VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
45		\$135,787	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
1	\$27,503.34	0	\$0
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		1	

ASSET CLASS	ASSETS IN SFHA
School	Agua Dulce Elementary School
	Agua Dulce High School
Designated Shelter/ Emergency Evacuation Center	David Berlanga Community Center

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

Banquete ISD Flood Hazard

LOCATION		EXTENT	
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)	
Riverine Localized	Localized Nearby creeks	1	
OCCURENCES			
Number of Floods (Range: 1996 - 2021)		Risk to Health and Safety (No. Incidences by Type)	
4		0 death, 0 injury	
PROBABILITY			
Future Flood Events Likelihood		1 Flood X Years	
16% annual chance		1 flood every 6.25 years	
IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
1,005	\$129,756,721	185	7
VULNERABILITY**			
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
0	\$0	0	\$0
ASSET CLASS	ASSETS IN SFHA		
No assets in SFHA			

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

City of Bishop Flood Hazard

LOCATION		EXTENT	
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)	
Riverine Localized	Nearby creeks Localized	14 – 1% event	
OCCURENCES			
Number of Floods (Range: 1996 - 2021)		Risk to Health and Safety (No. Incidences by Type)	
7		0 death, 0 injury	
PROBABILITY			
Future Flood Events Likelihood		1 Flood X Years	
28% annual chance		1 flood every 3.57 years	
IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
68	\$7,396,608	31	2
VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
30		\$130,950	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
2	\$28,195.18	0	\$0
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		2	
ASSET CLASS	ASSETS IN SFHA		
No assets in SFHA			

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

Figure 7-4. Map of FEMA Floodplains for City of Bishop



City of Corpus Christi Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized Coastal	Corpus Christi Bay Nueces Bay Oso Bay Gulf of Mexico	10.62

OCCURENCES	
Number of Floods (Range: 1996-2021)	Risk to Health and Safety (No. Incidences by Type)
140	1 death, 1 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
560% annual chance	1 flood every 0.18 years

IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
21,158	\$6,372,634,575	1701	48

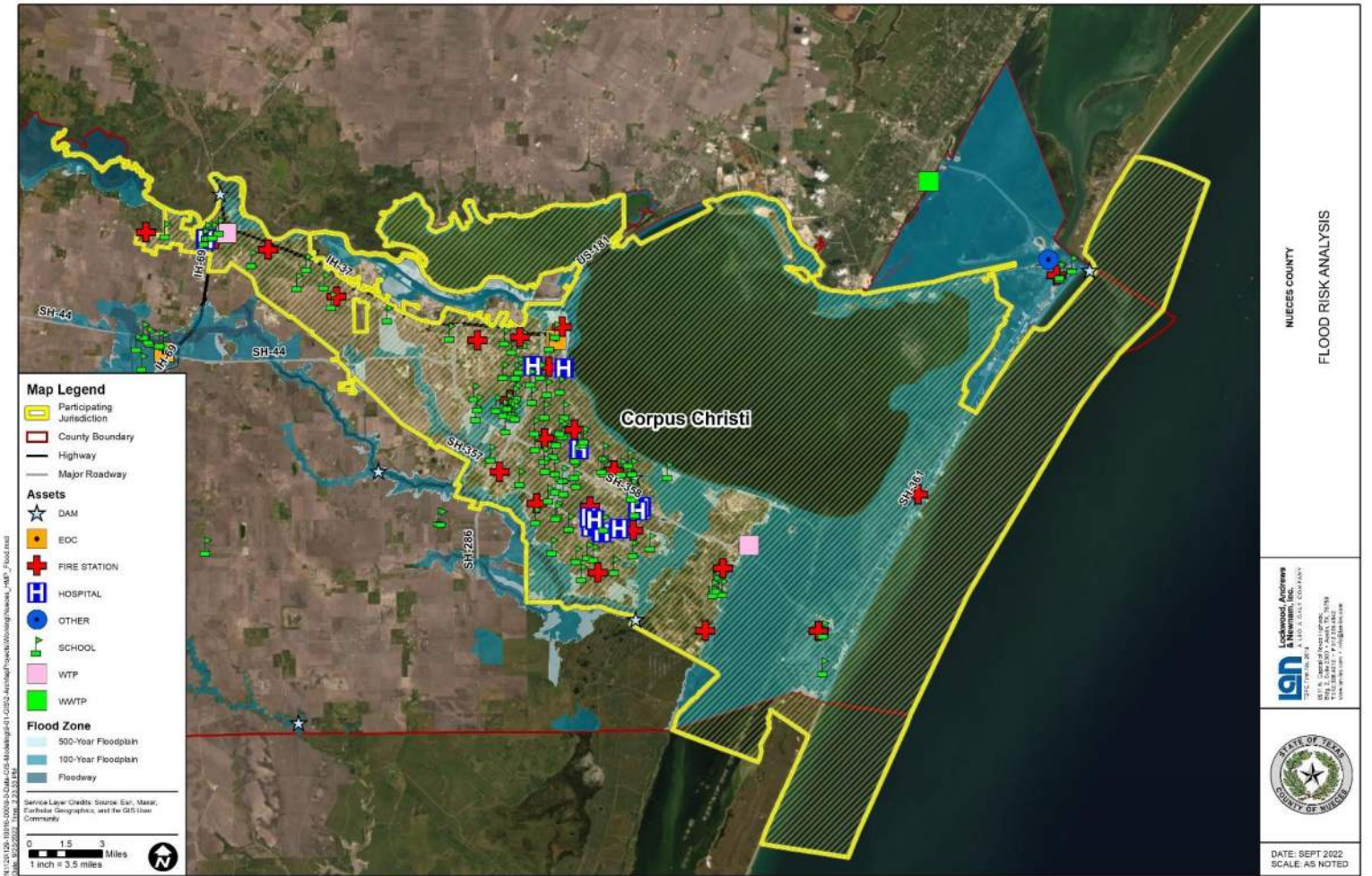
VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
4,281		\$38,466,124	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
198	\$12,704,491.11	13	\$2,401,553.45
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		151	
2-4 Family Residential		4	
Non-Residential Business		10	
Other Residential		5	
Other Nonresidential		28	

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

VULNERABILITY	
ASSET CLASS	ASSETS IN SFHA
Dam	Calallen Reservoir Dam
Fire Station	Fire Station 10
	Fire Station 15
	Fire Station 16
School	Barnes Elementary
	Seashore Middle School Academy
	Jones Elementary
	Seashore Learning Center
	Los Encinos SES
	West Oso Junior High
	Wynn Seale Metropolitan School of Design
	West Oso Elementary
	Dr. ML Garza-Gonzalez Charter School
	Garcia Elementary
	Dr. ML Garza-Gonzalez Accelerated Learning Center
	Mary Grett School
Cunningham Middle School	
Wastewater Treatment Plant	Laguna Wastewater Treatment Plant
	Greenwood Wastewater Treatment Plan

Figure 7-5. Map of FEMA Floodplains for City of Corpus Christi



City of Driscoll Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized	Nearby Creeks Localized flooding	2

OCCURENCES	
Number of Floods (Range: 1996-2021)	Risk to Health and Safety (No. Incidences by Type)
0	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
1% annual chance*	1 flood every 100 years*

*Based upon minimum probability of the planning area

IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
490	\$51,394,417	13	2

VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
33		\$154,662	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
1	\$27,417.53	0	\$0
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		1	
ASSET CLASS	ASSETS IN SFHA		
School	Driscoll Elementary & Middle School		

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

City of Petronila Flood Hazard

LOCATION		EXTENT	
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)	
Riverine Localized	Localized Nearby creeks	1	
OCCURENCES			
Number of Floods (Range: 1996 - 2021)		Risk to Health and Safety (No. Incidences by Type)	
3		0 death, 0 injury	
PROBABILITY			
Future Flood Events Likelihood		1 Flood X Years	
12% annual chance		1 flood every 8.3 years	
IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
0	\$0	22	0
VULNERABILITY**			
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
0	\$0	0	\$0
ASSET CLASS	ASSETS IN SFHA		
No assets in SFHA			

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

City of Port Aransas Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized Coastal	Localized Nearby Bays Gulf of Mexico	12 – 1% event

OCCURENCES	
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)
13	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
52% annual chance	1 flood every 1.92 years

IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
7,637	\$11,941,554,318	50	0

VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
3,256		\$140,405,966	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
31	\$10,311,229.89	4	\$8,145,223.15
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		20	
2-4 Family Residential		1	
Non-Residential Business		3	
Other Residential		2	
Other Nonresidential		5	
ASSET CLASS	ASSETS IN SFHA		
Fire Station	Port Aransas Fire Department		
Other	TXDOT Ferry Terminal		
School	Brundrett Middle School		
	University of Texas Marine Science Institute		

*Nueces County Appraisal District, 2022

**FEMA, as of Sept. 6th, 2022

Figure 7-8. Map of FEMA Floodplains for City of Port Aransas



City of Robstown Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized	Localized Sheet Runoff Drainage Overflow	13 – 1% event

OCCURENCES	
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)
17	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
68% annual chance	1 flood every 1.47 years

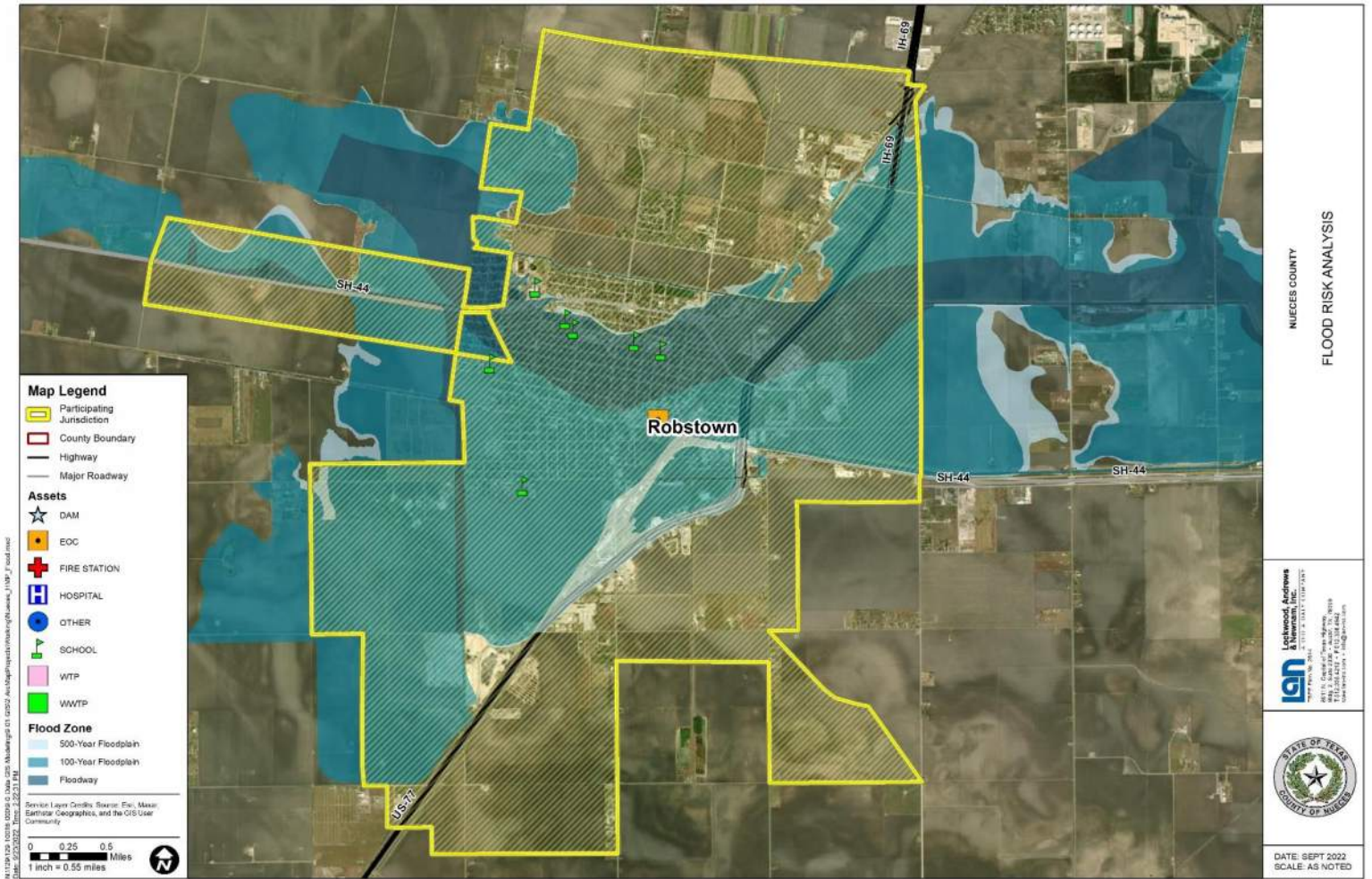
IMPACT			
Parcels in SFHA	Property Value in SFHA*	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
4,105	\$496,230,117	116	12

VULNERABILITY**			
Total Number of Closed Paid Losses		Total Dollar Amount of Closed Paid Losses	
373		\$1,270,700	
Repetitive Loss Structures (No.)	Repetitive Loss Payments	Severe Repetitive Loss Structures (No.)	Severe Repetitive Loss Payments
9	\$223,011.88	1	\$114,516.16
Repetitive Loss Structure NFIP Occupancy Status		Number of Repetitive Loss Structures	
Single Family Residential		8	
Non-Residential Business		1	

ASSET CLASS	ASSETS IN PROPOSED SFHA
EOC	Robstown Emergency Operations Center
School	Seale Junior High
	Hattie Martin Early Childhood Center
	Solomon P Ortiz Intermediate School
	Lotspeich Elementary
	Robert Driscoll Jr Elementary
	Salazar Crossroads Academy
	San Pedro Elementary

*Nueces County Appraisal District, 2022, **FEMA, as of Sept. 6th, 2022

Figure 7-9. Map of FEMA Floodplains for City of Robstown



Nueces County Drainage District #2 Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized	Localized Sheet Runoff Drainage Overflow	13 – 1% event

OCCURENCES	
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)
20	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
80% annual chance	1 flood every 1.25 years

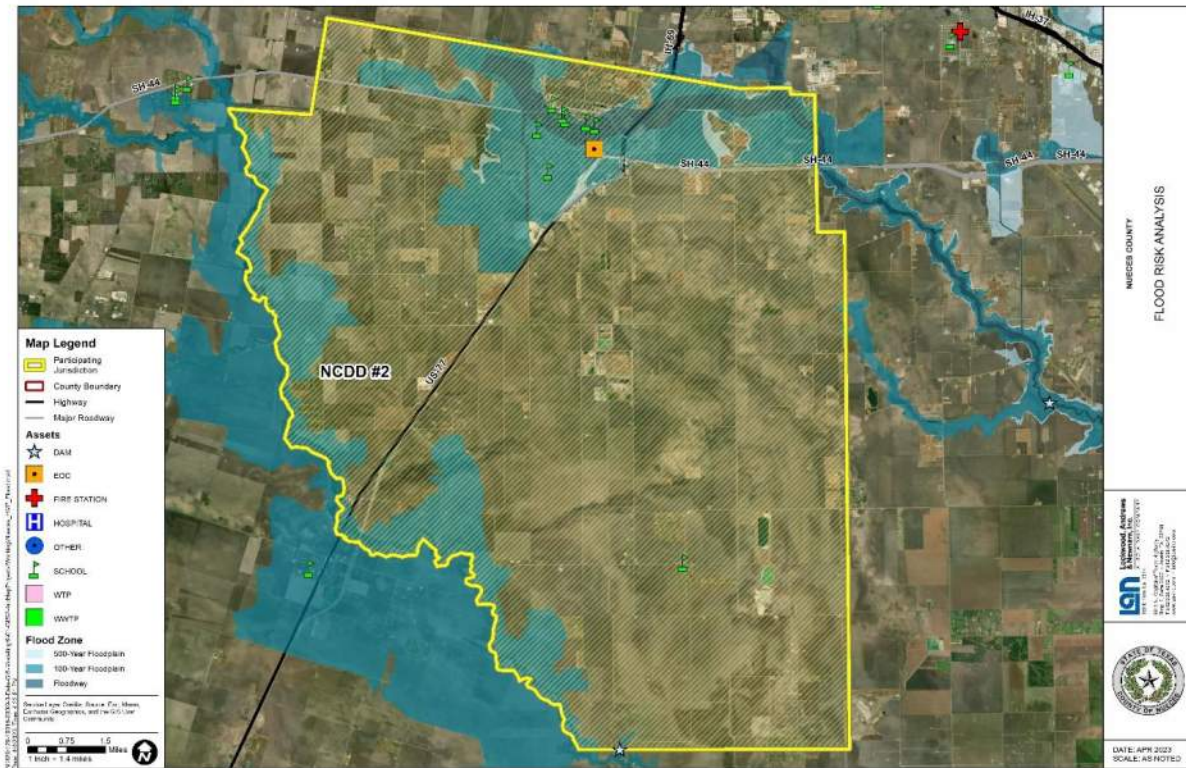
IMPACT		
Parcels in SFHA	Area of Parcels in SFHA (Acres)	Percentage of Total Area
5,222	30,539	34.23%

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$772,434	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 7-10. Map of FEMA Floodplains for Nueces County Drainage District #2



Nueces County Water Control and Improvement District #3 Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized	Localized Sheet Runoff Drainage Overflow	13 – 1% event

OCCURENCES	
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)
17	0 death, 0 injury

PROBABILITY	
Future Flood Events Likelihood	1 Flood X Years
68% annual chance	1 flood every 1.47 years

IMPACT		
Parcels in SFHA	Area of Parcels in SFHA (Acres)	Percentage of Total Area
2,310	1,560	24.24%

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$2,578,422	\$123,050
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$1,758,913	\$0	\$0

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #4 Flood Hazard

LOCATION		EXTENT
Flooding Types	Major Flooding Source	Maximum Flood Depth (Feet)
Riverine Localized Coastal	Localized Nearby Bays Gulf of Mexico	12 – 1% event
OCCURENCES		
Number of Floods (Range: 1996 - 2021)	Risk to Health and Safety (No. Incidences by Type)	
13	0 death, 0 injury	
PROBABILITY		
Future Flood Events Likelihood	1 Flood X Years	
52% annual chance	1 flood every 1.92 years	
IMPACT		
Parcels in SFHA	Area of Parcels in SFHA (Acres)	Percentage of Total Area
9,847	19,285	99.00%
VULNERABILITY		
Population Served**	Infrastructure*	
6,281	\$21,097,000	
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 7-12. Map of FEMA Floodplains for Nueces County Water Control and Improvement District #4



Section 8: Windstorms

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Windstorms Hazard Overview

Description

A windstorm is a storm with high winds or violent gusts with little or no rain. The windstorm hazard excludes extreme wind events that occur with other wind-related natural hazards such as hurricanes, tropical storms, and tornados which are addressed elsewhere in this plan.

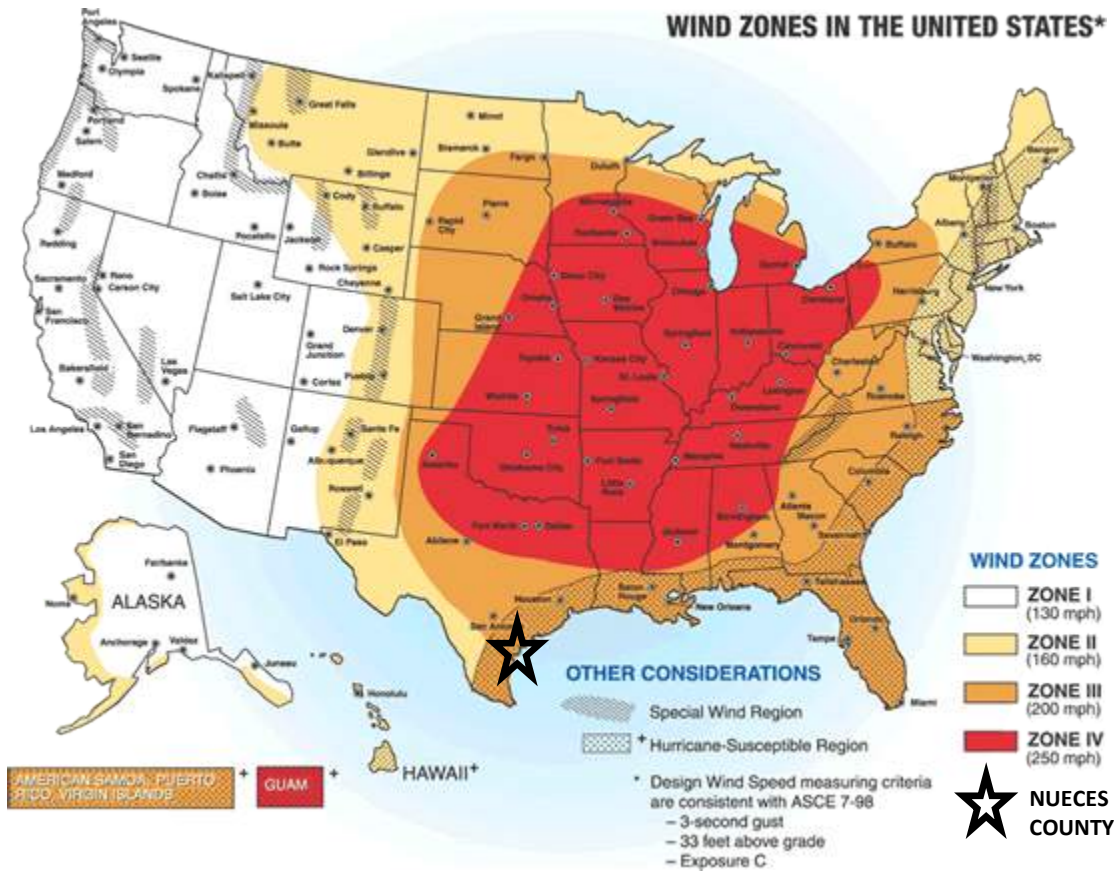
Location

Windstorms do not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the county planning area including all participating jurisdictions are uniformly exposed to windstorm activity. According to FEMA Wind Zones in the United States, Nueces County is in Wind Zone III and is subject to winds as high as 200 mph, as seen in Figure 8-1.

Location Variability

Windstorms are a widespread affecting hazard and impact all jurisdictions with very minimal variance in magnitude due to the proximity of all jurisdictions in the planning area. Windstorms impacting Nueces County are not expected to affect participating jurisdictions differently.

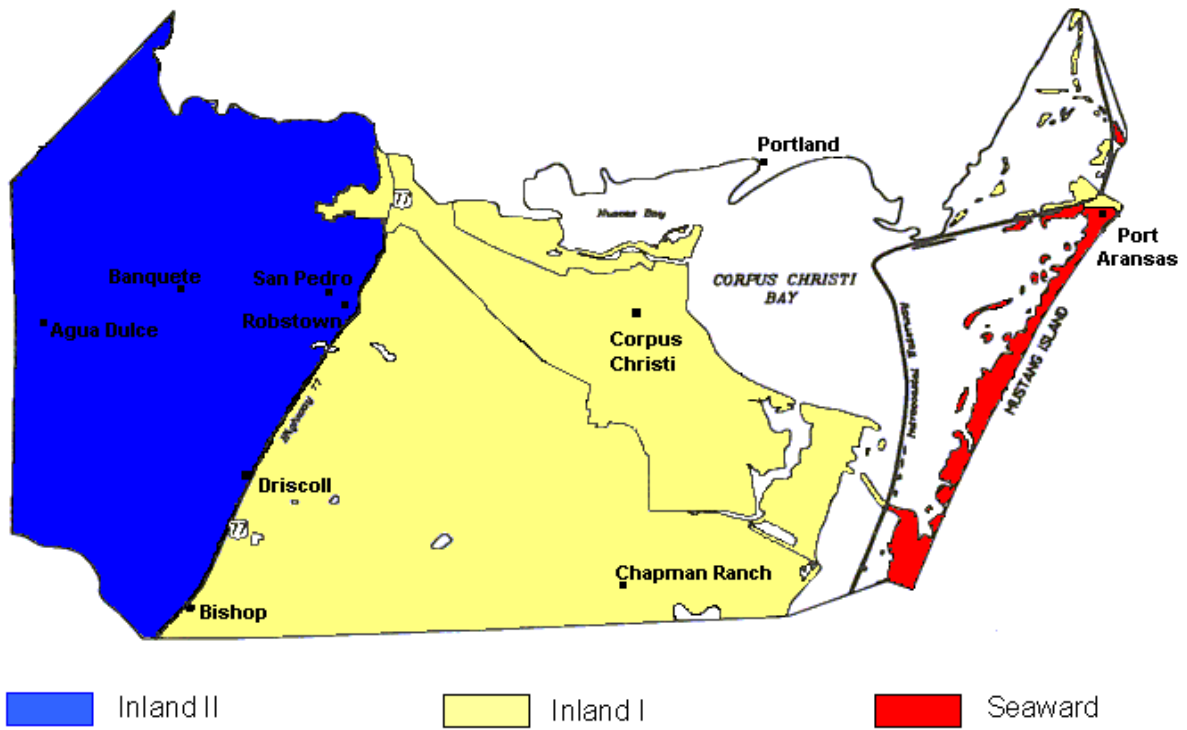
Figure 8-1. FEMA Wind Zones in the United States



The Texas Windstorm Insurance Association (TWIA) was established under the Texas Department of Insurance (TDI) by the Texas Legislature in 1971 following Hurricane Celia. TWIA provides windstorm and hail insurance along the Texas seacoast. Recommended design and inspection requirements for structures along the coast have been developed by TDI based on historical damages. Three designated catastrophe areas have been defined for Nueces County. Designated catastrophe areas are established for territories subject to unusually frequent and severe damage resulting from windstorm or hailstorms. Designated catastrophe areas for Nueces County include Seaward, Inland I, and Inland II. Adopted design wind speeds for these designated catastrophe areas are shown in Figure 8-2 and defined below:

- Seaward: 130 mph 3-second gust design wind speed
- Inland I: 120 mph 3-second gust design wind speed
- Inland II: 110 mph 3-second gust design wind speed

Figure 8-2. TDI Designated Catastrophe Areas



Extent

Windstorms extent is defined using the Beaufort Wind Scale. Table 8-1 summarizes the Beaufort Wind Scale.

Table 8-1. Beaufort Wind Scale¹

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-19 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (18-25 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	High waves (23-32 ft.), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (29-41 ft.) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (37-52 ft.) waves, foam patches cover sea, visibility more reduced	
12	64+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	

¹ www.spc.noaa.gov/faq/tornado/beaufort.html

Occurrences

Windstorms can occur at any time of year, but they are typically more common during the spring and early summer. According to the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database, Nueces County has experienced 246 (recorded) windstorm events from 9/26/1950 to 3/19/2022 (72 years). Table 8-2 includes a summary of windstorm events from 1950 to 2022, categorizing the events by wind speed. Table 8-3 includes a comprehensive list of all windstorm events on record within Nueces County. Historical windstorm events are mapped for the county and each participating jurisdiction in the following sections, as seen in Figures 3 through 14.

Additionally, four non-hurricane, windstorm-related FEMA disaster declarations took place in Nueces County between 1970 and 2022. Disaster declarations are made at the county level without published detail of impacts to each jurisdiction. Disaster Declarations are shown in Table 8-4.

Table 8-2. Historical Windstorm Occurrence Summary, 1950-2022

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
246	35	131	25	35	9	6	5

Table 8-3. Historical Windstorm Events, 1950-2022²

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Nueces Co.	5/12/1982	40	0	0	0	0
Nueces Co.	5/12/1982	43	0	0	0	0
Nueces Co.	5/12/1982	43	0	0	0	0
Nueces Co.	6/6/1983	47	0	0	0	0
Nueces Co.	10/7/1984	47	0	0	0	0
Nueces Co.	10/7/1984	48	0	0	0	0
Nueces Co.	5/8/1985	48	0	0	0	0
Nueces Co.	5/21/1985	50	0	0	0	0
Nueces Co.	5/17/1986	50	0	0	0	0
Nueces Co.	8/21/1986	50	0	0	0	0
Nueces Co.	8/21/1986	50	0	0	0	0
Nueces Co.	8/21/1986	50	0	0	0	0
Nueces Co.	8/21/1986	50	0	0	0	0
Nueces Co.	2/27/1987	50	0	0	0	0
Nueces Co.	11/16/1987	50	0	0	0	0
Nueces Co.	4/29/1988	50	0	0	0	0
Nueces Co.	4/29/1988	50	0	0	0	0
Nueces Co.	4/29/1988	50	0	0	0	0
Nueces Co.	6/3/1988	50	0	0	0	0
Nueces Co.	4/29/1989	50	0	0	0	0
Nueces Co.	2/21/1990	50	0	0	0	0
Nueces Co.	3/28/1991	50	0	0	0	0
Nueces Co.	3/28/1991	50	0	0	0	0

² NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022³ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Nueces Co.	5/8/1991	50	0	0	0	0
Nueces Co.	5/8/1991	50	0	0	0	0
Nueces Co.	3/3/1992	50	0	0	0	0
Nueces Co.	3/3/1992	50	0	0	0	0
Nueces Co.	4/17/1992	50	0	0	0	0
Corpus Christi	5/5/1993	50	0	0	50000	0
Robstown	5/5/1993	50	0	0	0	0
Port Aransas	5/10/1993	50	0	0	0	0
Corpus Christi	5/10/1993	50	0	0	0	0
Corpus Christi	9/26/1993	50	0	0	0	5000
Corpus Christi	4/15/1994	50	0	0	5000	5000
Robstown	4/11/1995	50	0	0	0	0
Corpus Christi	5/30/1995	50	0	0	30000	0
Bishop	5/11/1996	50	0	0	0	0
Agua Dulce	9/20/1996	50	0	0	0	0
Corpus Christi	11/24/1996	50	0	0	0	0
Corpus Christi	11/24/1996	50	0	0	0	0
Port Aransas	11/24/1996	50	0	0	0	0
Agua Dulce	5/9/1997	50	0	0	0	0
Robstown	5/9/1997	50	0	0	0	0
Robstown	6/17/1997	50	0	0	0	100000
Corpus Christi	6/17/1997	50	0	0	0	0
Port Aransas	2/12/1998	50	0	0	0	0
Agua Dulce	6/15/1998	50	0	0	0	0
Nueces Co.	5/8/1991	50	0	0	0	0

³ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022⁴ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Corpus Christi	8/14/1998	50	0	0	0	0
Corpus Christi Nas	3/28/1999	50	0	0	5500000	0
Corpus Christi	5/12/1999	50	0	0	0	0
Corpus Christi	5/12/1999	50	0	0	0	0
Corpus Christi	5/18/1999	51	0	0	0	0
Corpus Christi	5/18/1999	51	0	0	0	0
Corpus Christi	3/14/2000	51	0	0	0	0
Corpus Christi Nas	3/14/2000	51	0	0	0	0
Corpus Christi	3/14/2000	51	0	0	10000	0
Nueces Co.	5/2/2000	51	0	0	0	0
Corpus Christi	6/7/2001	51	0	0	0	0
Corpus Christi	9/9/2001	51	0	0	0	0
Corpus Christi	9/9/2001	51	0	0	0	0
Nueces Co.	3/30/2002	52	0	0	0	0
Agua Dulce	5/17/2002	52	0	0	0	0
Bishop	5/17/2002	52	0	0	0	0
Corpus Christi Nas	5/29/2002	52	0	0	0	0
Flour Bluff Jct	5/29/2002	52	0	0	0	0
Corpus Christi	5/29/2002	52	0	0	0	0
Bob Hall Pier	5/29/2002	52	0	0	0	0
Robstown	10/23/2002	52	0	0	0	0
Corpus Christi	2/15/2003	52	0	0	0	0
Corpus Christi	2/15/2003	52	0	0	0	0
Port Aransas	3/26/2003	52	0	0	0	0
Corpus Christi	8/14/1998	50	0	0	0	0

⁴ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022⁵ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Port Aransas	9/12/2003	52	0	0	0	0
Chapman Ranch	10/25/2003	52	0	0	0	0
San Pedro	2/24/2004	52	0	0	100000	0
Nueces Co.	4/5/2004	52	0	0	0	0
Petronila	5/1/2004	52	0	0	0	0
Corpus Christi	3/19/2005	52	0	0	0	0
Chapman Ranch	3/19/2005	52	0	0	0	0
Corpus Christi	5/8/2005	52	0	0	0	0
Crps Christi Intl Ar	5/8/2005	52	0	0	0	0
Robstown	5/29/2005	52	0	0	0	0
(Ngp)Nas Corpus Chri	11/15/2005	52	0	0	0	0
Bishop	3/28/2006	52	0	0	0	0
Calallen	5/14/2006	52	0	0	0	0
Banquete	5/14/2006	52	0	0	0	0
Crps Christi Intl Ar	6/26/2006	52	0	0	3000	0
Crps Christi Intl Ar	6/26/2006	52	0	0	2000	0
Chapman Ranch	6/26/2006	52	0	0	2000	0
Driscoll	6/30/2006	52	0	0	45000	0
Nueces Co.	5/3/2007	52	0	0	20000	0
Corpus Christi	6/5/2007	52	0	0	50000	0
Gardendale	10/19/2007	52	0	0	5000	0
(Crp)Corpus Christi	3/6/2008	52	0	0	0	0
Crps Christi Intl Ar	3/10/2008	52	0	0	50000	0
Bishop	3/10/2008	52	0	0	15000	0

⁵ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022⁶ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Gardendale	3/18/2008	52	0	0	5000	0
Cabaniss Naf	8/28/2009	52	0	0	10000	0
Rabb	10/9/2009	52	0	0	10000	0
(Ngp)Nas Corpus Chri	10/26/2009	52	0	0	100000	0
Nueces Co.	12/24/2009	52	0	0	250000	0
Nueces Co.	4/22/2010	52	0	0	0	0
Driscoll	6/2/2010	52	0	0	0	0
Corpus Christi	6/2/2010	52	0	0	1000000	0
(Ngp)Nas Corpus Chri	6/2/2010	52	0	6	250000	0
Laguna Vista	6/2/2010	52	0	0	0	0
Bob Hall Pier	6/2/2010	52	0	0	700000	0
Robstown Co Arpt	1/9/2011	52	0	0	500000	0
Driscoll	1/9/2011	52	0	0	0	0
Lon Hill	1/9/2011	52	0	0	15000	0
Calallen	1/9/2011	52	0	0	500000	0
(Crp)Corpus Christi	1/9/2011	52	0	0	0	0
Texas A And I	1/9/2011	52	0	0	0	0
Nueces Co.	5/12/2011	52	0	0	5000	0
Clarkwood	8/25/2011	52	0	0	0	0
Lon Hill	9/19/2011	52	0	0	1000	0
Rabb	9/19/2011	52	0	0	5000	0
Rabb	9/19/2011	52	0	0	10000	0
Banquete	9/19/2011	52	0	0	5000	0
Calallen	9/29/2011	52	0	0	1000	0
Gardendale	3/18/2008	52	0	0	5000	0
Cabaniss Naf	8/28/2009	52	0	0	10000	0

⁶ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022⁷ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Lon Hill	3/20/2012	52	0	0	5000	0
Lon Hill	3/20/2012	53	0	0	5000	0
Rabb	3/29/2012	53	0	0	0	0
Rabb	3/29/2012	53	0	0	10000	0
Texas A And I	4/2/2012	53	0	0	10000	0
La Rose	5/8/2012	53	0	0	5000	0
La Rose	5/8/2012	53	0	0	5000	0
Chapman Ranch	5/10/2012	53	0	0	0	0
(Ngp)Nas Corpus Chri	5/10/2012	53	0	0	0	0
Gardendale	5/10/2012	54	0	0	25000	0
Robstown	5/10/2012	54	0	0	1000000	100000
Robstown	5/10/2012	54	0	0	0	0
(Crp)Corpus Christi	5/10/2012	54	0	0	0	0
Gardendale	5/10/2012	54	0	0	50000	0
Port Aransas Arpt	11/3/2012	54	0	0	0	0
(Ngp)Nas Corpus Chri	11/3/2012	54	0	0	0	0
Flour Bluff Jct	11/3/2012	54	0	0	25000	0
Flour Bluff Jct	11/3/2012	54	0	0	0	0
Nueces Co.	2/25/2013	55	0	0	0	0
Corpus Christi	6/7/2013	55	0	0	10000	0
(Crp)Corpus Christi	6/30/2013	55	0	0	0	0
Petronila	9/2/2013	55	0	0	2000	0
Banquete	4/4/2014	55	0	0	5000	0
Nueces Co.	4/1/2015	55	0	0	5000	0

⁷ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1950-2022⁸ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Nueces Co.	4/1/2015	56	0	0	0	0
Nueces Co.	4/1/2015	56	0	0	10000	0
Bob Hall Pier	4/12/2015	56	0	0	0	0
Driscoll	4/14/2015	56	0	0	10000	0
Corpus Christi	4/14/2015	56	0	0	500000	0
Cabaniss Naf	4/14/2015	56	0	0	5000	0
Flour Bluff Jct	4/14/2015	56	0	0	0	0
Bob Hall Pier	4/14/2015	57	0	0	0	0
Rabb	4/22/2015	57	0	0	10000	0
Petronila	4/22/2015	57	0	0	3000000	0
Flour Bluff Jct	4/22/2015	58	0	0	5000	0
(Crp)Corpus Christi	5/12/2015	58	0	0	0	0
Gardendale	5/12/2015	58	0	0	100000	0
(Ngp)Nas Corpus Chri	5/12/2015	58	0	0	0	0
Bishop	5/15/2015	59	0	0	20000	0
(Crp)Corpus Christi	5/15/2015	59	0	0	0	0
Cabaniss Naf	5/15/2015	59	0	0	100000	0
Cabaniss Naf	5/24/2015	59	0	0	10000	0
Corpus Christi	7/31/2015	59	0	0	25000	0
Nueces Co.	12/13/2015	60	0	0	0	0
Agua Dulce	3/18/2016	60	0	0	20000	0

⁸ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1956-2022⁹ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Petronila	3/18/2016	60	0	0	25000	0
Robstown Co Arpt	3/18/2016	60	0	0	0	0
Gardendale	3/18/2016	60	0	0	50000	0
(Crp)Corpus Christi	3/18/2016	60	0	0	0	0
Cabaniss Naf	3/18/2016	60	0	0	0	0
Cabaniss Naf	3/18/2016	60	0	0	50000	0
(Crp)Corpus Christi	3/18/2016	60	0	0	2000	0
Gardendale	3/18/2016	60	0	0	5000	0
Peary Place	3/18/2016	60	0	0	25000	0
Texas A And I	3/18/2016	60	0	0	150000	0
(Ngp)Nas Corpus Chri	3/18/2016	60	0	0	4300000	0
Bob Hall Pier	3/19/2016	60	0	0	0	0
Laguna Vista	3/19/2016	61	0	0	0	0
(Ngp)Nas Corpus Chri	3/19/2016	61	0	0	10000	0
Laguna Vista	5/31/2016	61	0	0	0	0
Nueces Co.	12/8/2016	61	0	0	40000	0
Nueces Co.	1/22/2017	61	0	0	10000	0
Nueces Co.	1/22/2017	61	0	0	15000	0
Viola	5/29/2017	61	0	0	0	0
Bob Hall Pier	5/29/2017	61	0	0	0	0
Port Aransas	5/29/2017	61	0	0	0	0
Corpus Christi	6/4/2017	61	0	0	0	0
Corpus Christi	6/4/2017	61	0	0	1000	0

⁹ NOAA Storm Events Database, 2022

Table 8-3. Historical Windstorm Events, 1956-2022¹⁰ (cont.)

Jurisdiction	Date	Extent (Wind Speed in Knots)	Deaths	Injuries	Property Damage	Crop Damage
Texas A And I	6/4/2017	61	0	0	10000	0
Robstown	6/4/2017	61	0	0	15000	0
Petronila	6/5/2017	61	0	0	50000	0
Robstown Co Arpt	3/28/2018	61	0	0	25000	0
Annaville	3/29/2018	61	0	0	10000	0
T Head	3/29/2018	62	0	0	10000	0
T Head	4/14/2018	64	0	0	5000	0
(Ngp)Nas Corpus Chri	4/14/2018	65	0	0	0	0
Port Aransas	4/14/2018	65	0	0	0	0
Bishop Muni Arpt	4/7/2019	65	0	0	5000	0
Bob Hall Pier	4/7/2019	65	0	0	5000	0
Port Aransas	4/29/2020	65	0	0	0	0
Violet	4/29/2020	65	0	0	10000	0
Laguna Vista	4/29/2020	68	0	0	0	0
Bob Hall Pier	4/29/2020	68	0	0	0	0
Agua Dulce	5/16/2020	68	0	0	5000	0
Cabaniss Naf	5/16/2020	70	0	0	0	0
Cabaniss Naf	5/24/2020	70	0	0	15000	0
Flour Bluff	6/24/2020	70	0	0	5000	0
Flour Bluff	6/24/2020	70	0	0	5000	0
Calallen	8/18/2020	70	0	0	0	0
Palo Alto	8/18/2020	78	0	0	5000	0
Calallen	8/18/2020	78	0	0	50000	0
(Ngp)Nas Corpus Chri	5/11/2021	78	0	0	0	0
Agua Dulce	6/14/2021	80	0	0	0	0
Nueces Co.	3/21/2022	80	0	0	50000	0
Nueces Co.	4/11/2022		0	0	0	0

¹⁰ NOAA Storm Events Database, 2022

Table 8-4 Nueces County Windstorm-Related Disaster Declarations

Disaster Number	Declaration Date	Incident Begin Date	Incident End Date	Public Assistance Grants
313	9/18/1971	9/18/1971	9/18/1971	Information Not Provided
1439	11/5/2002	10/24/2002	11/15/2002	\$57,974,742
1709	6/29/2007	6/16/2007	8/3/2007	\$25,706,394
4223	5/29/2015	5/4/2015	6/23/2015	\$57,635,747

Probability

Probability, or frequency of return, was calculated by dividing the number of windstorm events in the recorded time period by the overall time period that the resource database has recorded events for that jurisdiction. Note, historical events are documented as a function of the path of the storm. A windstorm may travel over several jurisdictions; consequently, the windstorm event is recorded for all jurisdictions through which the windstorm passed. Probability for future windstorm events is defined for the county and each participating jurisdiction in the following sections.

Probabilities of future windstorm events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too will the locations, frequencies, and range of anticipated intensities of windstorms.

Impact

Windstorm impacts are documented by the number of deaths, injuries, property damage, and crop damage. Table 8-5 provides a summary of impacts for Nueces County as a whole. Impacts to the county and participating jurisdictions is documented in the following sections.

Table 8-5. Historical Windstorm Impacts Summary, 1956-2022

Number of Events	Deaths	Injuries	Property Damage	Crop Damage
254	0	6	\$19,385,000	\$210,000

In addition to the direct, historical impacts in Table 8-5, vulnerable assets and potential maximum impacts are listed in the jurisdictional tables. Because the impacts of windstorms are closely tied to the extent of the event and windstorms are expected to be

evenly distributed throughout the planning area, maximum impacts are listed in the jurisdictional tables. Fortunately, it is unlikely that a worst-case scenario windstorm would ever take place and maximize damages. Windstorms can cause indirect impacts by damaging power lines and other above-ground utilities. Crop losses and population displacement from housing damage could cause additional economic losses.

Vulnerability

Windstorms often cross-jurisdictional boundaries; therefore, all existing and future buildings, facilities, and populations in and around Nueces County are exposed to windstorm hazard and are at potential risk of impact. The damage caused by a windstorm is typically a result of high wind velocity and wind-blown debris. Vulnerability of humans and property is difficult to evaluate given that windstorm form at different strengths and in random locations. Property damage is typically most significant for structures of light construction. 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. Vulnerability is defined for the county and participating jurisdictions in the following sections.

Unincorporated Nueces County Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
County Wide (Unincorporated)	Seaward, Inland 1, and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
60	0	25	9	13	5	5	3

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
60	0	0	\$7,498,000	\$100,000

*NOAA Storm Events Database

PROBABILITY				
Number of Events	Record Time Period		Time Period Years	Probability
60	2002 – 2 2004 – 2 2005 – 1 2006 – 1 2008 – 1 2009 – 2 2011 – 6 2012 – 8	2013 – 1 2015 – 8 2016 – 8 2017 – 3 2018 – 3 2020 – 11 2021 – 1	72	83.33%

VULNERABILITY			
Total Population (County)*	Property Value**		Crop Land Total***
	Commercial	Residential	Acres
13,579	\$48,489,504,881	\$19,782,163,402	538,381

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-3. Map of Unincorporated Nueces County Windstorm Events



City of Agua Dulce Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
7	0	4	0	1	0	1	1

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
7	0	0	\$70,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
7	11/24/1996 5/9/1997 8/14/1998 5/17/2002 3/18/2016 5/16/2020 3/21/2022	72	9.7%

VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial & remaining	Residential	Acres
688	\$17,541,361	\$19,726,169	1.18

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Banquete ISD Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
11	0	9	2	1	0	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
11	0	0	\$3,149,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
11	6/26/2006 10/26/2009 9/19/2011 9/29/2011 3/29/2012 4/2/2012 5/8/2012 5/10/2012 4/1/2015 4/22/2015	72	15.2%

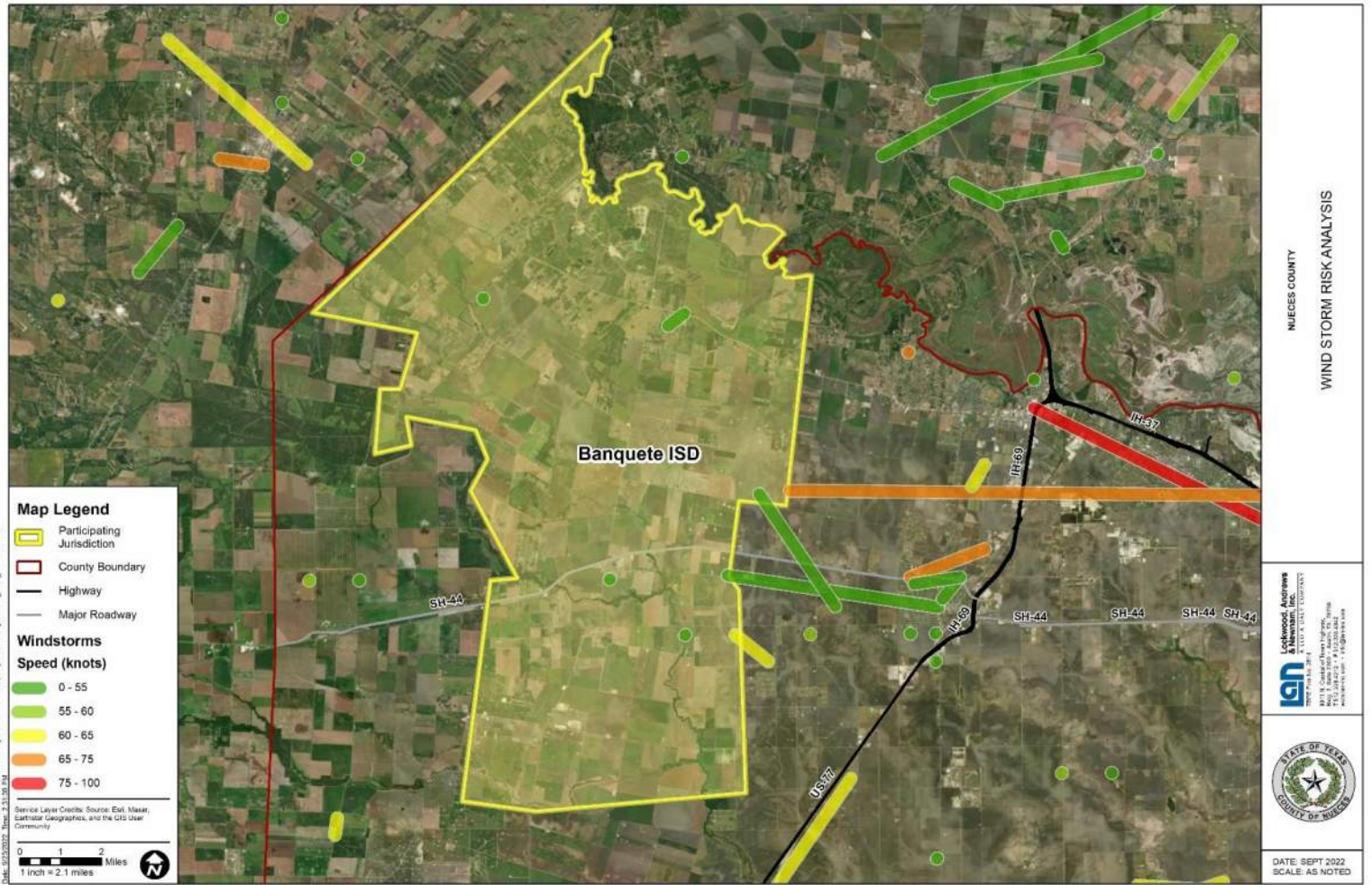
VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
3,862	\$202,039,573	\$229,361,915	44,627

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-5. Map of Banquete ISD Windstorm Events



City of Bishop Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

Number of Events	Magnitude (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
7	0	4	1	1	1	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
7	0	0	\$110,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
7	9/20/1996 5/29/2002 5/14/2006 3/18/2008 5/15/2015 3/18/2016 4/7/2019	72	9.7%

VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
3,155	\$129,594,352	\$111,155,952	520

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-6. Map of City of Bishop Windstorm Events



City of Corpus Christi Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Seaward, Inland 1, and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
50	2	23	10	8	3	1	1

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
50	0	6	\$11,788,000	\$10,000

*NOAA Storm Events Database

PROBABILITY					
Number of Events	Record Time Period			Time Period Years	Probability
50	1992 – 3	2001 – 3	2011 – 1	72	69.4%
	1994 – 1	2002 – 2	2012 – 3		
	1995 – 1	2003 – 2	2015 – 5		
	1996 – 2	2005 – 1	2016 – 4		
	1997 – 1	2007 – 1	2017 – 2		
	1998 – 1	2008 – 2	2018 – 1		
	1999 – 5	2009 – 1	2021 – 1		
	2000 – 2	2010-2			

VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
317,773	\$19,811,376,720	\$16,293,426,243	16,348

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-7. Map of City of Corpus Christi Windstorm Events



NUECES COUNTY
WIND STORM RISK ANALYSIS



DATE: SEPT 2022
SCALE: AS NOTED

City of Driscoll Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
5	0	3	1	2	0	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
5	0	0	\$1,620,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
5	5/3/2007 6/2/2010 1/9/2011 4/14/2015 3/18/2016 3/18/2016	72	6.9%

VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
673	\$31,419,594	\$20,046,143	366

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-8. Map of City of Driscoll Windstorm Events



City of Petronila Windstorms Hazards

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1

Number of Events	Magnitude (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
5	0	1	2	2	0	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
5	0	0	\$35,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
5	3/19/2005 4/4/2014 4/22/2015 3/18/2016 3/28/2018	72	6.9%

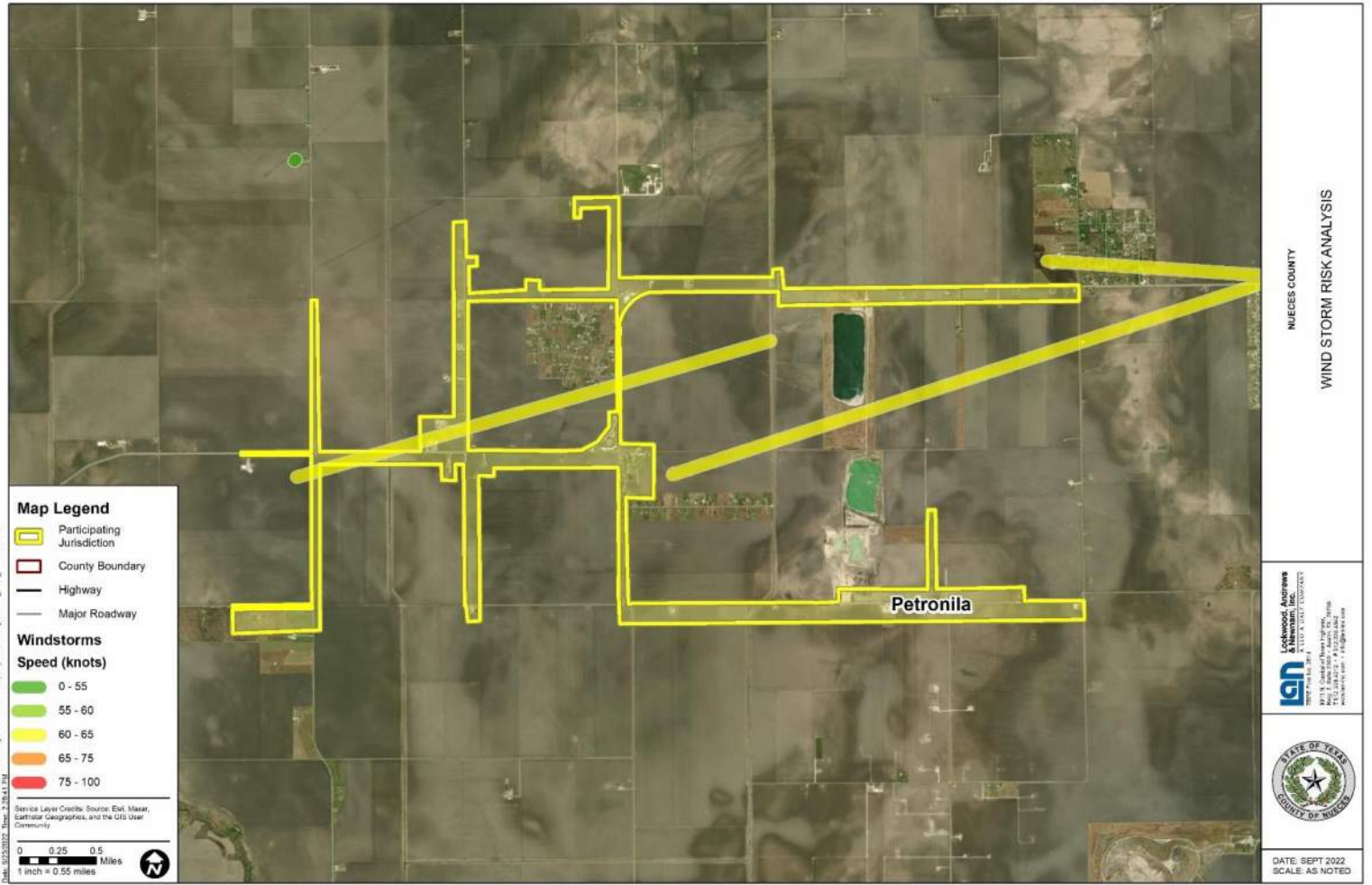
VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
87	\$9,604,492	\$5,643,701	883

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-9. Map of City of Petronila Windstorm Events



City of Port Aransas Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Seaward

Number of Events	Magnitude (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
9	0	6	0	1	2	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
9	0	0	\$100,000	\$0

*NOAA Storm Events Database

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
9	5/10/1993 5/9/1997 6/15/1998 9/12/2003 10/25/2003 11/3/2012 6/4/2017 4/7/2019 4/29/2020	72	12.5%

VULNERABILITY			
Population (County)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
3,105	\$26,165,024,636	\$2,154,503,744	131

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-10. Map of City of Port Aransas Windstorm Events



City of Robstown Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
City Wide	Inland 1 and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
12	0	9	0	3	0	0	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
12	0	0	\$140,000	\$100,000

*NOAA Storm Events Database

PROBABILITY				
Number of Events	Record Time Period		Time Period Years	Probability
12	5/10/1993 5/30/1995 6/17/1997 6/17/1997 2/15/2003 11/15/2005	1/9/2011 5/10/2012 3/18/2016 6/5/2017 3/29/2018	72	16.6%

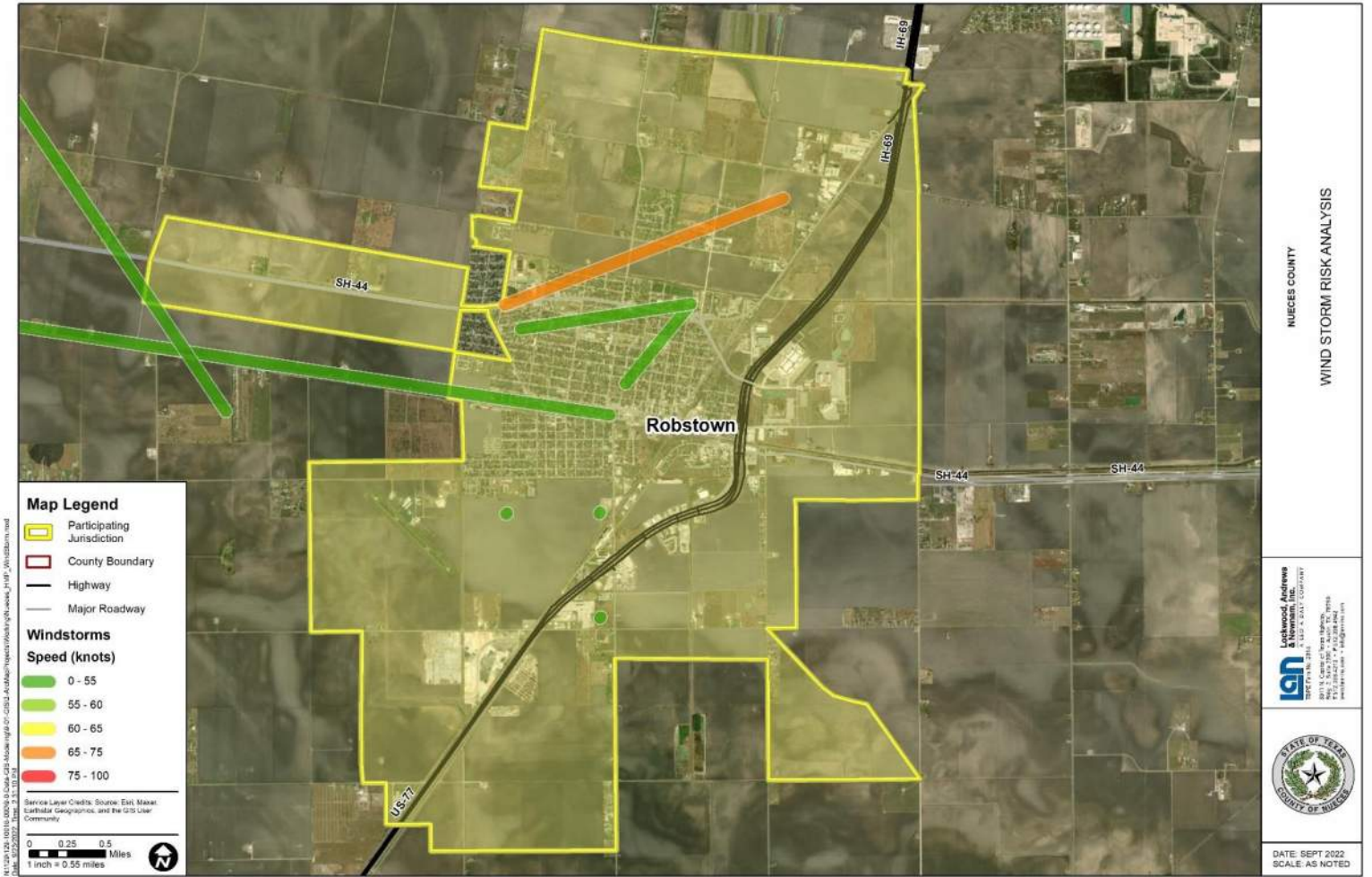
VULNERABILITY			
Population (City)*	Property Value**		Crop Land***
	Commercial	Residential	Acres
10,157	\$407,884,993	\$232,371,054	5,932

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 8-11. Map of City of Robstown Windstorm Events



Nueces County Drainage District #2 Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 1 and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
22	6	8	0	7	0	1	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
22	0	0	\$760,000	\$0

*NOAA Storm Events Database

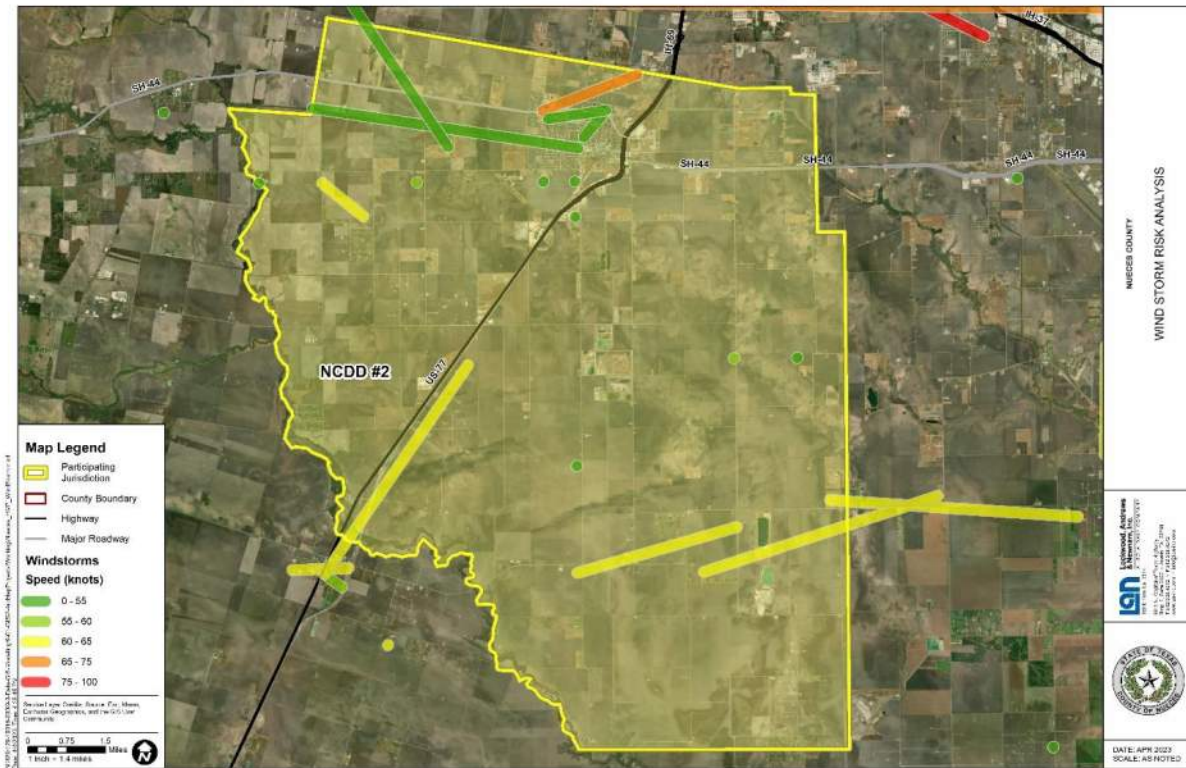
PROBABILITY					
Number of Events	Record Time Period			Time Period Years	Probability
22	10/4/1956	4/11/1995	1/9/2011	72	30.6%
	4/27/1957	5/9/1997	9/19/2011		
	5/1/1974	6/17/1997	5/10/2012		
	10/31/1981	2/24/2004	4/22/2015		
	10/7/1984	5/1/2004	3/18/2016		
	4/29/1988	5/29/2005	6/5/2017		
	4/17/1992	10/9/2009	3/28/2018		
	5/5/1993				

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 8-12. Map of Nueces County Drainage District #2 Windstorm Events



Nueces County Water Control and Improvement District #3 Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 1 and Inland 2

Number of Events	Extent (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
6	0	3	0	1	0	2	0

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
6	0	0	\$1,586,000	\$100,000

*NOAA Storm Events Database

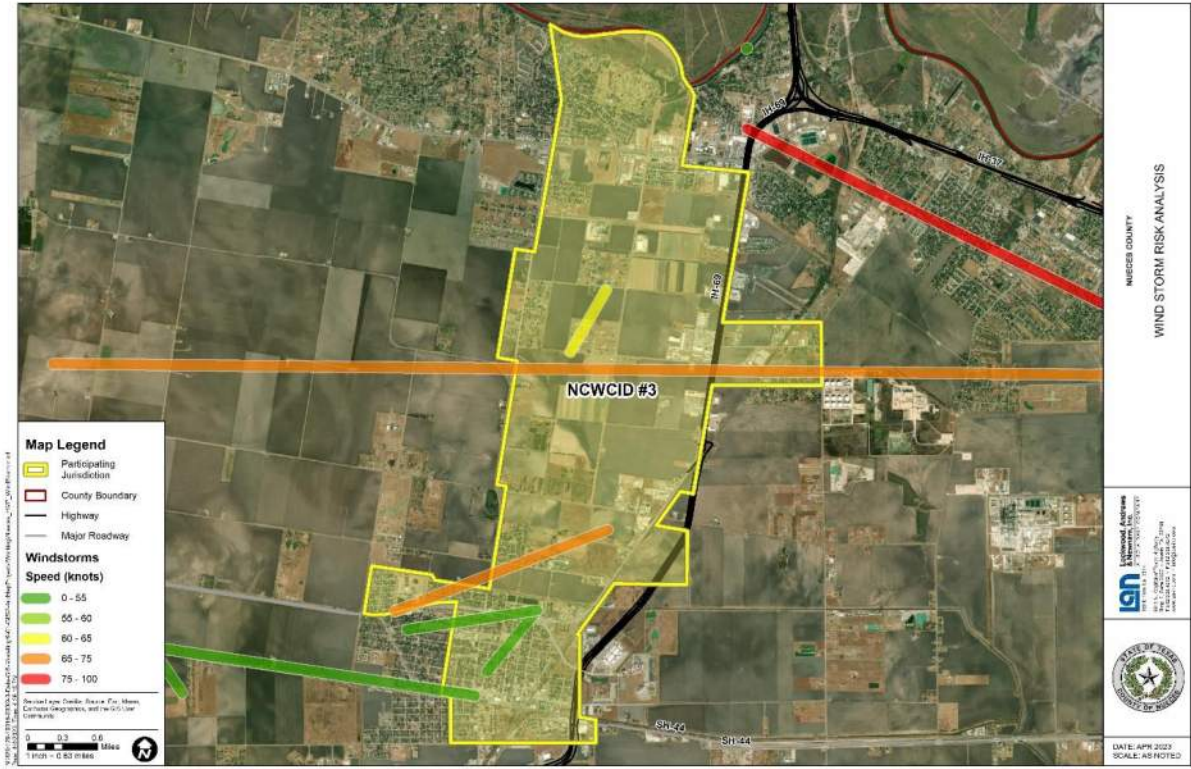
PROBABILITY				
Number of Events	Record Time Period		Time Period Years	Probability
6	10/9/2009 1/9/2011 5/10/2012	5/10/2012 3/28/2018 8/18/2020	72	8.3%

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$4,719,980	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

**Figure 8-13. Map of Nueces County Water Control and Improvement District #3
Windstorm Events**



Nueces County Water Control and Improvement District #4 Windstorms Hazard

LOCATION	
Area at Risk	Designated Catastrophe Area
District Wide	Inland 1 and Seaward

Number of Events	Magnitude (Wind Speed in Knots)						
	Unknown	50-54	55-59	60-64	65-69	70-74	75+
15	1	5	1	5	2	0	1

IMPACT*				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
15	0	0	\$110,000	\$0

*NOAA Storm Events Database

PROBABILITY					
Number of Events	Record Time Period			Time Period Years	Probability
15	5/11/1968	8/21/1986	3/26/2003	72	12.5%
	11/26/1969	4/29/1988	9/12/2003		
	9/1/1970	5/10/1993	6/5/2007		
	8/5/1975	11/24/1996	3/19/2016		
	8/10/1980	2/12/1998	4/14/2018		

VULNERABILITY		
Population Served**	Infrastructure*	
6,281	\$21,097,000	
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 8-14. Map of Nueces County Water Control and Improvement District #4 Windstorm Events



Section 9: Extreme Heat

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Extreme Heat Hazard Overview

Description

Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. If extreme heat conditions persist, it may be considered a heat wave.

Location

Climate and weather are major drivers of extreme heat. The spatial and temporal ranges at which these forces operate are relatively large scale, putting the entire planning area in risk.

A phenomenon known as heat islanding may mean that urban areas are at slightly higher risk than nearby rural areas. Man-made surfaces such as concrete and asphalt absorb thermal energy from the sun during the day. During nighttime, this thermal energy is released. This cyclical process ensures that ambient temperature remains high through the city. The heat islanding effect may cause temperatures to be up to 10 degrees higher in urban areas than in surrounding rural areas.

Location Variability

Extreme Heat is a widespread affecting hazard and impact all jurisdictions with very minimal variance in magnitude due to the proximity of all jurisdictions. Extreme Heat Hazards impacting Nueces County are not expected to affect participating jurisdictions differently.

Extent

Extreme heat is most dangerous in the summer months. Extreme heat is not just a factor of temperature; humidity plays a role as well. An extreme heat event may occur with air temperature as low as 80°F if the relative humidity is over 40%. An 80°F temperature seems low, particularly for Texas in the summer, so people may not be aware of the risk to extreme heat and therefore may not adequately prepared for the effects of extreme heat. Citizens of the planning area, particularly populations vulnerable to extreme heat, should avoid prolonged heat exposure.

Table 9-1. NOAA’s National Weather Service Heat Index, Temperature (F°)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 Extreme Danger

As shown in Table 9-1, The National Oceanic and Atmospheric Administration’s (NOAA) National Weather Service Heat Index shows how humidity and temperature interact to endanger people who are engaged in strenuous activity or are exposed to the environment without any protection. It should be noted that these risks exist even if the area is not currently experiencing conditions that qualify as an extreme heat event. The normal high temperatures may be enough to endanger human health.

The previous maximum temperatures per jurisdiction, as shown in Table 9-2, have been recorded at or above 109°F. At a relative humidity of 40% and above, these temperatures correspond to a heat index exceeding 137°F. Prolonged exposure to, or strenuous activity in, these conditions is extremely dangerous. These conditions are the worst that may be expected in the foreseeable future.

Table 9-2. Previous maximum temperatures per Jurisdiction

Jurisdiction	Date	Temperature	Heat Index
Unincorporated Nueces County	September 2000	109°	137°+
Agua Dulce	September 2000	109°	137°+
Bishop	September 2000	109°	137°+
Banquete ISD	September 2000	109°	137°+
Corpus Christi	September 2000	109°	137°+
Driscoll	September 2000	109°	137°+
Petronila	September 2000	109°	137°+
Port Aransas	September 2000	109°	137°+
Robstown	August 1983	113°	137°+

Occurrences

Extreme heat events typically occur in summer months during periods of high heat and high humidity. According to the National Climatic Data Center (NCDC)¹, six extreme heat events took place in Nueces County from 2000 to 2021, as shown in Table 9-3. All events are recorded at the county level, though comments may reflect noteworthy events at the municipal level.

Table 9-3. Previous Recorded Occurrences of Extreme Heat

Date	Comments
8/31/2000	Corpus Christi International Airport reported a high of 103 degrees, tying the record high temperature for August.
9/1/2000 to 9/5/2000	Corpus Christi reached an all-time high temperature of 109 degrees on 9/5/2000. This date may be the overall hottest day on record in South Texas. Other jurisdictions in South Texas reported all-time highs on the day.
5/10/2006	For a period of about five hours, temperatures climbed into the low-100s ahead of a cold front.
8/1/2011	Temperatures in Nueces County ranged from 100 – 108 degrees. Heat index values were around 110 degrees. The conditions led to the death of a homeless man in Corpus Christi due to dehydration and heat stroke.

¹NCDC Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

9/8/2015	Temperatures were around 90 degrees with a 100-degree heat index. In Corpus Christi, a four-month-old boy was found dead inside a car after about 40 minutes. ²
6/21/2021	Excessive heat occurred over the area during the afternoon of the 21st. Heat index values ranged from 115 to 120 degrees with temperatures in the mid to upper 90s.

The state of Texas is generally very hot in the summer. From 1999 – 2021, 261 heat-related deaths were reported by the NCDC in the state of Texas. Remarkably, forty-seven of the heat-related deaths occurred during the evacuation of Hurricane Rita.

Probability

The six historical heat events reported by NCDC from 2000 to 2021 suggest that the planning area and all participating jurisdictions can expect a 28.6% annual occurrence of extreme heat events. The expected reoccurrence interval of extreme heat events is about 3.5 years. Extreme heat events are expected to take place in summer months based on previous occurrences, which were reported in the months of May through September.

Probabilities of future extreme heat events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change, so too will the locations, frequencies, and range of anticipated intensities of extreme heat events. Over the past decade, daily record high temperatures have occurred twice as often as record lows across the continental United States. Heat waves are becoming more common. Heat waves are more dangerous when combined with high humidity. The combination of temperature and humidity is measured by the heat index. The annual number of days with a heat index above 100°F is currently projected to double, and days with a heat index above 105 degrees F is projected to triple, nationwide.

Impact

The risks associated with extreme heat tend to most greatly impact humans. Buildings are not likely to be damaged by extreme heat. The populations most at risk are children, the elderly, those in poor health, and those who spend large portions of their time outside. According to the latest compiled study on heat related deaths by the National Center for Environmental Health, from 1999-2009, the most recent years for which a report of this nature has been compiled, extreme heat exposure led to 7,233 deaths in the United States. The victims of extreme heat tended to be male (69%) and over the age of 65 (39%). The overwhelming majority of deaths (94%) occurred in the summer months of May to September.

²<http://www.mysanantonio.com/news/local/crime/article/Corpus-Christi-father-indicted-arrested-for-6948457.php>

Extreme heat can impact agricultural industries in the form of crop or livestock losses. Extreme heat may cause economic impacts related to damage crops and grazing lands caused by reduced productivity of workers.

Vulnerability

Due to the uniformity of extreme heat events across the planning area, jurisdictional variations in vulnerability provide the most informative perspective from which to examine differences in extreme heat within the planning area. Males and those over the age of 65 tend to be the populations most vulnerable to extreme heat hazards. Demographic information regarding these populations is shown below in the jurisdictional tables. Agricultural assets are also vulnerable to extreme heat. Livestock and crops can be damaged or killed by extreme heat. Information regarding the vulnerability of agricultural assets is also shown in the jurisdictional tables.

Unincorporated Nueces County Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
County Wide (Unincorporated)	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
353,079	175,480	54,021	26,848

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
280,817	84.38%	\$122,134,449

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Agua Dulce Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
688	325	91	39

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
2.45	1.81%	\$1,066

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

Banquete ISD Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
District Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
3,862	1,958	850	295

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
61,968	79.31%	\$26,951,458

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Bishop Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
3,155	1540	410	128

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
232	18.60%	\$100,903

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Corpus Christi Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
317,773	156,026	39,721	17,163

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
21,392	24.35%	\$9,303,924

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Driscoll Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
673	304	122	51

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
438	68.54%	\$190,497

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Petronila Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
87	52	15	11

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
108	88.52%	\$46,972

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Port Aransas Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 109°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
3,105	1,534	519	235

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
859	13.36%	\$373,601

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

City of Robstown Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
City Wide	Up to 113°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

VULNERABILITY			
Total Population*	Male Population	Total Population Over 65	Male Population Over 65
10,157	4,561	2,337	958

Agricultural Area (Acres)**	Agricultural Area (Percentage of Jurisdiction)	Agricultural Value***
4,413	48.78%	\$1,919,326

* Census Bureau Population Estimate 2021

** USDA Crop Land and National Land Cover Dataset, 2021

***USDA Nueces County Census of Agriculture, 2017

Nueces County Drainage District #2 Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
District Wide	Up to 113°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

IMPACT & VULNERABILITY	
Extreme heat may place additional strain on employees, facilities, and assets of the drainage district.	
Population Served**	Infrastructure*
20,468	\$2,256,741

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #3 Extreme Heat Hazard

LOCATION	EXTENT FOR MITIGATION (Next Five Years, based on historical data)
District Wide	Up to 113°, Up to 137+° Heat Index

PROBABILITY	
Annual Probability	Return Interval
28.6%	One heat event every 3.5 years

IMPACT & VULNERABILITY	
Extreme heat may place additional strain on employees, facilities, and assets of the water control and improvement district.	
Population Served**	Infrastructure*
18,799	\$4,719,980

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #4 Extreme Heat Hazard

LOCATION		EXTENT FOR MITIGATION (Next Five Years, based on historical data)	
District Wide		Up to 109°, Up to 137+° Heat Index	
PROBABILITY			
Annual Probability		Return Interval	
28.6%		One heat event every 3.5 years	
IMPACT & VULNERABILITY			
Extreme heat may place additional strain on employees, facilities, and assets of the water control and improvement district.			
Population Served**		Infrastructure*	
6,281		\$21,097,000	

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Section 10: Lightning

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Lightning Hazard Overview

Description

Lightning is a sudden electrostatic discharge during an electrical storm between electrically charged regions of a cloud, between that cloud and another cloud, or between a cloud and the ground.

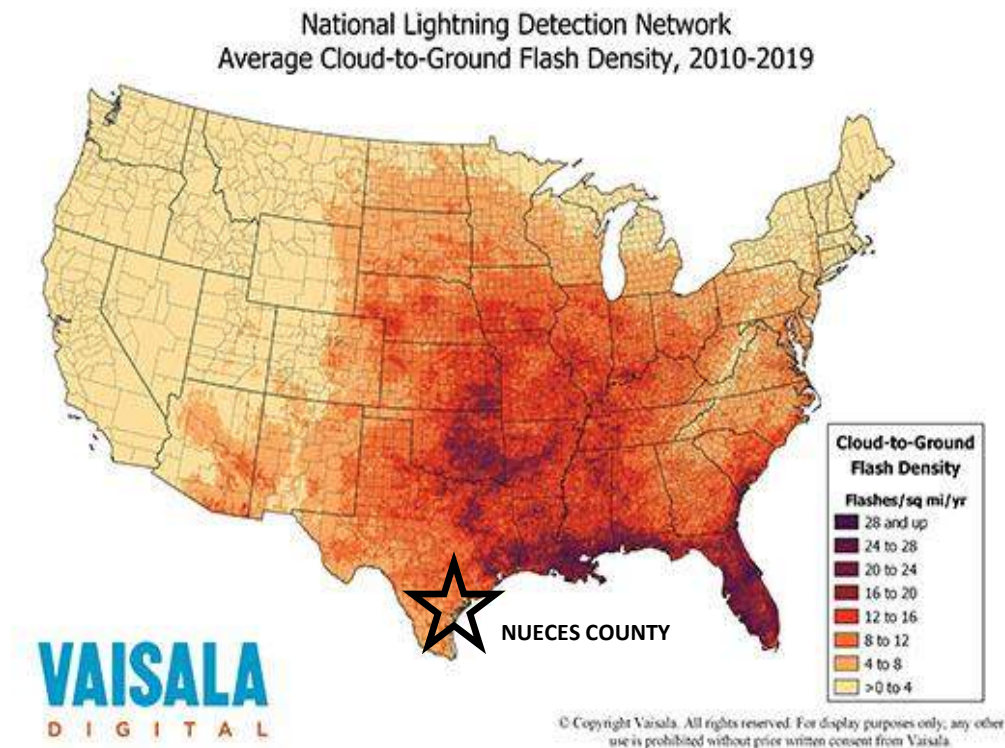
Location

Worldwide, there is predictable spatial variation in the frequency of lightning strikes. This spatial variation is shown nationally in Figure 10-1. However, when examining lightning activity at smaller scales, such as the county or community level, the distribution of lightning events is evenly distributed. Lightning does not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the county planning area including all participating jurisdictions are uniformly exposed to lightning activity.

Location Variability

Lightning Hazards are a widespread affecting hazard and impact all jurisdictions with very minimal variance in magnitude due to the proximity of all jurisdictions. Lightning impacts the entire planning area equally.

Figure 10-1. National Average Cloud-to-Ground Flash Density (2010-2019)



Extent

Lightning extents can be described in terms of the frequency of lightning strikes within a time frame. Lightning Activity Levels (LAL) is one of the metrics used to describe lightning extent. Table 10-1 describes the storm activity and strikes-per-minute associated with the six different Lightning Activity Levels.

Table 10-1. Lightning Activity Levels (LAL)

LAL Value	Cloud and Storm Description ¹	Strikes per 15 min
1	No thunderstorms	
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense.	>25
6	Similar to LAL 3 except thunderstorms are dry.	

All participating jurisdictions are vulnerable to LAL5. The worst lightning extent the planning area and all participating jurisdictions can expect to experience is LAL5.

Occurrence

NCDC records from 2000 – 2021 show eleven records of lightning strikes within the planning area. These events were the cause of four injuries, and one death. In one instance, three golfers were nearly struck and left with minor injuries. The fourth injury case was that of a 14-year-old girl whose umbrella was struck. She was left with minor injuries. A lightning strike in Port Aransas resulted in the death of a 63-year-old beach goer. Six of these events recorded property damage, with a total of \$1,235,000 in damage.

Lightning occurrences are discussed in greater detail in the jurisdictional tables.

Probability

The probability of a lightning strike is calculated by dividing the number of events by the number of years for which records exist. For jurisdictions without records, a probability of 1% will be applied. Because lightning is assumed to take place uniformly within the

¹ From <http://www.prh.noaa.gov/hnl/pages/LAL.php>

planning area, it is assumed that the probability of a lightning strike is similar for other jurisdictions in the planning area.

Probabilities of future lightning events may also be subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change, the locations and frequencies of lightning strikes may also change.

Impact

Each individual lightning strike has a very small spatial extent. Only the facilities hit by lightning are expected to be damaged. Facility shutdowns are expected to be less than 24 hours. Deaths are possible, but rare. In 21 years of records from the National Climatic Data Center (NCDC), only one lightning death was recorded. Injuries to lightning are also rare. One of the lightning strikes in Corpus Christi in NCDC records was a lightning strike on an occupied truck. The person inside the vehicle was not killed or injured. Another one of the NCDC in Corpus Christi involved three people who were nearly struck by lightning while playing golf. The record indicates that even though they were very close to the lightning strike, “[injuries] were very minor.”

The downstream impacts of a lightning strike have the potential to be damaging. Lightning strikes have the potential to spark wildfires, cause explosions or fires if they hit combustible materials, or damage power infrastructure. Lightning impacts are provided for each jurisdiction as a function of the potential future losses including commercial property value and agricultural value. Commercial property value for each jurisdiction was compiled from the Nueces County Appraisal Role. Agricultural value for each jurisdiction is a function of the total agricultural lands shown in the 2021 USDA Crop Land and National Land Cover Database divided by the total agricultural land for the county and multiplied by the total market value of agricultural products sold for Nueces County from the 2017 Agricultural Census, the most recent available.

Vulnerability

The vulnerabilities to lightning come in the form of assets that may be damaged by a strike or in the form of agricultural land that would be vulnerable to lightning-started wildfires. Communities with higher concentrations of commercial buildings may be more vulnerable to lightning strikes. Commercial buildings are often taller than residential buildings, particularly single-family residential buildings, and may be at greater risk of lightning strikes.

Unincorporated Nueces County Lightning Hazard

NCDC Record	
8/31/2007 - Lightning struck a tank battery in an open field just off F.M. 70 and C.R. 63, causing a small explosion and fire. Roughly 150 barrels of oil were spilled from the tank battery.	

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
1	0 deaths, 0 injuries	\$15,000

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
5% annual chance	1 lightning event every 20 years

IMPACT	
Commercial Property Value**	Agricultural Value****
\$968,938,581	\$122,134,449

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
943	280,817	84.38%

*NCDC Records, No reported deaths, or injuries

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Agua Dulce Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance*	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT	
Commercial Property Value **	Agricultural Value****
\$15,251,504	\$1,066

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
71	2.45	1.81%

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Banquete ISD Lightning Hazard

NCDC Record		
5/13/2015 - Lightning struck an oil tank causing an explosion and fire. The tank was near Farm to Market Road 666 and County Road 83 north of Banquete.		
OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
1	0 deaths, 0 injuries*	\$50,000
PROBABILITY		
Future Lightning Event Likelihood	1 Lightning Event X Years	
5% Annual Chance*	1 lightning event every 20 years	
IMPACT		
Commercial Property Value **	Agricultural Value****	
\$102,846,088	\$26,951,458	
VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
104	61,968	79.31%

*NCDC Records, No reported deaths, or injuries

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Bishop Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance*	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT AND VULNERABILITY	
Commercial Property Value **	Agricultural Value****
\$123,993,966	\$100,903

IMPACT AND VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
183	232	18.60%

**Nueces County Araisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Corpus Christi Lightning Hazard

NCDC Record	
7/10/2004	Lightning nearly struck three golfers at the Corpus Christi County Club. All three were knocked to the ground and one blacked out. Injuries were very minor.
9/11/2005	Lightning struck a 14-year-old girl carrying an umbrella in Flour Bluff. The girl suffered minor injuries to her hand, ringing in her ears, and a headache.
6/1/2006	Lightning struck a waste oil tank at the Valero Bill Greehey Refinery. The lightning strike resulted in a fire and oil spill. Valero estimated roughly 63,000 gallons of an oil water mix spilled into the Corpus Christi Ship Channel, which was closed for several days.
6/26/2006	Lightning struck a foundation company truck on McBride Ln. One person was inside the truck at the time but was not injured.
5/27/2009	Lightning struck a house near the Kings Crossing subdivision causing significant damage.
6/2/2010	Lightning struck the Tropical Isles Apartments on Jamaica Drive causing a fire.
5/29/2017	Lightning struck a home on Citrus Valley Drive in Corpus Christi. The house caught on fire. An elderly woman had to be rescued.
5/29/2017	Lightning struck a town home on McArdle Road in Corpus Christi. The fire destroyed the town home and led to 5 additional town homes catching on fire.

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
8	0 deaths, 4 injuries	\$1,170,000

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
40% Annual Chance	1 lightning event every 2.5 years

IMPACT	
Commercial Property Value **	Agricultural Value****
\$16,744,675,468	\$9,303,924

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
12,148	21,392	24.35%

*NCDC Records

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Driscoll Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance*	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT	
Commercial Property Value **	Agricultural Value****
\$29,366,710	\$190,497

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
106	438	68.54%

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Petronila Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance*	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT	
Commercial Property Value **	Agricultural Value****
\$667,778	\$46,972

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
6	108	88.52%

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Port Aransas Lightning Hazard

Historical Record		
3/15/2009 – A 63-year-old man was struck and killed by lightning on Mustang Island Beach near Port Aransas.		
OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
1	1 death, 0 injuries	\$0
PROBABILITY		
Future Lightning Event Likelihood	1 Lightning Event X Years	
5% Annual Chance*	1 lightning event every 20 years	
IMPACT		
Commercial Property Value **	Agricultural Value****	
\$25,743,548,569	\$373,601	
VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
2,888	859	13.36%

*NCDC Records

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Robstown Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT	
Commercial Property Value **	Agricultural Value****
\$373,735,450	\$1,919,326

VULNERABILITY		
Commercial Parcels (No.)	Agricultural Area (Acres)***	Agricultural (Percent area of Jurisdiction)
813	4,413	48.78%

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Nueces County Drainage District #2 Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT & VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #3 Lightning Hazard

NCDC Record	
No NCDC Records	

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
0	0 deaths, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
1% Annual Chance	1 lightning event every 100 years*

*Based upon minimum probability of the planning area

IMPACT & VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$4,719,980	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #4 Lightning Hazard

Historical Record		
3/15/2009 – A 63-year-old man was struck and killed by lightning on Mustang Island Beach near Port Aransas.		

OCCURENCES*		
Number of Events (Range: 2000-2021)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
1	1 death, 0 injuries	\$0

PROBABILITY	
Future Lightning Event Likelihood	1 Lightning Event X Years
5% Annual Chance*	1 lightning event every 20 years

*NCDC Records

IMPACT & VULNERABILITY		
Population Served**	Infrastructure*	
6,281	\$21,097,000	
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Section 11: Coastal Erosion

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Coastal Erosion Hazard Overview

Description

Coastal erosion is the “loss of land, marshes, wetlands, beaches, or other coastal features within the coastal zone because of the actions of wind, waves, tides, storm surges, subsidence, or other forces”¹. Coastal erosion may result in the temporary redistribution of coastal sediments, or the long-term loss of coastal sediments and sediment accumulation.

The United States Geologic Survey (USGS) has identified eleven primary natural process and human activities that cause coastal land loss; these are summarized in Table 11-1. These primary causes for coastal land loss can impact the coast concurrently resulting in sever rates of erosion. Figure 11-1 illustrates how these processes jointly impact the coast.

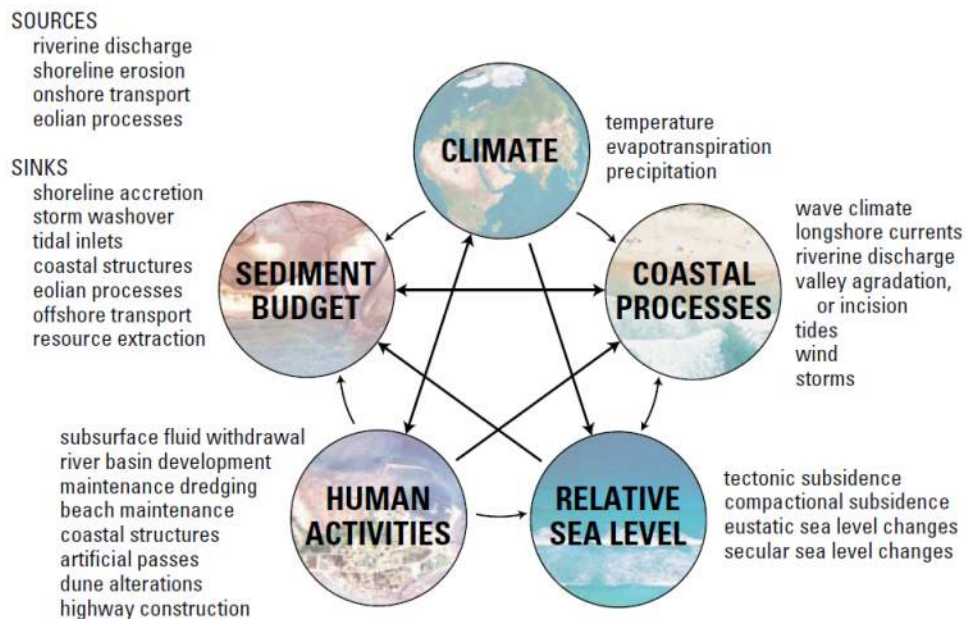
¹ Texas Natural Resources Code, Section 33.601

Table 11-1. USGS Primary Causes of Coastal Land Loss²

Primary Causes of Coastal Land Loss	
Natural Processes	
Agent	Examples
Erosion	waves and currents storms landslides
Sediment Reduction	climate change stream avulsion source depletion
Submergence	land subsidence sea-level rise
Wetland Deterioration	herbivory freezes fires saltwater intrusion
Human Activities	
Agent	Examples
Transportation	boat wakes, altered water circulation
Coastal Construction	sediment deprivation (bluff retention) coastal structures (jetties, groins, seawalls)
River Modification	control and diversion (dams, levees)
Fluid Extraction	water, oil, gas, sulfur
Climate Alteration	global warming and ocean expansion increased frequency and intensity of storms
Excavation	dredging (canal, pipelines, drainage) mineral extraction (sand, shell, heavy mins.)
Wetland Destruction	pollutant discharge traffic failed reclamation burning

² Source: <https://pubs.usgs.gov/of/2003/of03-337/landloss.pdf>

Figure 11-1. USGS Interacting Factors That Influence Coastal Land Loss³



Location

According to Shoreline Movement and Beach and Dune Volumetrics along the Texas Gulf Coast, 1930s to 2019 by Paine et al⁴, the majority of Nueces County is located in the Middle Texas Coast, with the bottom of the county located in the Lower Texas Coast, as shown in Figures 11-2 and 11-3. Nueces County is one of five counties located in Texas’ Coastal Region IV. The Texas General Land Office defines five regions of the Texas coast in their Texas Coastwide Erosion Response Plan 2013 update, which is the most recent available⁵. An update to the Texas Coastwide Erosion Response Plan was projected to be completed in December of 2018, but according to the Texas General Land Office it has yet to be completed.⁶ Coastal erosion in Nueces County impacts the gulf-facing shoreline, Laguna, bays, islands, navigable waterways, channels, harbors, and marinas. The primary impact along the gulf-facing shoreline is erosion which then contributes to deposition within adjacent waterways and channels as sediment is redistributed by wave and tidal currents.

³ Source: <https://pubs.usgs.gov/of/2003/of03-337/landloss.pdf>

⁴ Paine, J. G., Caudle, T., and Andrews, J. R., 2021, Shoreline movement and beach and dune volumetrics along the Texas Gulf Coast, 1930s to 2019: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the General Land Office under contract no. 16-201-000, 101 p.

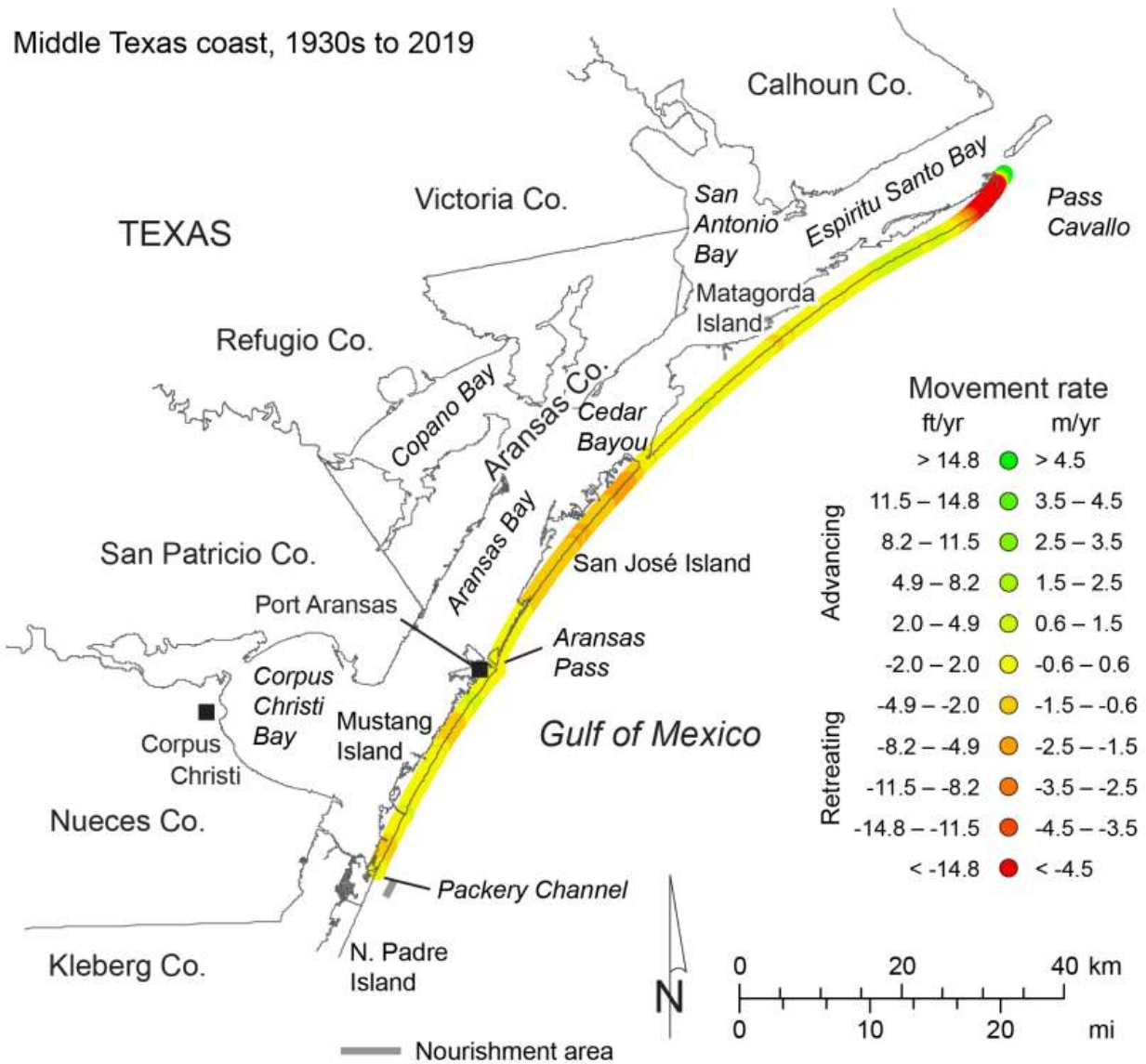
<https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project>

⁵ <http://www.glo.texas.gov/coast/coastal-management/forms/files/coastwide-erosion-response-plan.pdf>

⁶ <https://www.glo.texas.gov/coastal-grants/projects/1659-coastwide-erosion-response-plan-update-2018.html>

Figure 11-2. Middle Texas Coast – Critical Erosion Area⁷

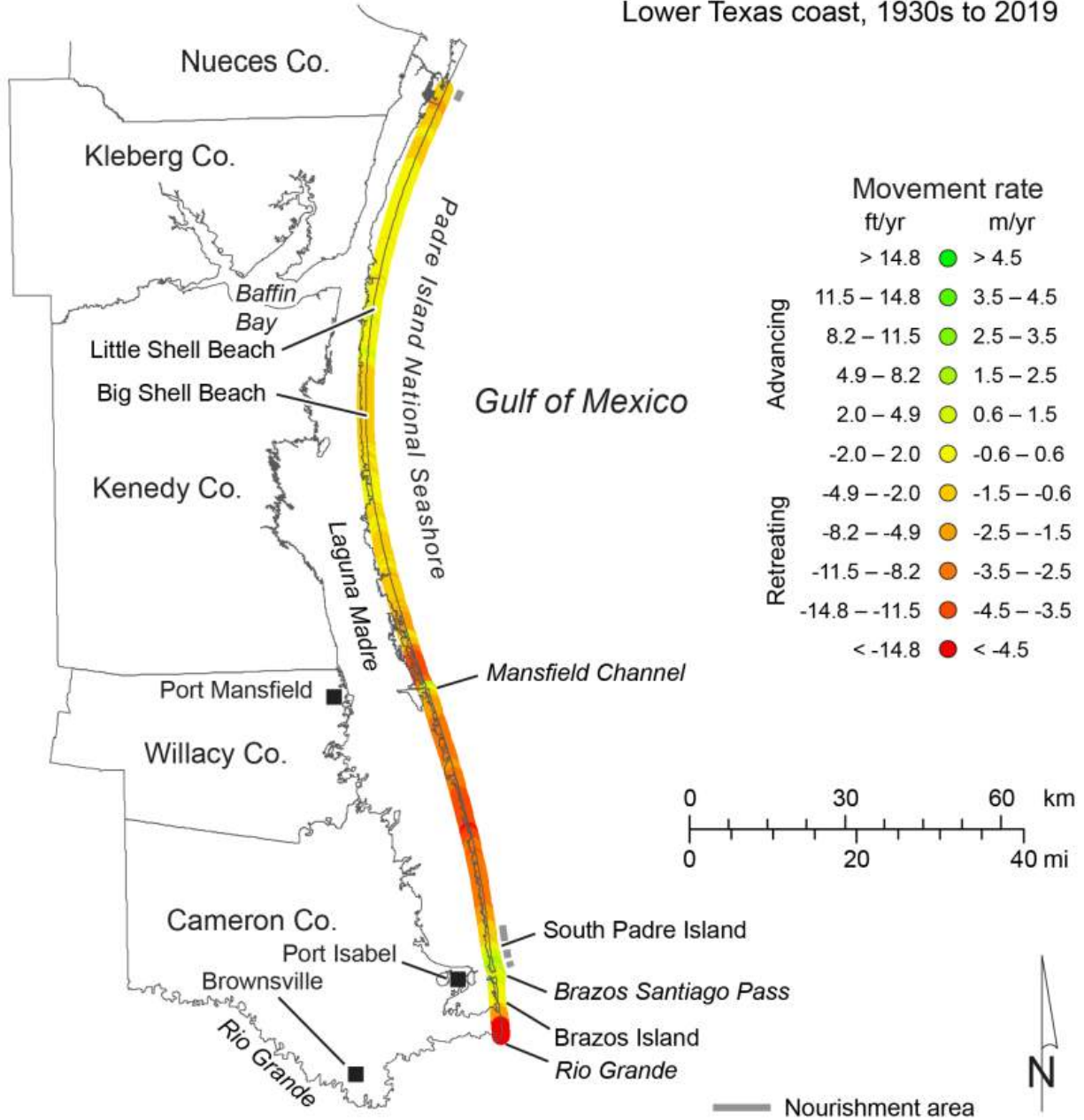
Middle Texas coast, 1930s to 2019



⁷ Paine, J. G., Caudle, T., and Andrews, J. R., 2021, Shoreline movement and beach and dune volumetrics along the Texas Gulf Coast, 1930s to 2019: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the General Land Office under contract no. 16-201-000, 101 p. <https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project>

Figure 11-3. Lower Texas Coast – Critical Erosion Area⁸

Lower Texas coast, 1930s to 2019



⁸ Paine, J. G., Caudle, T., and Andrews, J. R., 2021, Shoreline movement and beach and dune volumetrics along the Texas Gulf Coast, 1930s to 2019: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the General Land Office under contract no. 16-201-000, 101 p. <https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project>

Location Variability

Coastal Erosion Hazards are unique in comparison to hazards that affect the overall planning area due to the geographic variation of jurisdictions and if the jurisdictions consist of shoreline, lagoon, bays, islands, navigable waterways, channels, harbors, and/or marinas. In addition, changes in future tide conditions, average climate, and average temperatures can exacerbate coastal erosion for vulnerable jurisdictions. Variability of the impact of coastal erosion hazards can be seen in Figures 11-5 and 11-7 to 11-12.

Extent

Coastal Erosion extent can be measured in feet per year and is driven by various factors: waves, sediment deposition, sea level rise, storm events, and human interference. Figure 11-2 through Figure 11-8 illustrates the extent of coastal erosion impacting the planning area along with examples of factors that drive coastal erosion.

Table 11-2. Port of Corpus Christi – Ship Channel Distance¹³

FROM	TO	Nautical Miles
Station 210+00 In Gulf of Mexico	Port Aransas Inner Basin	3.9
	La Quinta Junction	12.5
	Harbor Bridge	22.1
	Bulk Terminal	25.5
	West End - Inner Harbor	29.4
	West End - La Quinta Channel	18.4
La Quinta Junction	La Quinta Terminal	5.3
	End of La Quinta Channel	5.9
	Harbor Bridge	9.6
Harbor Bridge	Bulk Terminal	3.4
	West End - Inner Harbor	7.5
TOTAL		143.5

There are numerous named and unnamed small watercraft canal and channel systems located, primarily, along the backside of the barrier islands. A sampling of the named channels include Mustang Beach Channel, Water Exchange Channel (aka, Fish Pass), Humble Channel, Sinclair Cut, Morris & Cummings Cut, Wilsons Cut, and Atlantic. Unnamed channels include public and private canals for residential and commercial access and development.

Harbors and Marinas

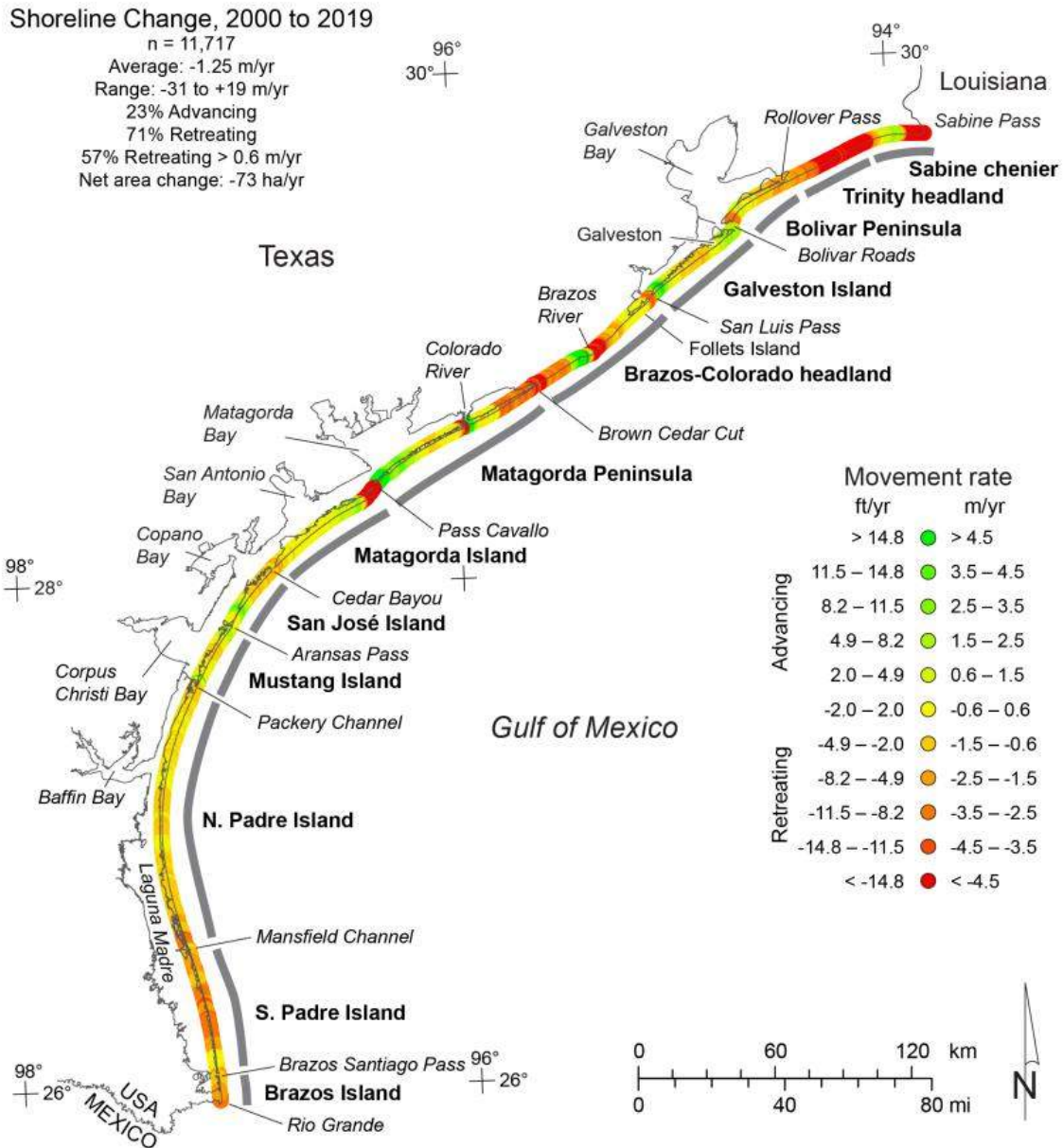
Also located within Nueces County are various harbors and marinas that are also affected by coastal erosion. A sampling of the major harbors and marinas include Conn Brown Harbor, Port Ingleside, Viola Turning Basin, Dennis Dryer Municipal Harbor, Island Moorings Marina, and Corpus Christi Marina. The Coastal Erosion Planning & Response Act (2020-2021 Report) identifies the most recent critical erosion areas for the Nueces County Gulf shoreline. Critical coastal erosion areas are coastal eroding areas where "the rate of shoreline retreat is greater than two feet per year."¹⁴

Figure 11-4, an excerpt from BEG Coastal Studies, 2021, illustrates the changing rate of the Gulf Coast shoreline.

¹³ Source: <http://portofcc.com/wp-content/uploads/Rodman-Bay-Map.pdf>

¹⁴ Coastal Erosion Planning & Response Act (2020-2021 Report): <https://www.glo.texas.gov/coast/coastal-management/forms/files/cepra-report-2017.pdf>

Figure 11-5. Gulf Coast Shoreline Change Rate¹⁵



The shorelines along Nueces County’s bays experience similar rates of erosion. For example, North Beach in Corpus Christi Bay has a history of beach erosion requiring periodic restoration with the most recent occurring in 2001, 2003, and 2016¹⁶ as well as an ongoing effort with FEMA funding dating back to 2017.

¹⁵ Paine, J. G., Caudle, T., and Andrews, J. R., 2021, Shoreline movement and beach and dune volumetrics along the Texas Gulf Coast, 1930s to 2019: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the General Land Office under contract no. 16-201-000, 101 p.
<https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project>

¹⁶ Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi

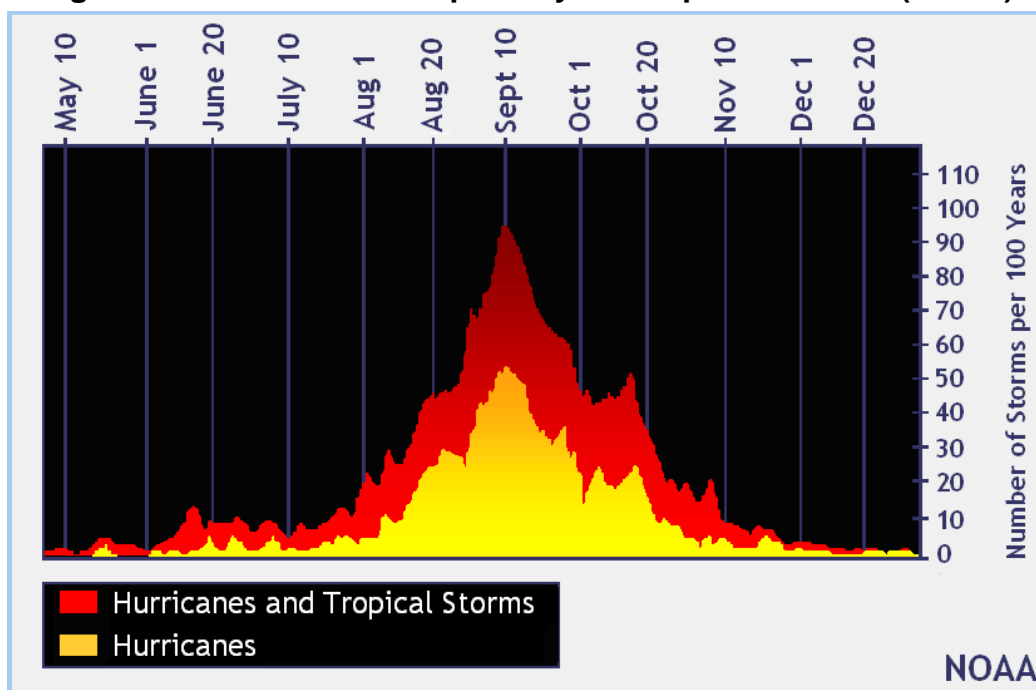
Occurrences

Coastal erosion is sporadic and episodic, occurring over short and long-term periods and at different rates along the coastline. Coastal erosion is most apparent over a short period due to sporadic and accelerated rates of erosion caused by extreme weather events such as hurricanes and other major storm events. Long-term erosion is less apparent due to slower rates of erosion due to seasonal changes such as El Nino events, rising sea levels, and other long-term human activities and natural processes such as climate changes.

Short-Term

The most significant cause of short-term coastal erosion is the effect of tropical storms and hurricanes. Storms and hurricanes that enter the Gulf of Mexico cause coastal erosion within Nueces County regardless of the location that the storm makes landfall. Tropical storms and hurricanes within the Gulf cause increased winds and tidal forces that can extend hundreds of miles from the center of the storm.

Figure 11-6. Number of Tropical Cyclones per 100 Years (NOAA)



The BEG Coastal Studies (2021) also addressed short-term coastal erosion indicating that for the period of time from 2000 to 2019 the coastal erosion rate for the Gulf shoreline along Nueces County varied from more than 4 foot/year of erosion to more than 23 foot/year of accretion (Figure 11-5). These areas of significant accretion occur primarily near jetties and similar structures.

A comparison of the coastal erosion rates based on 2021 Texas BEG data indicates that 6.5 miles of the 21 miles of Nueces County's Gulf-facing shoreline is classified as critical

erosion (i.e., greater than -2 feet/year). This accounts for approximately 2.5% of the State total, or 31% of Nueces County's total Gulf-facing shoreline.

The bay shorelines also experienced similar short-term erosion. For example, North Beach located in Corpus Christi Bay had an average erosion rate of -2.6 foot/year along the entire beach with a high of -6 foot/year at the southern end¹⁷. The most recent surveys between 2007 and 2012 indicate that approximately 61% of North Beach in Corpus Christi Bay is eroding, 18% is in transition, and 21% is accreting (Figure 11-6).

Figure 11-7. North Beach Erosion Rates 2007 to 2012¹⁸



¹⁷ Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi, 2012 (Latest Data)

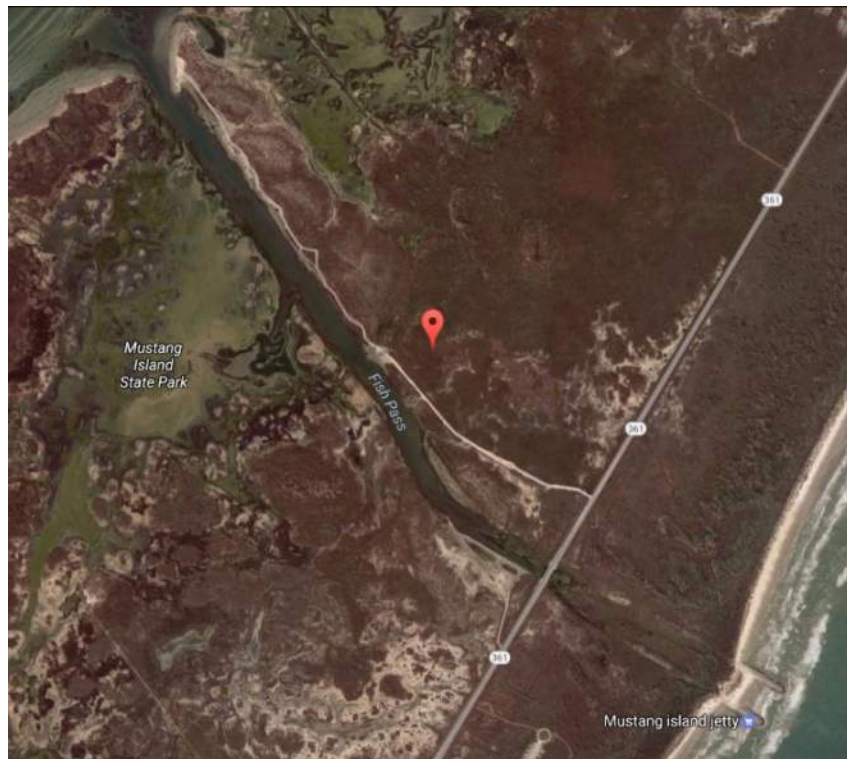
¹⁸ Conrad Blucher Institute for Surveying and Science, Texas A&M University – Corpus Christi, 2012 (Latest Data)

Long-Term

Long-term Gulf-facing shoreline erosion rate for the beaches of Nueces County has had an average rate of -1.13 feet/year for the last 89 years at¹⁹. An analysis of the Gulf-facing shoreline erosion rates also indicates that 76%, or approximately 16 miles, of the Gulf-facing shoreline within Nueces County is eroding compared to the State average of 64%, but that the mean erosion rate for Nueces County was -1.13 feet/year which was about a fifth of the State mean of -5.9 feet/year.

Coastal erosion also results in sediment accretion into natural and manmade waterways. One example of this can be seen in 2017 aerial imagery of Fish Pass on Mustang Island which is completely blocked from sediment accretion between State Hwy 361 and the jetties at the Gulf-facing shoreline (see Figure 11-7).

Figure 11-8. Sediment Accretion of Fish Pass on Mustang Island²⁰



Probability

Coastal erosion is a continual process with erosion rates that vary over time. As stated above, the most significant cause of short-term coastal erosion is the effect of tropical storms and hurricanes. The annual probability of the occurrence of tropical storms and hurricane for the county and each participating jurisdiction is summarized in Section 6 of

¹⁹ Bureau of Economic Geology, 2021

²⁰ Fish Pass on Mustang Island, Google Earth, 2017

this plan. However, because any tropical storm or hurricane that enters the Gulf has an impact on coastal erosion for the entirety of the Gulf Coast the more representative probability for reoccurrence is summarized in the CEPRA 2015 report which indicates that three hurricanes impact the Texas Gulf Coast every four years.

The Bureau of Economic Geology at the University of Texas at Austin measured coastal shoreline erosion as a historical shoreline change rate based on averages over an 89-year period from 1930 to 2019. The results of this assessment indicate that Nueces County's Gulf-facing shoreline is experiencing a mean erosion rate of -1.13 feet/year.

Probabilities of future coastal erosion events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns, average temperatures, and sea levels change, so too will the locations, frequencies, and range of anticipated intensities of coastal erosion. Events associated with climate change, such as rising sea levels and increases in storm frequency and intensity, are directly related to increases in coastal erosion.

Impact

Coastal erosion results in the loss of agricultural, industrial, maritime shipping, commercial and recreational boating, residential land, public parks, wetlands, and critical infrastructure. These impacts are experienced directly by the jurisdictions that border the Gulf. These coastal jurisdictions include Unincorporated Nueces County, the City of Corpus Christi, and the City of Port Aransas. Impacts on the remaining jurisdictions are indirect. The Texas GLO's Texas Coastal Resiliency Master Plan, dated March 2017, includes the following statement concerning impacts by coastal erosion, "if left unaddressed, will continue to have adverse impacts on infrastructure, natural resources, economic activities, and the health and safety of residents."

A healthy beach and dune system can reduce damage to property and critical infrastructure by absorbing some of the energy from storm surges and waves. Beach and dune restoration projects to repair damage caused by coastal erosion are a continual economic burden for the coastal jurisdictions. Additionally, loss of coastal property and beaches may reduce property values and reduce tourism along the coast.

Navigable waterways and small watercraft canal and channel systems, including the Gulf Intracoastal Waterway (GIWW), are impacted by sediment accretion. Dredging of major and minor channels to remove excess sediment to restore access for commercial and private ships is a constant economic strain on the coastal jurisdictions. Coastal erosion and accretion have a notable impact on the ports, coastal petrochemical facilities, road infrastructure, and commercial businesses.

The inland jurisdictions, those that do not border the Gulf, may not be impacted directly by coastal erosion but they do experience indirect impacts. Indirect impacts include the economic impact of addressing coastal erosion issues. These costs are redistributed to the community through higher taxes, and increased cost of goods and services. Additionally, inland jurisdictions may rely on the coast for the opportunity of participating in and benefiting from the tourist industry which is directly impacted by the health of the beaches and dune systems.

Examples of the costs associated with the maintenance and restoration efforts needed to address coastal erosion are shown in Table 11-3. This is the list of coastal restoration projects identified by the Coastal Erosion Planning and Response Act (CEPRA) 2015 Report. The 2020-2021 CEPRA lists two projects within Nueces County. The purpose of both projects is to protect the shoreline of Rookery Island, and their summed shares funded by CEPRA equal \$542,000. The Gulf of Mexico Energy Security Act (GOMESA) provided these two projects a total of \$3,443,110 in funds. Thus, these two projects alone demonstrate a need of \$3,400,443 in funding other than that provided by CEPRA and GOMESA.

Table 11-3. Nueces County 2015 CEPRA Funded Coastal Erosion Projects

No.	Project Name	Cost		CEPRA Cycle	Fiscal Year
		Funded	Un-Funded		
1	Mustang & NPI Beach Maintenance Impacts & Best Practices	\$ 100,000	na	8	2014-2015
2	Nueces River Delta Stabilization & Habitat Protection	\$ 322,500	na		
3	McGee Beach Nourishment	\$ 269,000	na		
4	Shamrock Island Habitat Protection & Enhancement Phase 2	na	\$ 1,856,800		
5	Cole Park Shoreline Protection	na	\$ 2,000,000		
6	Indian Point Shoreline Stabilization & Habitat Protection	\$ 750,000	na	7	2012-2013
7	Nueces Bay Portland Causway March Restoration	\$ 2,914,000	na		
8	Nueces River Delta Stabilization & Habitat Protection	\$ 187,500	na		
9	Corpus Christi Beach Nourishment	\$ 2,340,000	na		
Total		\$ 6,883,000	\$ 3,856,800		
		\$ 10,739,800			

Source: CEPRA 2015 report (<http://www.glo.texas.gov/coast/coastal-management/forms/files/CEPRA-Report-2015.pdf>)

Vulnerability

Private and public lands, infrastructure, and industry along the coast are directly vulnerable to the impacts of coastal erosion. The navigable waterways and small watercraft canal and channel systems, including the Gulf Intracoastal Waterway (GIWW), are directly vulnerable to the impacts of coastal erosion and accretion. The Texas GLO's Coastal Resiliency Master Plan identified key issues and proposed solutions to address Nueces County's vulnerability to coastal erosion. The resultant list of projects with associated costs are summarized in Table 11-4 and are shown in Figure 11-8.

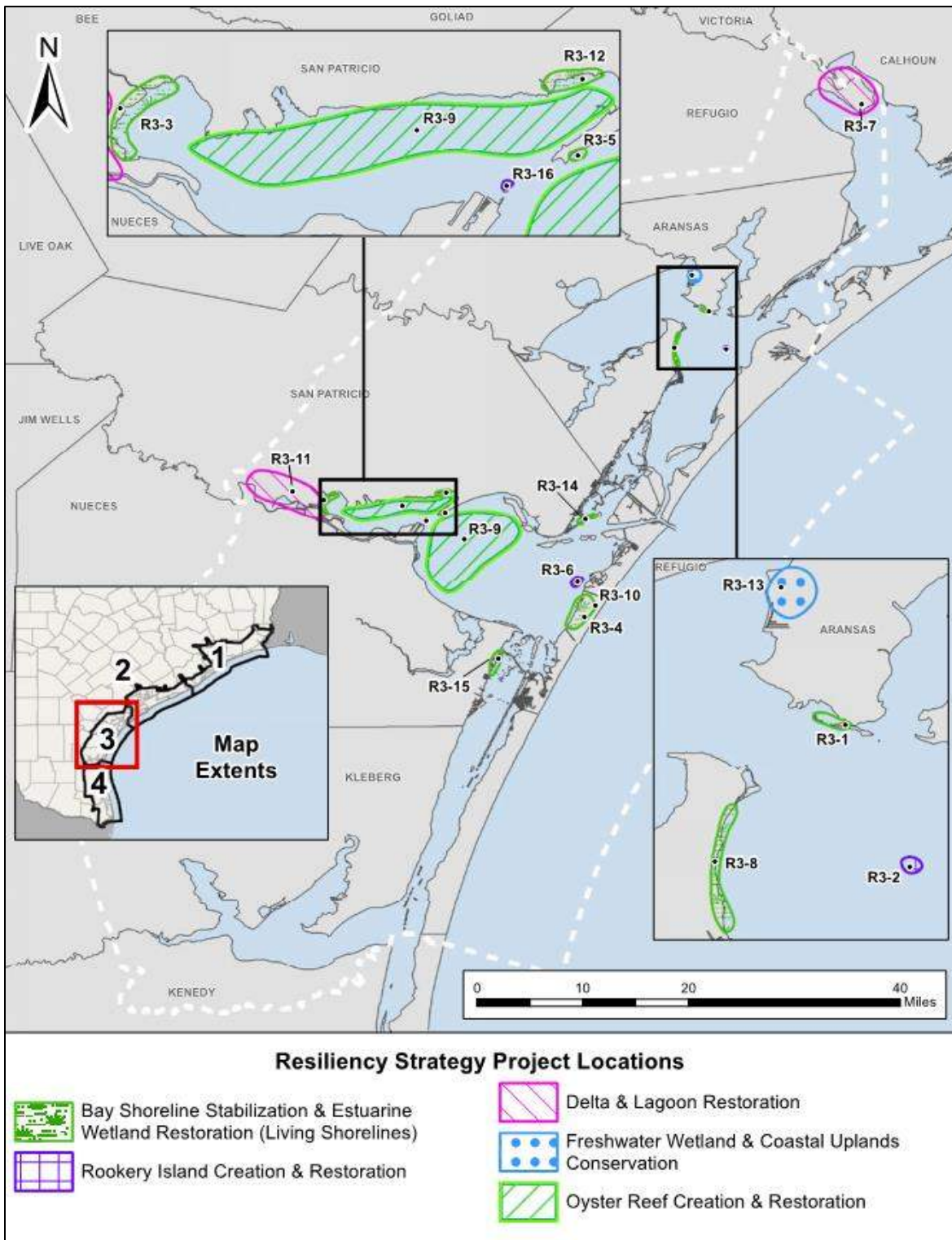
A prominent vulnerable asset within Nueces County is the Corpus Christi Ship Channel Entrance and Jetty Channel. The US Army Corps of Engineers recommended a FY2013 budget of \$4.9M to dredge these areas to remove sedimentation to maintain the channel depth, and recommended an additional \$3.2M to repair levees adjacent to Nueces Bay that were eroded by storm events and wave action. Specific vulnerable assets are identified for each of the coastal jurisdictions in the following sections. Maps depicting coastal erosion hazards in impacted jurisdictions are shown in Figures 11-10, 11-11, and 11-12.

Table 11-4. Strategies & Projects to Address Nueces County Coastal Vulnerabilities²¹

Strategy	ID	Tier 1 Projects	Estimated Cost Range
Bay Shoreline Stabilization and Estuarine Wetland Restoration (Living Shorelines)	R3-3	Nueces River Delta Shoreline Stabilization	\$3M - \$8M
	R3-4	Mustang Island State Park Acquisition	\$3M - \$10M
	R3-5	Indian Point Shoreline Protection	\$0.5M - \$2M
	R3-10	Coastal Bend Gulf Barrier Island Conservation	\$0.5M - \$1.5M
	R3-12	Portland Living Shoreline	\$1M - \$3.5M
	R3-14	Dagger Island Living Shoreline	\$1M - \$2.5M
	R3-15	Flour Bluff Living Shoreline	\$1.5M - \$4.5M
Delta & Lagoon Restoration	R3-11	Nueces County Hydrologic Restoration Study	\$0.5M - \$2.5M
Oyster Reef Creation & Restorations	R3-9	Corpus Christi & Nueces Bays Oyster Reef Restoration	\$1M - \$10M
Rookery Island Creation & Restoration	R3-6	Shamrock Island Restoration - Phase 2	\$6M - \$18M
	R3-16	Causeway Island Rookery Habitat Protection	\$0.5M - \$2M

²¹ Texas GLO's Coastal Resiliency Master Plan, March 2017

Figure 11-9. Map of Projects to Address Nueces County Vulnerabilities²²



²² Texas GLO's Coastal Resiliency Master Plan, March 2017

Unincorporated Nueces County Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

City of Agua Dulce Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

Banquete ISD Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBAILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

City of Bishop Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

City of Corpus Christi Coastal Erosion Hazard

LOCATION				
Gulf-Facing Shoreline		13.5 Miles		
EXTENT				
Gulf-Facing Shoreline Change Rate (ft/yr)				
Minimum	Maximum		Average	
-4.72	+5.51		-1.26	
OCCURENCE				
Coastal erosion is a continual process. Coastal erosion occurs over short and long-term periods and at different rates along the coastline.				
PROBABILITY				
Short-Term Coastal Erosion				
Number of Gulf Tropical Storms & Hurricanes	Time Period Years		Probability	
75	100		3 Hurricanes impact the Texas coast every 4 years	
Long-Term Gulf-facing Coastal Erosion				
Total Gulf-Facing Shoreline Miles	Shoreline Erosion Area %	Future Coastal Erosion Area Miles	Critical Erosion Area %	Future Critical Erosion Area Miles
13.5	89.2%	12.0	30.8%	4.2
IMPACT & VULNERABILITY				
Coastal Property Value		Coastal Crop Land		
Commercial	Residential	Acres	Estimated Value	
\$150,397,416	\$46,020,933	790	\$343,591	
Coastal Critical Facilities				
Name		Description		
Corpus Christi Ship Channel		Navigable Waterway		
La Quinta Channel		Navigable Waterway		
Encinal Canal		Navigable Waterway		
Rincon Canal		Navigable Waterway		
Packery Channel		Navigable Waterway		
Gulf Interacoastal Waterway		Navigable Waterway		

Figure 11-10 City of Corpus Christi Coastal Erosion Hazard Map



City of Driscoll Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

City of Petronila Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

City of Port Aransas Coastal Erosion Hazard

LOCATION				
Gulf-Facing Shoreline			7.5 Miles	
EXTENT				
Gulf-Facing Shoreline Change Rate (ft/yr)				
Minimum	Maximum		Average	
-3.58	2.62		-0.73	
OCCURENCE				
Coastal erosion is a continual process. Coastal erosion occurs over short and long-term periods and at different rates along the coastline.				
PROBABILITY				
Short-Term Coastal Erosion				
Number of Gulf Tropical Storms & Hurricanes	Time Period Years		Probability	
75	100		3 Hurricanes impact the Texas coast every 4 years	
Long-Term Gulf-Facing Coastal Erosion				
Total Gulf-Facing Shoreline Miles	Shoreline Erosion Area %	Future Coastal Erosion Area Miles	Critical Erosion Area %	Future Critical Erosion Area Miles
7.5	53.8%	4.0	31.3%	2.3
IMPACT & VULNERABILITY				
Coastal Property Value		Coastal Crop Land		
Commercial	Residential	Acres	Estimated Value	
\$23,460,410	\$117,467,435	235	\$102,207	
Coastal Critical Facilities				
Name		Description		
Corpus Christi Ship Channel		Navigable Waterway		
Aransas Channel		Navigable Waterway		
Lydia Ann Channel		Navigable Waterway		

Figure 11-11. City of Port Aransas Coastal Erosion Hazard Map



City of Robstown Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

Nueces County Drainage District #2 Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

Nueces County Water Control and Improvement District #3 Coastal Erosion Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This is an inland jurisdiction that is not directly impacted by coastal erosion.

Nueces County Water Control and Improvement District #4 Coastal Erosion Hazard

LOCATION				
Gulf-Facing Shoreline			16.5 Miles	
EXTENT				
Gulf-Facing Shoreline Change Rate (ft/yr)				
Minimum	Maximum		Average	
-4.72	5.51		-0.84	
OCCURENCE				
Coastal erosion is a continual process. Coastal erosion occurs over short and long-term periods and at different rates along the coastline.				
PROBABILITY				
Short-Term Coastal Erosion				
Number of Gulf Tropical Storms & Hurricanes	Time Period Years		Probability	
75	100		3 Hurricanes impact the Texas coast every 4 years	
Long-Term Gulf-Facing Coastal Erosion				
Total Gulf-Facing Shoreline Miles	Shoreline Erosion Area %	Future Coastal Erosion Area Miles	Critical Erosion Area %	Future Critical Erosion Area Miles
16.5	74.2%	12.2	20.9%	3.4
IMPACT				
Coastal Parcels	Area of Coastal Parcels (Acres)		Percentage of Total Parcel Area	
349	3,499		34.23%	
VULNERABILITY				
Population Served		Infrastructure*		
6,281**		\$4,800,000		

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 11-12. Nueces County Water Control and Improvement District #4 Coastal Erosion Hazard Map



Section 12: Tornado

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Tornado Hazard Overview

Description

A tornado is a violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes can have wind speeds of 250 miles per hour or more. Damage paths can be in excess of one mile wide and 50 miles long.

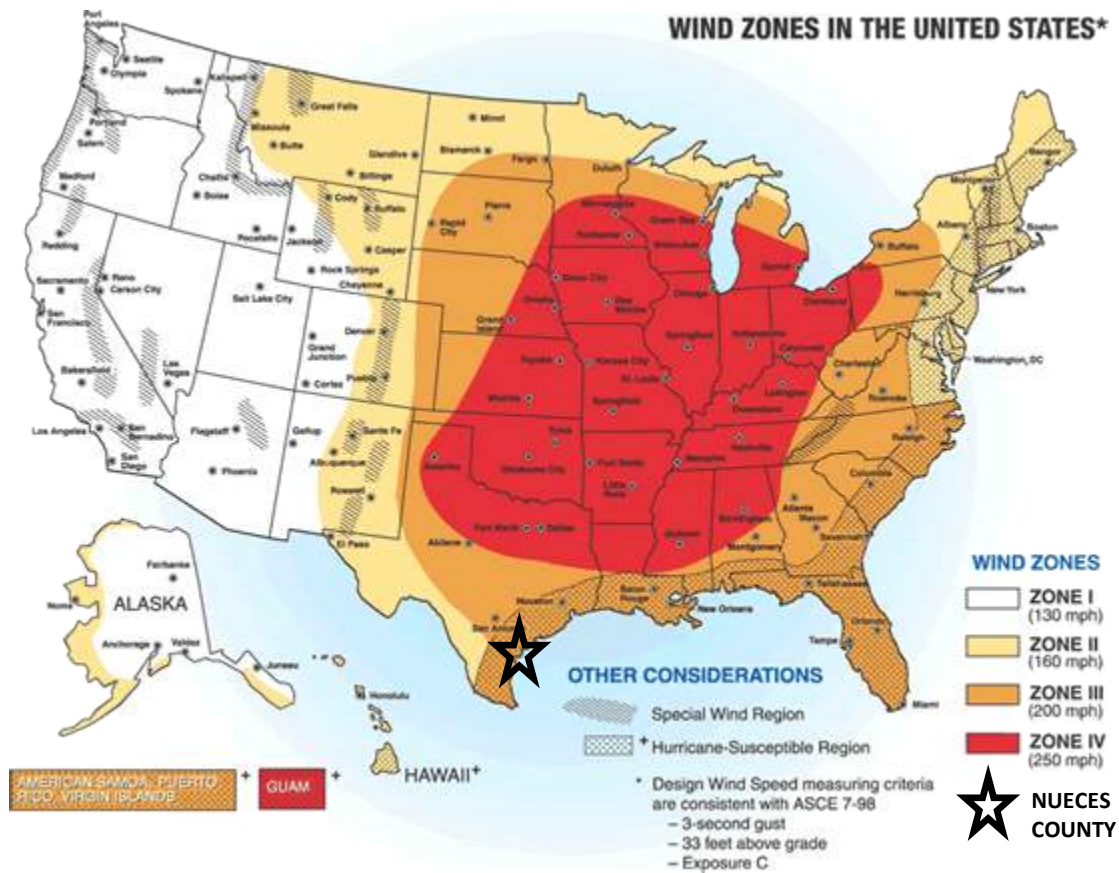
Location

Tornadoes do not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the county planning area including all participating jurisdictions are uniformly exposed to tornado activity. According to FEMA Wind Zones in the United States, as shown in Figure 12-1, Nueces County is in Wind Zone III, associated with winds as high as 200 mph.

Locations Variability

Tornado Hazards are not unique to a specific jurisdiction and impact the entire planning area equally. All participating jurisdictions are equally at risk geographically to tornados due to the similar existing geographic conditions. Tornados impacting the planning area can be seen in **Figure 12-2 to Figure 12-13**.

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









Extent

Tornado damage is currently defined using the Enhanced Fujita Scale which took effect on February 1st, 2007; the preceding scale was called the Fujita Tornado Damage Scale. The Enhanced Fujita Scale is summarized in Table 12-1. The Enhanced Fujita Scale has 28 Damage Indicators (DI), or types of structures and vegetation, each with a varying number of Degrees of Damage (DoD). Damage Indicators are summarized in Table 12-2. Each Damage Indicator has a unique Degree of Damage Scale. For example, Small Barns and Farm Outbuildings (SBO) Degree of Damage Scale is provided as Table 12-3. For unique Degree of Damage Scales for the remaining Damage Indicators refer to National Oceanic and Atmospheric Administration (NOAA) website¹.

Based upon the planning area’s location in Wind Zone III, which can see winds up to 200 miles per hour, the most powerful tornado the planning area can expect to experience is an EF5.

¹ <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>

Table 12-1. Enhanced Fujita Scale²

Scale	Wind Speed (mph)	Relative Frequency	Potential Damage	Example of Damage
EF0	65 - 85	56.88%	<p>Minor or no damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.</p>	
EF1	86 - 110	31.07%	<p>Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.</p>	
EF2	111 - 135	8.80%	<p>Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.</p>	
EF3	136 - 165	2.51%	<p>Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.</p>	
EF4	166 - 200	0.66%	<p>Extreme damage. Well-constructed and whole frame houses completely leveled; cars and other large objects thrown up to 300 feet and small missiles generated.</p>	
EF5	> 200	0.08%	<p>Total destruction of buildings. Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks and train cars can be thrown approximately 1 mile.</p>	

² NOAA

Table 12-2. Damage Indicators

Number	Damage Indicator (Abbreviation)	Degrees of Damage (DoD)
1	Small barns, farm outbuildings (SBO)	8
2	One- or two-family residences (FR12)	10
3	Single-wide mobile home (MHSW)	9
4	Double-wide mobile home (MHDW)	12
5	Apt, condo, townhouse (3 stories or less)	6
6	Motel (M)	10
7	Masonry apt. or motel (MAM)	7
8	Small retail bldg. (fast food) (SRB)	8
9	Small professional (doctor office, branch bank) (SPB)	9
10	Strip mall (SM)	9
11	Large shopping mall (LSM)	9
12	Large, isolated ("big box") retail bldg. (LIRB)	7
13	Automobile showroom (ASR)	8
14	Automotive service building (ASB)	8
15	School - 1-story elementary (interior or exterior halls) (ES)	10
16	School - jr. or sr. high school (JHSH)	11
17	Low-rise (1-4 story) bldg. (LRB)	7
18	Mid-rise (5-20 story) bldg. (MRB)	10
19	High-rise (over 20 stories) (HRB)	10
20	Institutional bldg. (hospital, govt., or university) (IB)	11
21	Metal building system (MBS)	8
22	Service station canopy (SSC)	6
23	Warehouse (tilt-up walls or heavy timber) (WHB)	7
24	Transmission line tower (TLT)	6
25	Free-standing tower (FST)	3
26	Free standing pole (light, flag, luminary) (FSP)	3
27	Tree – hardwood (TH)	5
28	Tree – softwood (TS)	5

Table 12-3. Small Barns and Farm Outbuildings (SBO)

Degrees of Damage (DoD)	Damage Description	Expected Wind Speed (mph)	Lower Bound Wind Speed (mph)	Upper Bound Wind Speed (mph)
1	Threshold of visible damage	62	53	78
2	Loss of wood or metal roof panels	74	61	91
3	Collapse of doors	83	68	102
4	Major loss of roof panels	90	78	110
5	Uplift or collapse of roof structures	93	77	114
6	Collapse of walls	97	81	119
7	Overturning or sliding of entire structure	99	83	118
8	Total destruction of building	112	94	131

Occurrences

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 smaller high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. According to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information Storm Event Database Nueces County has experienced 108 (recorded) tornado events over the course of the record period from 11/1/1950 to 11/30/2016 (66 years). Table 12-4 includes a summary of tornado events from 1950 to 2006 using the Fujita Scale and Table 12-5 summarizes tornado events from 2007 to 2021 using the latest magnitude scale the Enhanced Fujita Scale. Table 12-6 includes a comprehensive list of all tornadoes on record within Nueces County. Historical tornado events are mapped for the county and each participating jurisdiction in the following sections, as seen in Figures 12-2 through 12-13.

Table 12-4. Historical Tornado Occurrence Summary, 1950-2006

Number of Events	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
95	8	46	29	11	1	0	0

Table 12-5. Historical Tornado Occurrence Summary, 2007-2021

Number of Events	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
14	0	11	3	0	0	0	0

Table 12-6. Historical Tornado Events, 1950-2021³

Jurisdiction	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Corpus Christi	7/28/1953	1015	F0	0	0	\$0	\$0
Nueces Co	8/31/1953	2025	F0	0	0	\$250	\$0
Port Aransas	10/23/1953	1515	F2	0	0	\$25,000	\$0
Robstown	5/11/1955	1030	F0	0	0	\$0	\$0
Robstown	5/11/1955	1030	F1	0	0	\$0	\$0
Robstown	6/22/1955	1515	F0	0	0	\$0	\$0
Nueces Co	10/4/1956	1330	F1	0	0	\$2,500	\$0
Corpus Christi	10/12/1959	1030	F1	0	0	\$25,000	\$0
Corpus Christi	4/26/1960	30	F1	0	0	\$2,500	\$0
Corpus Christi	8/8/1960	1100	F1	0	0	\$2,500	\$0
Nueces Co	10/16/1960	1200	F1	0	0	\$25,000	\$0
Corpus Christi	10/16/1960	1310	F2	0	1	\$250,000	\$0
Corpus Christi	2/5/1961	940	F0	0	0	\$2,500	\$0
Corpus Christi	4/29/1961	1245	F2	0	0	\$25,000	\$0
Bishop	6/18/1961	1500	F2	0	0	\$25,000	\$0
Corpus Christi	6/18/1961	1500	F1	0	0	\$250	\$0
Nueces Co	8/21/1962	1300	F1	0	0	\$2,500	\$0
Robstown	7/17/1964	2344	F0	0	0	\$0	\$0
Nueces Co	3/30/1965	540	F1	0	0	\$25,000	\$0
Corpus Christi	9/22/1967	820	F2	0	0	\$0	\$0
Corpus Christi	9/22/1967	925	F0	0	0	\$0	\$0
Nueces Co	9/22/1967	1129	F0	0	0	\$0	\$0
Nueces Co	9/22/1967	1129	F0	0	0	\$0	\$0
Nueces Co	9/22/1967	1444	F0	0	0	\$0	\$0
Nueces Co	9/22/1967	1445	F0	0	0	\$0	\$0
Corpus Christi	5/7/1968	2245	F0	0	1	\$250	\$0
Corpus Christi	5/9/1968	1220	F0	0	0	\$0	\$0
Corpus Christi	5/9/1968	1230	F2	0	1	\$25,000	\$0

³ NCDC Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

Table 12-6. Historical Tornado Events, 1950-2021 (cont.)

Jurisdiction	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Corpus Christi	5/9/1968	1245	F1	0	0	\$2,500	\$0
Corpus Christi	5/9/1968	1335	F1	0	0	\$30	\$0
Nueces Co	5/9/1968	1345	F1	0	0	\$25,000	\$0
Nueces Co	5/11/1968	600	F1	0	0	\$0	\$0
Corpus Christi	9/16/1968	1745	F1	0	0	\$25,000	\$0
Nueces Co	5/12/1969	1600	F2	0	0	\$2,500	\$0
Robstown	10/12/1969	1730	F0	0	0	\$0	\$0
Robstown	10/12/1969	1730	F0	0	0	\$0	\$0
Robstown	10/12/1969	1730	F0	0	0	\$0	\$0
Nueces Co	5/22/1970	919		0	0	\$0	\$0
Nueces Co	6/24/1970	1650	F3	1	15	\$250,000	\$0
Corpus Christi	6/25/1970	945	F0	0	0	\$0	\$0
Nueces Co	5/10/1971	1625	F1	0	0	\$0	\$0
Nueces Co	8/6/1971	1200	F1	0	0	\$250	\$0
Nueces Co	8/6/1971	1200	F1	0	0	\$0	\$0
Corpus Christi	4/27/1972	1220	F1	0	0	\$0	\$0
Corpus Christi	4/27/1972	1250	F0	0	0	\$0	\$0
Corpus Christi	6/2/1972	135	F1	0	1	\$2,500	\$0
Corpus Christi	6/13/1973	1220	F0	0	0	\$0	\$0
Corpus Christi	8/13/1973	1005	F0	0	0	\$0	\$0
Nueces Co	8/13/1973	1146	F0	0	0	\$0	\$0
Nueces Co	6/13/1974	1400	F0	0	0	\$0	\$0
Nueces Co	7/13/1974	1256	F0	0	0	\$0	\$0
Corpus Christi	9/21/1974	914	F0	0	0	\$30	\$0
Corpus Christi	9/28/1974	1645	F1	0	0	\$30	\$0
Nueces Co	5/24/1975	1115	F0	0	0	\$0	\$0
Corpus Christi	4/20/1976	755	F1	0	0	\$2,500	\$0
Bishop	4/28/1976	644	F2	0	0	\$2,500	\$0
Corpus Christi	5/7/1976	950	F0	0	0	\$0	\$0
Nueces Co	6/25/1976	1100		0	0	\$0	\$0
Nueces Co	6/25/1976	1125		0	0	\$0	\$0
Corpus Christi	7/8/1976	1136	F1	0	0	\$25,000	\$0
Corpus Christi	7/8/1976	1730	F0	0	0	\$0	\$0
Driscoll	7/14/1976	1345	F1	0	0	\$2,500	\$0
Corpus Christi	8/17/1976	1205		0	0	\$0	\$0
Nueces Co	8/18/1976	1200		0	0	\$0	\$0

Table 12-6. Historical Tornado Events, 1950-2021 (cont.)

Jurisdiction	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Corpus Christi	9/7/1976	755		0	0	\$0	\$0
Nueces Co	8/21/1978	1320	F0	0	0	\$0	\$0
Corpus Christi	8/25/1978	900	F0	0	0	\$0	\$0
Bishop	8/9/1980	1530	F1	0	0	\$250,000	\$0
Port Aransas	8/9/1980	2130	F2	0	3	\$2,500,000	\$0
Bishop	8/10/1980	400	F2	0	0	\$2,500,000	\$0
Nueces Co	8/10/1980	1730	F1	0	0	\$0	\$0
Corpus Christi	8/29/1981	1430	F0	0	0	\$2,500	\$0
Nueces Co	8/29/1981	1530	F1	0	0	\$0	\$0
Nueces Co	11/9/1986	1242	F0	0	0	\$0	\$0
Corpus Christi	9/16/1988	1630	F0	0	0	\$0	\$0
Corpus Christi	9/16/1988	2000	F1	0	0	\$250,000	\$0
Corpus Christi	4/17/1992	1255	F0	0	0	\$2,500	\$0
Corpus Christi	4/17/1992	1315	F0	0	0	\$25,000	\$0
Corpus Christi	5/31/1992	1255	F0	0	0	\$25,000	\$0
Port Aransas	6/2/1992	615	F1	0	0	\$25,000	\$0
Robstown	8/25/1992	955	F0	0	0	\$0	\$0
Corpus Christi	6/2/1994	935	F0	0	0	\$0	\$0
Nueces Co	8/5/1994	1325	F0	0	0	\$0	\$0
Nueces Co	9/12/1994	1930		0	0	\$0	\$0
Robstown	8/1/1995	1555	F0	0	0	\$0	\$0
Corpus Christi	8/23/1995	1739	F0	0	0	\$0	\$0
Nueces Co	9/20/1996	1200	F0	0	0	\$0	\$0
Nueces Co	6/17/1997	1645	F1	0	1	\$80,000	\$0
Corpus Christi	9/22/1998	1048	F0	0	0	\$0	\$0
Robstown	10/6/2000	1500	F0	0	0	\$0	\$0
Petronila	12/26/2000	1430	F0	0	0	\$0	\$0
Corpus Christi	10/24/2002	1319	F2	1	20	\$75,000,000	\$0
Corpus Christi	10/24/2002	1441	F1	0	6	\$10,000,000	\$0
Corpus Christi	7/5/2003	215	F0	0	0	\$0	\$0
Nueces Co	9/2/2005	1252	F0	0	0	\$0	\$0
Corpus Christi	7/7/2007	1640	EF0	0	0	\$20,000	\$0
Port Aransas	9/29/2007	1140	EF0	0	0	\$5,000	\$0
Corpus Christi	3/6/2008	1458	EF1	0	0	\$20,000	\$0
Corpus Christi	3/18/2008	1340	EF0	0	0	\$50,000	\$0
Nueces Co	6/2/2010	2215	EF0	0	0	\$0	\$1,000

Table 12-6. Historical Tornado Events, 1950-2021 (cont.)

Jurisdiction	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Nueces Co	6/30/2010	1330	EF0	0	0	\$0	\$0
Corpus Christi	1/9/2011	329	EF1	0	0	\$5,000,000	\$0
Corpus Christi	5/8/2012	715	EF0	0	0	\$0	\$0
Corpus Christi	5/10/2012	2120	EF0	0	0	\$100,000	\$0
Nueces Co	6/2/2013	950	EF0	0	0	\$0	\$0
Corpus Christi	5/15/2015	1205	EF0	0	0	\$25,000	\$0
Corpus Christi	5/24/2015	27	EF1	0	0	\$750,000	\$0
Nueces Co	9/26/2015	1415	EF0	0	0	\$0	\$0
Petronila	8/1/2020	1542	EF0	0	0	\$0	\$0

Probability

Probability, or frequency of return, was calculated by dividing the number of tornado events in the recorded time period by the overall time period that the resource database has recorded events for that jurisdiction. Note, historical events are documented as a function of the origin of the touchdown location. A Tornado may travel over several jurisdictions; however, the tornado event is solely recorded for the jurisdiction of the tornado origin. Table 12-7 provides a general overview of tornado severity, probability, impacts, and defining characteristics. Probability for future tornado events is defined for the county and each participating jurisdiction in the following sections.

Probabilities of future tornado events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too may the locations, frequencies, and range of anticipated intensities of tornado events.

Table 12-7. Tornado Severity Defined

WEAK	STRONG	VIOLENT
<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

Impact

Tornados impacts are documented by the number of deaths, injuries, property damage, and crop damage. Table 12-8 provides a summary of impacts for Nueces County as a whole. Impacts to the county and participating jurisdictions is documented in the following sections.

Tornadoes, depending upon extent, can destroy anything they come into contact with. Due to the unpredictable locations of tornado touchdowns, it is difficult to identify assets or populations within jurisdictions that are particularly vulnerable to tornadoes. Due to those two facts, all assets, property, and populations within the planning area are considered vulnerable to tornadoes. Properties within the planning area may experience power outages or other utility failures even if they're not destroyed during a tornado event. Homes destroyed by tornadoes will lead to displaced populations. Crops and commercial property destroyed in tornado events will have negative economic impacts.

Table 12-8. Historical Tornado Impacts Summary, 1950-2021⁴

Number of Events	Deaths	Injuries	Property Damage	Crop Damage
109	2	49	\$97,408,590	\$1,000

Vulnerability

Tornadoes typically cross jurisdictional boundaries: therefore, all existing and future buildings, facilities, and populations in and around Nueces County are at potential risk of impact. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail. Vulnerability of humans and property is difficult to evaluate given that tornadoes form at different strengths and in random locations. Property damage is typically most significant for structures of light construction. 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. Vulnerability is defined for the county and participating jurisdictions in the following sections.

⁴ NCDC Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

Unincorporated Nueces County Tornado Hazard

LOCATION							
County Wide (Unincorporated)							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
33	6	14	11	1	1	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
4	0	4	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
37	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 1.9 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
37	1	16	\$413,000

VULNERABILITY				
Population (County)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
13,579	\$968,938,581	\$755,606,666	280,817	\$122,134,449

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-2. Unincorporated Nueces County Tornado Hazard Map (1950 – 2021)



City of Agua Dulce Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
	Magnitude (Fujita Scale)						
Number of Events 1950-2006*	N/A	F0	F1	F2	F3	F4	F5
0	0	0	0	0	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
0	0	0	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
0	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 100 YEARS*

*Based upon minimum probability of the planning area

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
0	0	0	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
688	\$15,251,504	\$19,726,169	2.45	\$1,066

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-3. City of Agua Dulce Tornado Hazard Map (1950 – 2021)



NOTE: There were no recorded tornado occurrences in this jurisdiction from 1950 to 2021.

Banquete ISD Tornado Hazard

LOCATION							
City Wide							
OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
4	0	0	1	3	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
0	0	0	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
4	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 17.8 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
4	0	0	\$2,777,500

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,862	\$102,846,088	\$222,649,907	61,968	\$26,951,458

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Bishop Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
10	0	9	1	0	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
0	0	0	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
10	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 7.1 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
10	0	0	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,155	\$123,993,966	\$110,819,070	232	\$100,903

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-5. City of Bishop Tornado Hazard Map (1950 – 2021)



City of Corpus Christi Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
	Magnitude (Fujita Scale)						
Number of Events 1950-2006*	N/A	F0	F1	F2	F3	F4	F5
43	2	22	14	5	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
8	0	5	3	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
51	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 1.4 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
51	1	30	\$91,660,590

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
317,773	\$16,744,675,468	\$16,266,319,691	21,392	\$9,303,924

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-6. City of Corpus Christi Tornado Hazard Map (1950 – 2021)



City of Driscoll Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
1	0	0	1	0	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
0	0	0	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
1	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 71 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
1	0	0	\$2,500

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
673	\$29,366,710	\$20,046,143	438	\$190,497

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-7. City of Driscoll Tornado Hazard Map (1950 – 2021)



NOTE: There was one recorded Tornado occurrence in this jurisdiction from 1950 to 2021.

City of Petronila Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
1	0	1	0	0	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
1	0	1	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
2	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 36 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
1	0	0	\$0	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
87	\$667,778	\$2,988,340	108	\$46,972

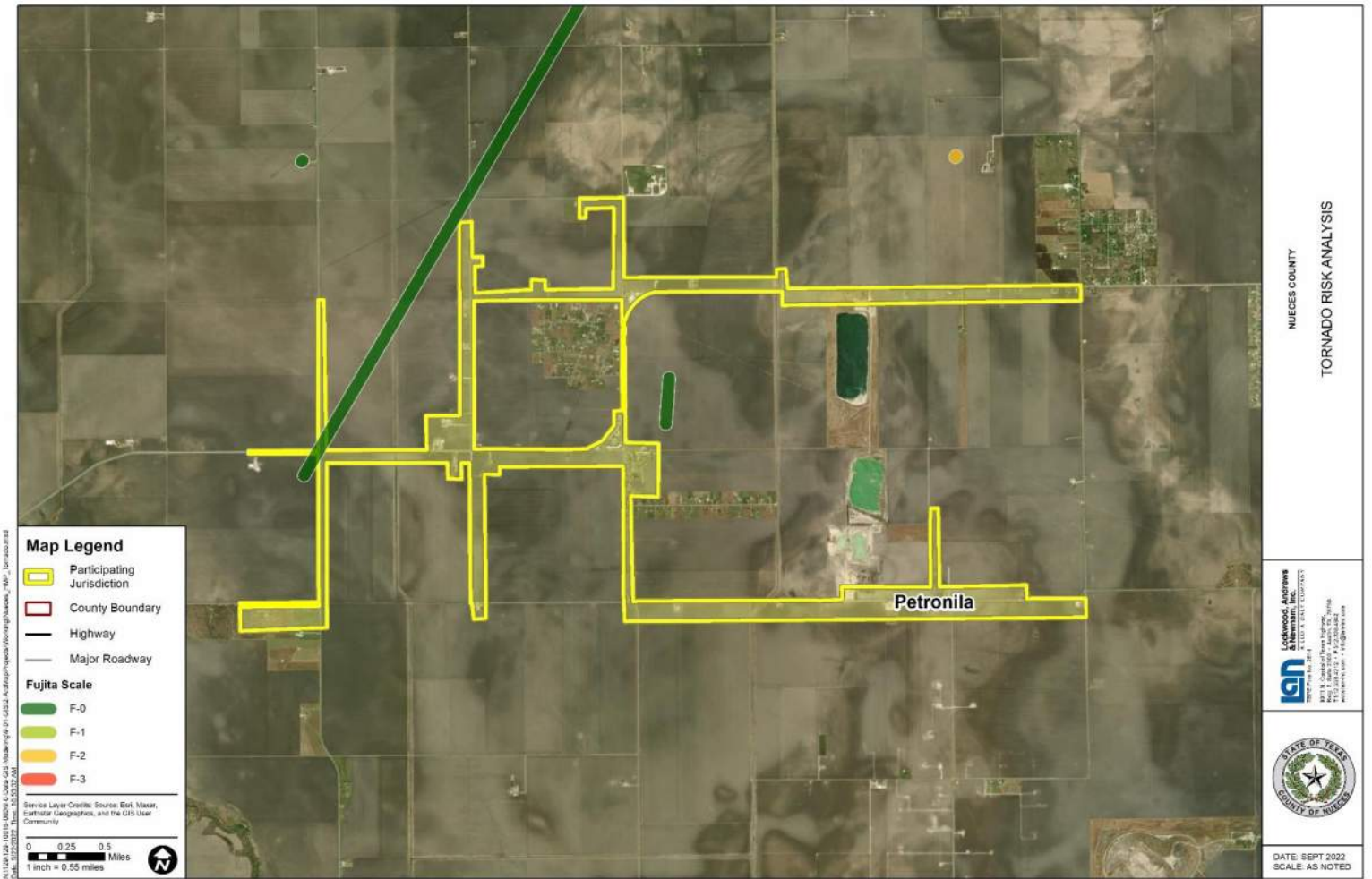
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-8. City of Petronila Tornado Hazard Map (1950 – 2021)



City of Port Aransas Tornado Hazard

LOCATION							
Jurisdiction Wide							
OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
3	0	0	0	3	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
1	0	0	1	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
4	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 17.8 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
4	0	0	\$51,000

VULNERABILITY				
Population*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,105	\$25,743,548,569	\$2,154,096,149	859	\$373,601

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-9. City of Port Aransas Tornado Hazard Map (1950 – 2021)



City of Robstown Tornado Hazard

LOCATION							
City Wide							

OCCURENCE	EXTENT						
	Magnitude (Fujita Scale)						
Number of Events 1950-2006*	N/A	F0	F1	F2	F3	F4	F5
10	7	0	1	2	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
1	0	1	0	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
11	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 6.5 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
11	0	3	\$2,555,000

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
10,157	\$373,735,450	\$229,911,267	4,413	\$1,919,326

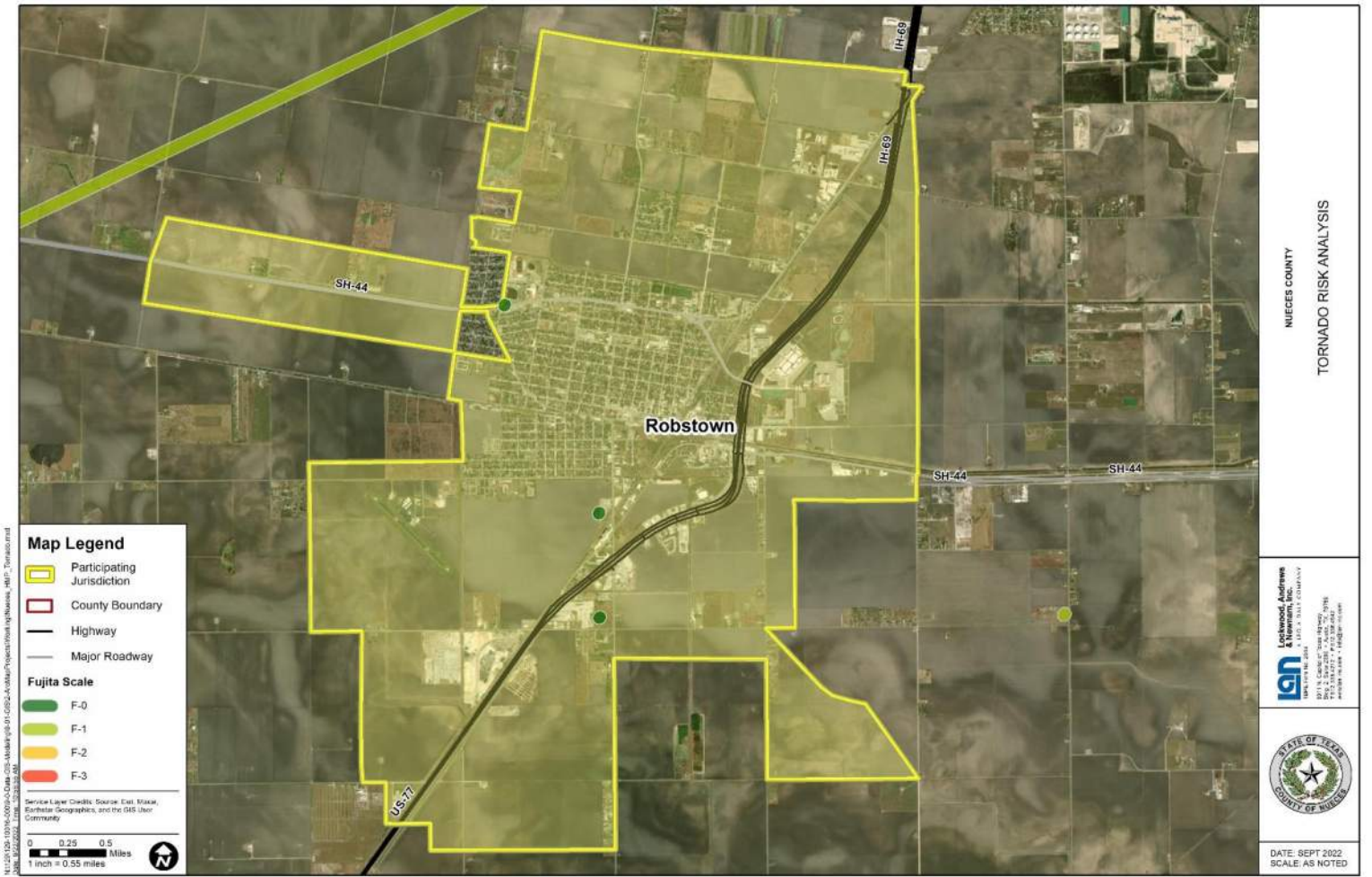
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 12-10. City of Robstown Tornado Hazard Map (1950 – 2021)



Nueces County Drainage District #2 Tornado Hazard

LOCATION							
District Wide							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
18	0	12	4	2	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
2	0	1	1	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
20	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 3.5 YEARS

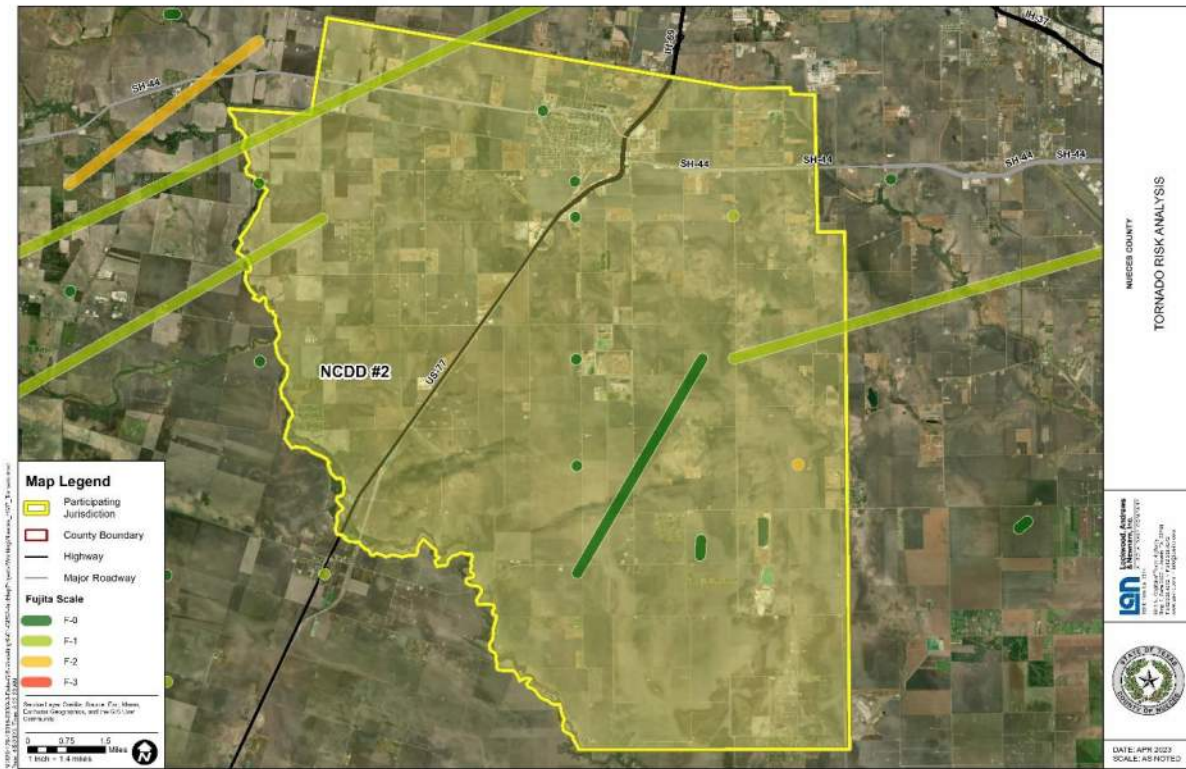
IMPACT			
Number of Events	Deaths	Injuries	Property Damage
20	1	27	\$5,110,000

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 12-11. Nueces County Drainage District #2 Tornado Hazard Map (1950 – 2021)



Nueces County Water Control and Improvement District #3 Tornado Hazard

LOCATION							
District Wide							

OCCURENCE	EXTENT						
	Magnitude (Fujita Scale)						
Number of Events 1950-2006*	N/A	F0	F1	F2	F3	F4	F5
1	0	1	0	0	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
1	0	0	1	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
2	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 35.5 YEARS

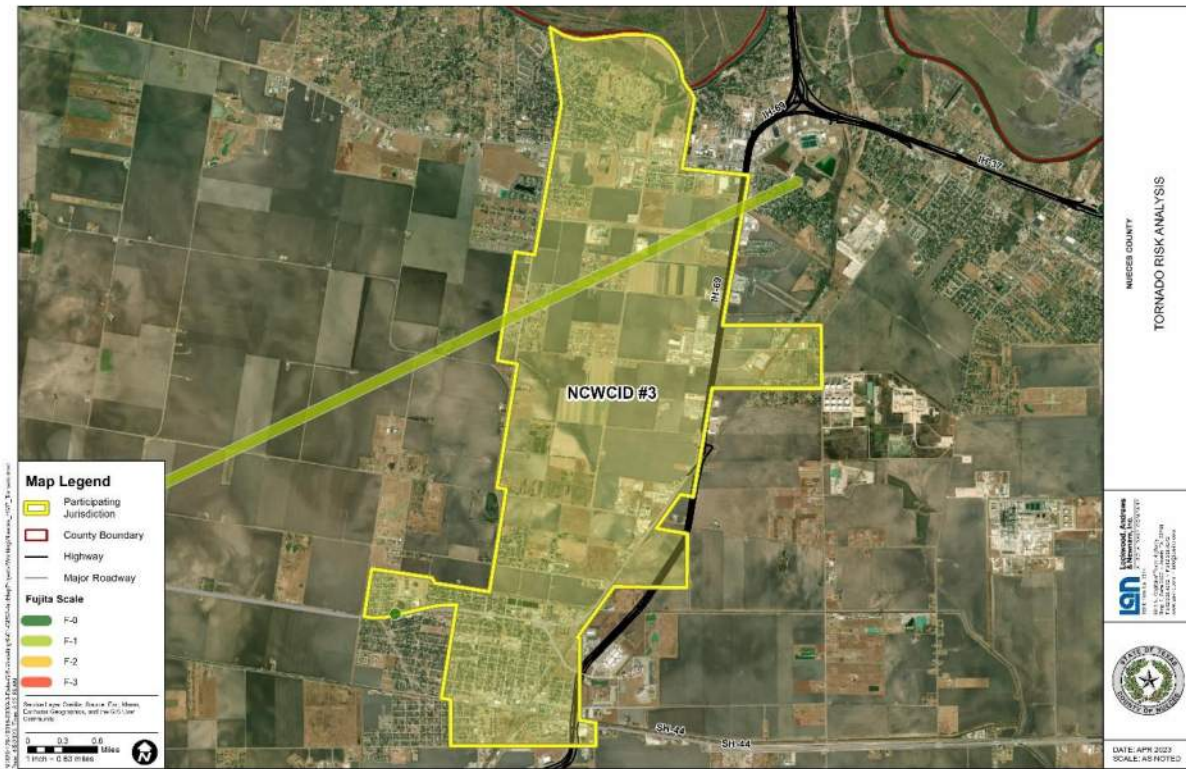
IMPACT			
Number of Events	Deaths	Injuries	Property Damage
2	0	0	\$5,010,000

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$7,255,507	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 12-12. Nueces County Water Control and Improvement District #3 Tornado Hazard Map (1950 – 2021)



Nueces County Water Control and Improvement District #4 Tornado Hazard

LOCATION							
District Wide							

OCCURENCE	EXTENT						
Number of Events 1950-2006*	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
7	0	1	4	2	0	0	0
Number of Events 2007-2021*	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
1	0	0	1	0	0	0	0

* Fujita Scale replaced with Enhanced Fujita Scale in 2007

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
8	11/1/1950 to 11/30/2021	71	1 TORNADO TOUCHDOWN ESTIMATED EVERY 8.875 YEARS

IMPACT			
Number of Events	Deaths	Injuries	Property Damage
8	0	0	\$71,000

VULNERABILITY		
Population Served**		Infrastructure*
6,281		\$21,097,000
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 12-13. Nueces County Water Control and Improvement District #4 Tornado Hazard Map (1950 – 2021)



Section 13: Hailstorm

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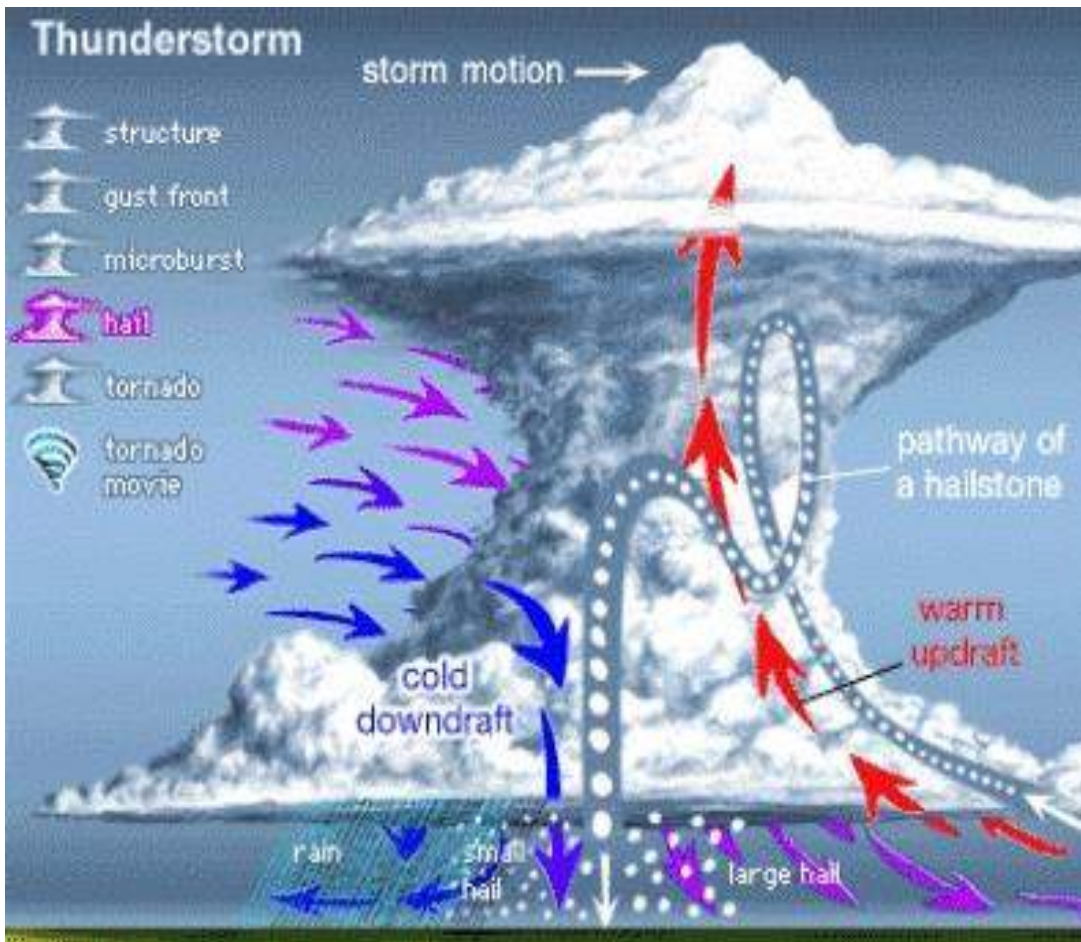
Hailstorm Hazard Overview

Description

Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. Nearly all severe thunderstorms produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually large hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general hail 2 inches (5 cm), a little larger than golf ball, or larger in diameter is associated with supercells. Non-supercell storms are capable of producing golf ball size hail. In all cases, the hail falls when the thunderstorm's updraft can no longer support the weight of the ice. The stronger the updraft the larger the hailstone can grow¹. This process of hail development within a thunderstorm is depicted in Figure 13-1.

¹ NOAA

Figure 13-1: Hail Development within a Thunderstorm



Location

Hailstorms do not have any specific geographic boundaries and can occur throughout the county uniformly. It is assumed that the county planning area including all participating jurisdictions are uniformly exposed to damage from hailstorms.

Location Variability

Hailstorms are a widespread affecting hazard and impact all jurisdictions with very minimal variance in magnitude due to the proximity of all jurisdictions. Hailstorms impacting Nueces County are not expected to affect any participating jurisdictions differently. Hailstorms that have impacted the planning area can be seen in **Figures 13-3 to Figure 13-14**.

Extent

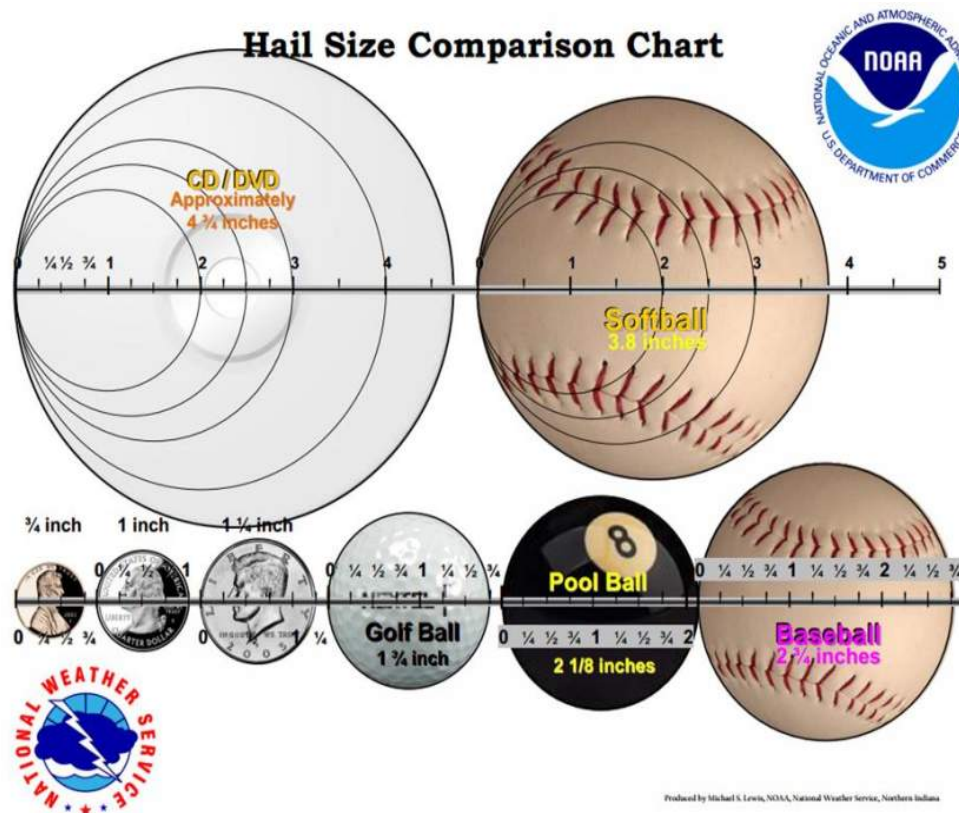
Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail.

Hail has been known to cause injury to humans, and occasionally has been fatal. There have been no recorded fatalities or injuries in the region.

Hail size is estimated by comparing it to a known object, as shown in Figure 13-2. Most hailstorms are made up of a mix of sizes, and only the very largest hail stones pose serious risk to people caught in the open. Hail of quarter size and larger is considered severe. The potential damage caused by different hail sizes is shown in Table 13-1.

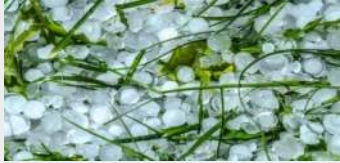







Historically, hailstones almost three inches in diameter have fallen in the planning area. For future planning purposes, all participating jurisdictions can expect hailstones up to three inches in diameter. The extent of hailstorm is uniform across the region.

Figure 13-2: Hail Size Comparison Chart²



² NOAA

Table 13-1. Estimating Hail Size³

Size	Relative Frequency	Potential Damage	Example of Damage
Pea	¼” Diameter	Virtually no damage. Slight Damage to plants.	
Marble	½” Diameter	Virtually no structural damage. Some damage to plants.	
Quarter	1” Diameter	Some severe damage. Dents to vehicles. Extensive damage to crops, plants, minor bodily damage.	
Ping Pong Ball	1½” Diameter	Severe damage. Paint damaged on cars; shingle roof damage; limbs broken; extensive damage to crops. Extensive bodily injury.	
Golf Ball	1¾”	Severe damage. Damage to windows, metal roofs pitted, aircraft pitted, trees damaged, total crop damage.	
Tennis Ball	2½”	Extreme Damage Damage to roof tiles, Significant structural damage to buildings, risk of serious bodily injury.	
Baseball	3”	Extreme Damage Cars and airplanes severely damaged, damage to forests, humans, and animals seriously in danger.	
Softball	4½”	Total Destruction Buildings destroyed, fatalities in humans and animals; cars and airplanes destroyed, forest severely damaged.	

³ NOAA

Occurrences

Hail producing storms can occur at any time of year and at any time of day, but they are typically more common in the spring and summer months during the late afternoon and evening hours. A smaller high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. According to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information Storm Event Database, Nueces County has experienced 129 (recorded) hailstorm events over the course of the record period from 03/21/1956 to 04/22/2021 (65 years). Table 13-2 includes a summary of hailstorm events from 1956 to 2021 and Table 13-3 includes a comprehensive list of all hailstorms on NCEM Storm Events Database records within Nueces County. Spatial data for hailstorm occurrences was retrieved from the NOAA's National Weather Service Storm Prediction Center⁴, and may be viewed for each jurisdiction in Figures 13-3 through 13-14.

Table 13-2. Historical Hailstorm Occurrence Summary, 1956-2021

Number of Events	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
129	28	15	47	5	8	21	5

Table 13-3. Historical Hailstorm Events, 1956-2021⁵

Date	Time	Magnitude (Size of Hail)	Injuries	Fatalities	Prop Damage	Crop Damage	Jurisdiction
1956-03-21	15:35:00	1.00	0	0	0.00	0.00	Nueces
1957-03-03	15:00:00	1.00	0	0	0.00	0.00	Corpus Christi
1957-04-27	04:30:00	1.50	0	0	0.00	0.00	Robstown
1959-05-10	20:20:00	2.75	0	0	0.00	0.00	Nueces
1961-04-29	12:46:00	0.75	0	0	0.00	0.00	Corpus Christi
1966-03-28	14:45:00	1.00	0	0	0.00	0.00	Nueces
1968-05-17	20:00:00	1.50	0	0	0.00	0.00	Nueces
1969-11-26	22:50:00	1.75	0	0	0.00	0.00	Nueces
1971-05-10	19:50:00	1.75	0	0	0.00	0.00	Nueces
1971-05-11	11:55:00	1.75	0	0	0.00	0.00	Nueces
1973-06-11	16:30:00	1.75	0	0	0.00	0.00	Robstown
1975-05-01	09:00:00	1.50	0	0	0.00	0.00	Corpus Christi
1976-04-07	22:20:00	0.75	0	0	0.00	0.00	Nueces
1977-09-08	15:40:00	1.75	0	0	0.00	0.00	Corpus Christi
1977-09-08	15:40:00	1.75	0	0	0.00	0.00	Corpus Christi

⁴ <https://www.spc.noaa.gov/gis/svrgis/>

⁵ NCEM Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

Table 13-3. Historical Hailstorm Events, 1956-2021 (cont.)

Date	Time	Magnitude (Size of Hail)	Injuries	Fatalities	Prop Damage	Crop Damage	Jurisdiction
1980-05-22	00:15:00	1.75	0	0	0.00	0.00	Corpus Christi
1981-05-29	16:45:00	0.75	0	0	0.00	0.00	Nueces
1985-05-08	20:44:00	0.75	0	0	0.00	0.00	Corpus Christi
1986-10-26	17:53:00	1.75	0	0	0.00	0.00	Corpus Christi
1989-05-17	17:00:00	1.75	0	0	0.00	0.00	Bishop
1992-02-24	15:30:00	0.75	0	0	0.00	0.00	Bishop
1993-05-02	07:37:00	2.50	0	0	\$2,500,000	0.00	Nueces
1994-05-13	17:15:00	0.75	0	0	\$50,000	0.00	Bishop
1994-05-13	17:00:00	1.75	0	0	\$50,000	0.00	Nueces
1995-04-11	00:15:00	0.75	0	0	0.00	0.00	Corpus Christi
1995-04-11	02:00:00	0.75	0	0	0.00	0.00	Port Aransas
1995-12-18	01:45:00	1.00	0	0	0.00	0.00	Nueces
1996-04-05	11:30:00	0.75	0	0	0.00	0.00	Corpus Christi
1996-04-05	11:45:00	0.75	0	0	0.00	0.00	Corpus Christi
1996-05-11	17:00:00	1.00	0	0	0.00	0.00	Corpus Christi
1996-05-11	17:10:00	1.25	0	0	0.00	0.00	Corpus Christi
1996-08-14	15:25:00	0.75	0	0	0.00	0.00	Nueces
1997-05-09	13:20:00	0.75	0	0	0.00	0.00	Corpus Christi
1998-03-07	00:05:00	1.00	0	0	0.00	0.00	Robstown
1998-03-07	00:20:00	1.75	0	0	0.00	0.00	Corpus Christi
1998-04-18	12:32:00	0.75	0	0	0.00	0.00	Corpus Christi
2001-06-07	15:50:00	1.00	0	0	0.00	0.00	Corpus Christi
2001-06-07	16:05:00	1.00	0	0	0.00	0.00	Corpus Christi
2002-05-29	16:18:00	0.75	0	0	0.00	0.00	Corpus Christi
2002-12-12	06:15:00	0.75	0	0	0.00	0.00	Corpus Christi
2002-12-12	06:35:00	0.88	0	0	0.00	0.00	Corpus Christi
2003-03-26	00:25:00	0.75	0	0	0.00	0.00	Robstown
2003-10-25	19:00:00	0.88	0	0	0.00	0.00	Corpus Christi
2004-02-24	11:50:00	1.00	0	0	0.00	0.00	Corpus Christi
2004-02-24	11:04:00	1.00	0	0	0.00	0.00	Nueces
2004-02-24	11:25:00	1.00	0	0	0.00	0.00	Robstown
2004-04-06	09:40:00	0.75	0	0	0.00	0.00	Robstown
2004-05-13	22:38:00	0.88	0	0	0.00	0.00	Corpus Christi
2005-03-20	03:25:00	0.88	0	0	0.00	0.00	Corpus Christi

Table 13-3. Historical Hailstorm Events, 1956-2021 (cont.)

Date	Time	Magnitude (Size of Hail)	Injuries	Fatalities	Prop Damage	Crop Damage	Jurisdiction
2005-05-08	18:25:00	0.88	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:19:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:20:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:25:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:28:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:35:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:37:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-08	17:55:00	1.00	0	0	0.00	0.00	Robstown
2005-05-08	18:27:00	1.25	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:10:00	1.50	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:30:00	1.50	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:25:00	1.75	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:30:00	1.75	0	0	0.00	0.00	Corpus Christi
2005-05-08	18:40:00	1.75	0	0	0.00	0.00	Corpus Christi
2005-05-29	20:52:00	0.75	0	0	0.00	0.00	Corpus Christi
2005-05-29	20:45:00	1.00	0	0	0.00	0.00	Corpus Christi
2005-05-29	16:13:00	1.00	0	0	0.00	0.00	Nueces
2005-08-31	17:30:00	0.75	0	0	0.00	0.00	Robstown
2006-03-28	16:27:00	0.75	0	0	0.00	0.00	Driscoll
2006-03-28	16:45:00	1.00	0	0	0.00	0.00	Bishop
2006-05-10	15:30:00	1.00	0	0	0.00	0.00	Bishop
2006-05-10	16:35:00	1.00	0	0	0.00	0.00	Nueces
2006-05-10	17:22:00	1.75	0	0	0.00	0.00	Nueces
2006-05-10	15:35:00	2.75	0	0	0.00	0.00	Nueces
2006-05-14	20:00:00	1.00	0	0	0.00	0.00	Corpus Christi
2006-08-30	16:17:00	0.88	0	0	0.00	0.00	Driscoll
2006-12-23	14:30:00	0.88	0	0	0.00	0.00	Robstown
2007-03-13	23:18:00	0.75	0	0	0.00	0.00	Nueces
2007-04-01	03:42:00	0.88	0	0	0.00	0.00	Corpus Christi
2008-02-16	20:56:00	0.88	0	0	0.00	0.00	Robstown
2008-03-06	13:37:00	0.75	0	0	0.00	0.00	Corpus Christi
2008-03-06	13:15:00	1.00	0	0	0.00	0.00	Corpus Christi
2008-03-06	14:50:00	1.00	0	0	0.00	0.00	Nueces
2008-03-10	13:44:00	0.75	0	0	0.00	0.00	Bishop
2009-03-26	15:10:00	0.88	0	0	0.00	0.00	Nueces

Table 13-3. Historical Hailstorm Events, 1956-2021 (cont.)

Date	Time	Magnitude (Size of Hail)	Injuries	Fatalities	Prop Damage	Crop Damage	Jurisdiction
2009-05-23	18:00:00	0.75	0	0	0.00	0.00	Corpus Christi
2009-05-23	18:05:00	0.75	0	0	0.00	0.00	Corpus Christi
2009-05-27	12:22:00	0.75	0	0	0.00	0.00	Robstown
2009-06-03	19:27:00	0.88	0	0	0.00	0.00	Corpus Christi
2010-04-17	14:58:00	0.88	0	0	0.00	0.00	Nueces
2011-01-09	03:48:00	1.00	0	0	\$500	0.00	Driscoll
2012-03-29	15:23:00	1.00	0	0	\$100	0.00	Corpus Christi
2012-03-29	16:02:00	1.00	0	0	\$100	0.00	Robstown
2012-03-29	16:10:00	1.00	0	0	\$100	0.00	Robstown
2012-03-29	16:12:00	1.75	0	0	\$5,000	0.00	Robstown
2012-04-16	11:11:00	1.25	0	0	\$5,000	0.00	Corpus Christi
2012-04-16	11:27:00	1.50	0	0	\$5,000	0.00	Corpus Christi
2012-04-20	16:03:00	1.00	0	0	\$100	0.00	Corpus Christi
2012-05-08	13:21:00	0.75	0	0	0.00	0.00	Nueces
2012-05-08	13:52:00	1.00	0	0	\$100	0.00	Corpus Christi
2012-05-10	13:06:00	1.00	0	0	0.00	0.00	Corpus Christi
2012-05-10	13:48:00	1.00	0	0	\$5,000	0.00	Corpus Christi
2012-05-10	13:57:00	1.00	0	0	0.00	0.00	Corpus Christi
2012-05-10	14:12:00	1.00	0	0	0.00	0.00	Corpus Christi
2012-05-10	21:27:00	1.00	0	0	0.00	0.00	Corpus Christi
2012-05-10	13:29:00	1.25	0	0	\$5,000	0.00	Corpus Christi
2012-05-10	14:24:00	1.25	0	0	0.00	0.00	Corpus Christi
2012-05-10	13:16:00	1.75	0	0	0.00	0.00	Corpus Christi
2012-05-15	13:41:00	0.75	0	0	0.00	0.00	Nueces
2012-11-03	21:15:00	0.88	0	0	0.00	0.00	Corpus Christi
2012-11-03	21:30:00	0.88	0	0	0.00	0.00	Corpus Christi
2014-04-04	04:00:00	1.00	0	0	\$500	0.00	Corpus Christi
2014-04-04	04:05:00	1.00	0	0	\$100	0.00	Robstown
2014-04-04	03:28:00	1.75	0	0	\$100	0.00	Nueces
2015-04-17	20:44:00	1.00	0	0	0.00	0.00	Corpus Christi
2015-04-22	13:15:00	0.88	0	0	0.00	0.00	Corpus Christi
2015-04-22	12:30:00	1.00	0	0	0.00	0.00	Nueces
2015-04-22	12:12:00	1.00	0	0	0.00	0.00	Robstown
2015-04-22	12:32:00	1.75	0	0	0.00	0.00	Nueces
2016-04-24	15:55:00	1.75	0	0	\$50,000	0	Corpus Christi

Table 13-3. Historical Hailstorm Events, 1956-2021 (cont.)

Date	Time	Magnitude (Size of Hail)	Injuries	Fatalities	Prop Damage	Crop Damage	Jurisdiction
2016-04-24	16:00:00	2.75	0	0	\$250,000	0	Corpus Christi
2016-04-24	16:02:00	2.75	0	0	\$250,000	0	Corpus Christi
2016-04-24	16:10:00	1.5	0	0	\$100,000	0	Corpus Christi
2016-04-24	16:10:00	1	0	0	\$25,000	0	Corpus Christi
2016-04-24	16:15:00	1	0	0	\$25,000	0	Corpus Christi
2016-06-02	14:37:00	1	0	0	0	0	Driscoll
2017-06-04	16:50:00	1	0	0	0	0	Corpus Christi
2017-06-04	16:59:00	1.75	0	0	\$10,000	0	Corpus Christi
2017-06-05	13:44:00	1.5	0	0	0	0	Driscoll
2020-08-18	17:12:00	1	0	0	0	0	Nueces

Probability

Probability, or frequency of return, was calculated by dividing the number of hailstorm events in the recorded time period by the overall time period that the resource database has recorded events for that jurisdiction. A hailstorm may travel over several jurisdictions; however, the hailstorm event is solely recorded for the jurisdiction of the hailstorm origin. Table 13-4 provides a general overview of hailstorm severity, probability, impacts, and defining characteristics. Probability for future hailstorm events is defined for the county and each participating jurisdiction in the following sections based on NCDC Storm Events Database records.

Probabilities of future hailstorm events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too may the locations, frequencies, and range of anticipated intensities of hailstorm events.

Table 13-4. Hailstorm Severity Defined

Minor Damage	Severe Damage	Extreme Damage
<ul style="list-style-type: none"> • 36% of all hailstorms. • \$0 to Less than \$100 in damage. • No bodily injuries if exposed to the hail. 	<ul style="list-style-type: none"> • 45% of all hailstorms • \$500 to \$50,000 in damages. • Minor bodily injuries if exposed to the hail. 	<ul style="list-style-type: none"> • 17% of all hailstorms • \$100,000 to \$5,000,000 in damages. • Fatalities possible if exposed to hail.

Impact

Hailstorm impacts are documented by the number of deaths, injuries, property damage, and crop damage. Table 13-5 provides a summary of impacts for Nueces County as a whole. Impacts to the county and participating jurisdictions is documented in the following sections.

Table 13-5. Historical Hailstorm Impacts Summary, 1955-2021⁶

Number of Events	Deaths	Injuries	Property Damage	Crop Damage
129	0	0	\$2,731,600	\$0

Vulnerability

Hailstorms typically cross-jurisdictional boundaries; therefore, all existing and future buildings, facilities, and populations in and around Nueces County are at potential risk of impact. The damage caused by a hail is dependent upon the size of the “hail stones” and result in damage to vehicles, buildings, roofs, plants, trees, and especially crops. Vulnerability of humans and property is difficult to evaluate given that hailstorms form at different strengths and in random locations. Property damage is typically most significant for vehicles and structures of light construction. Three types of structures are more likely to suffer damage: manufactured homes and recreational vehicles. Agricultural crops are especially vulnerable to 1” or greater size hail and can lead to total crop failure. Vulnerability is defined for the county and participating jurisdictions in the following sections.

⁶ NCDL Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

Unincorporated Nueces County Hailstorm Hazard

LOCATION							
County Wide (Unincorporated)							
OCCURENCE	EXTENT						
Number of Events 1955-2021*	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
28	6	2	9	0	1	7	3
PROBABILITY							
Number of Events	Record Time Period	Time Period Years	Probability				
28	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 2.3 YEARS				
IMPACT							
Number of Events	Deaths	Injuries	Property Damage	Crop Damage			
28	0	0	\$2,050,100	\$0			
VULNERABILITY							
Population (County)*	Property Value**		Crop Land				
	Commercial	Residential	Acres***	Value****			
13,579	\$968,938,581	\$755,606,666	280,817	\$122,134,449			

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-3. Unincorporated Nueces County Hailstorm Hazard Map (1955 – 2021)



City of Agua Dulce Hailstorm Hazard

LOCATION							
City Wide							

OCCURENCE Number of Events 1955- 2021	EXPECTED EXTENT*						
	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
0	23.7%	12.7%	35.5%	4.2%	5.1%	16.1%	2.5%

*While the City of Agua Dulce has no recorded hail events because hailstorms take place in a spatially unpredictable manner, it is expected that Agua Dulce can be impacted by hail events in the same way that the planning area as a whole has been impacted by hail events. A probabilistic distribution of hail extent of based up on historical occurrences in the planning area is presented above.

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
0	3/26/1956 to 4/22/2021	65	1% annual chance, or one hailstorm every 100 years *

*Based upon minimum probability of the planning area

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
0	0	0	\$0	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
688	\$15,251,504	\$19,726,169	2.45	\$1,066

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-4. City of Agua Dulce Hailstorm Hazard Map (1955 – 2021)



NOTE: There were no NCDCE Storm Events Database recorded hailstorm occurrences in this jurisdiction from 1955 to 2021.

Banquete ISD Hailstorm Hazard

LOCATION	
City Wide	

OCCURENCE Number of Events 1955- 2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	6	3	0	2	0	0	1

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
6	3/21/1956 – 4/22/2021	65	1 HAILSTORM EVENT ESTIMATED EVERY 10.8 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
6	0	0	\$50,000	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,862	\$102,846,088	\$222,649,907	61,968	\$26,951,458

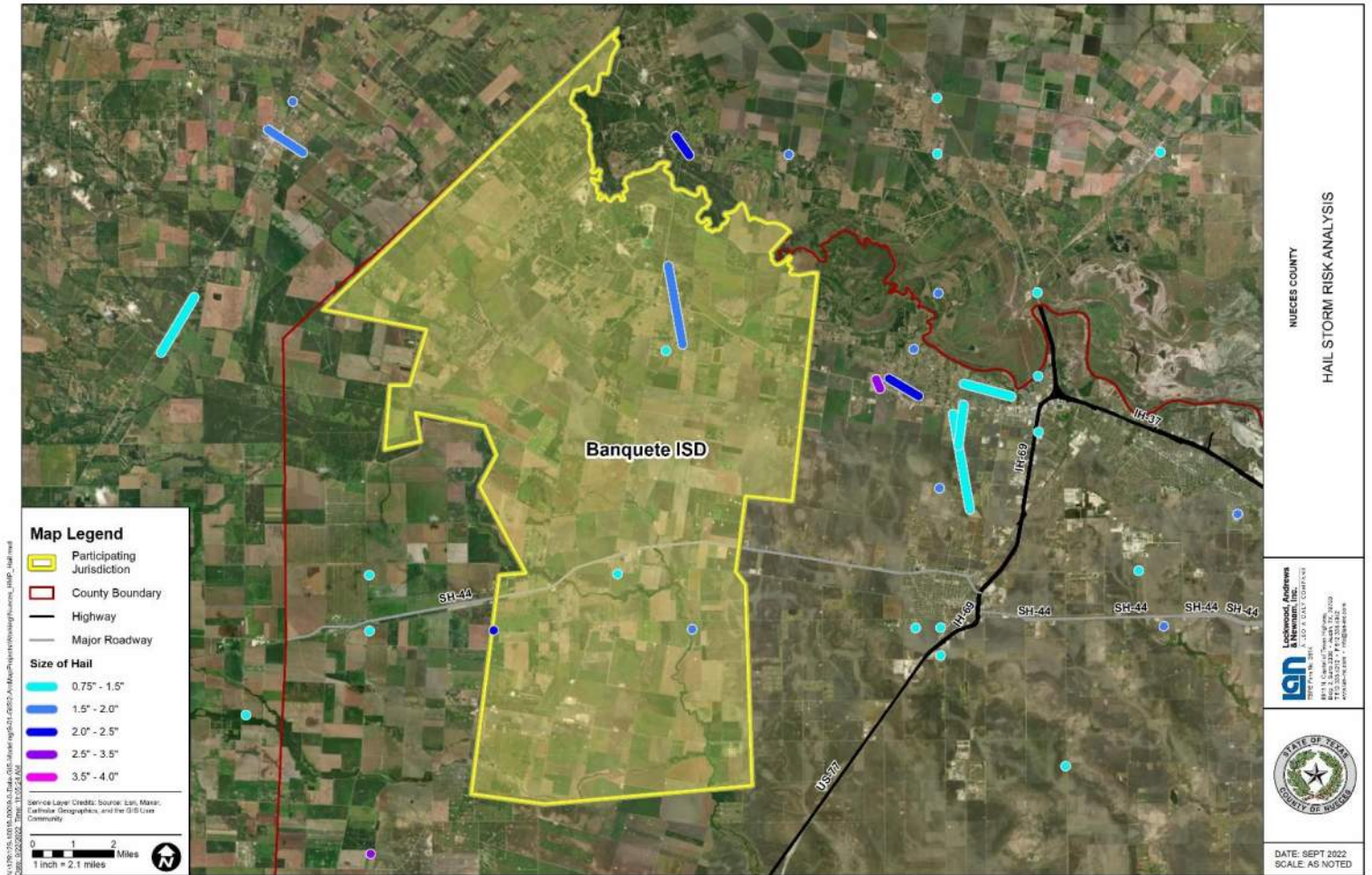
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-5. Banquete ISD Hailstorm Hazard Map (1955 – 2021)



City of Bishop Hailstorm Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT						
	Magnitude (Size of Hail)						
	¾"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
Number of Events 1955-2021							
16	4	2	7	0	1	2	0

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
16	3/21/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 4.1 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
16	0	0	\$5,150	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,155	\$123,993,966	\$110,819,070	232	\$100,903

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-6. City of Bishop Hailstorm Hazard Map (1955 – 2021)



City of Corpus Christi Hailstorm Hazard

LOCATION	
City Wide	

OCCURENCE Number of Events 1955- 2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	73	13	10	27	5	5	11

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
73	3/21/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 0.9 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
73	0	0	\$730,650	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
317,773	\$16,744,675,468	\$16,266,319,691	21,392	\$9,303,924

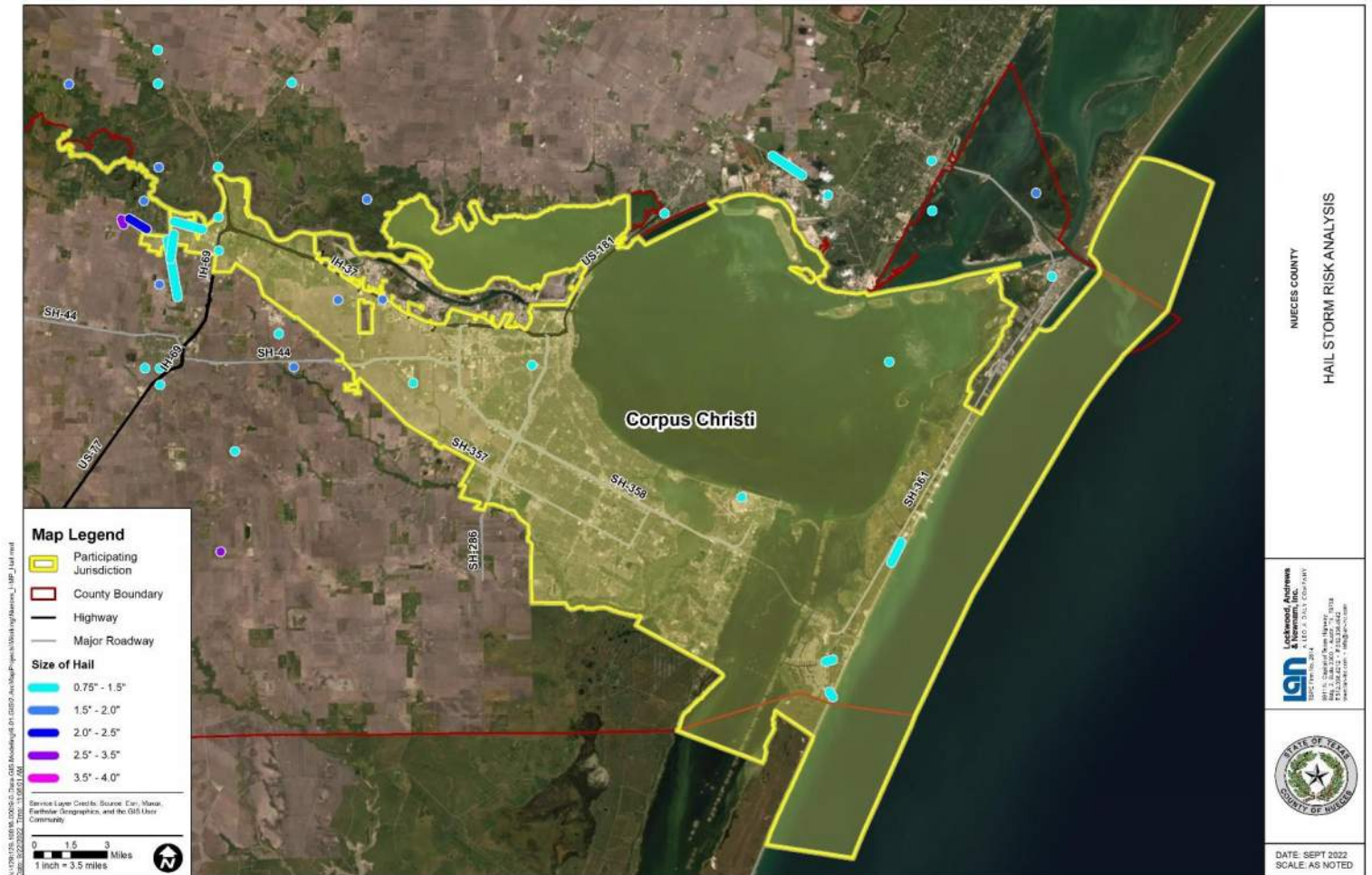
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-7. City of Corpus Christi Hailstorm Hazard Map (1955 – 2021)



City of Driscoll Hailstorm Hazard

LOCATION							
City Wide							

OCCURENCE Number of Events 1955- 2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	5	1	1	2	0	1	0

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
5	3/21/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 13 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
5	0	0	\$500	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
673	\$29,366,710	\$20,046,143	438	\$190,497

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-8. City of Driscoll Hailstorm Hazard Map (1955 – 2021)



City of Petronila Hailstorm Hazard

LOCATION	
City Wide	

OCCURENCE Number of Events 1955- 2021*	EXPECTED EXTENT*						
	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
0	23.7%	12.7%	35.5%	4.2%	5.1%	16.1%	2.5%

*While the City of Petronila has no recorded hail events because hailstorms take place in a spatially unpredictable manner, it is expected that Petronila can be impacted by hail events in the same way that the planning area as a whole has been impacted by hail events. A probabilistic distribution of hail extent of based up on historical occurrences in the planning area is presented above.

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
0	3/26/1956 to 4/22/2021	65	1% annual chance, or one hailstorm every 100 years **

*Based upon minimum probability of the planning area

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
0	0	0	\$0	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
87	\$667,778	\$2,988,340	108	\$46,972

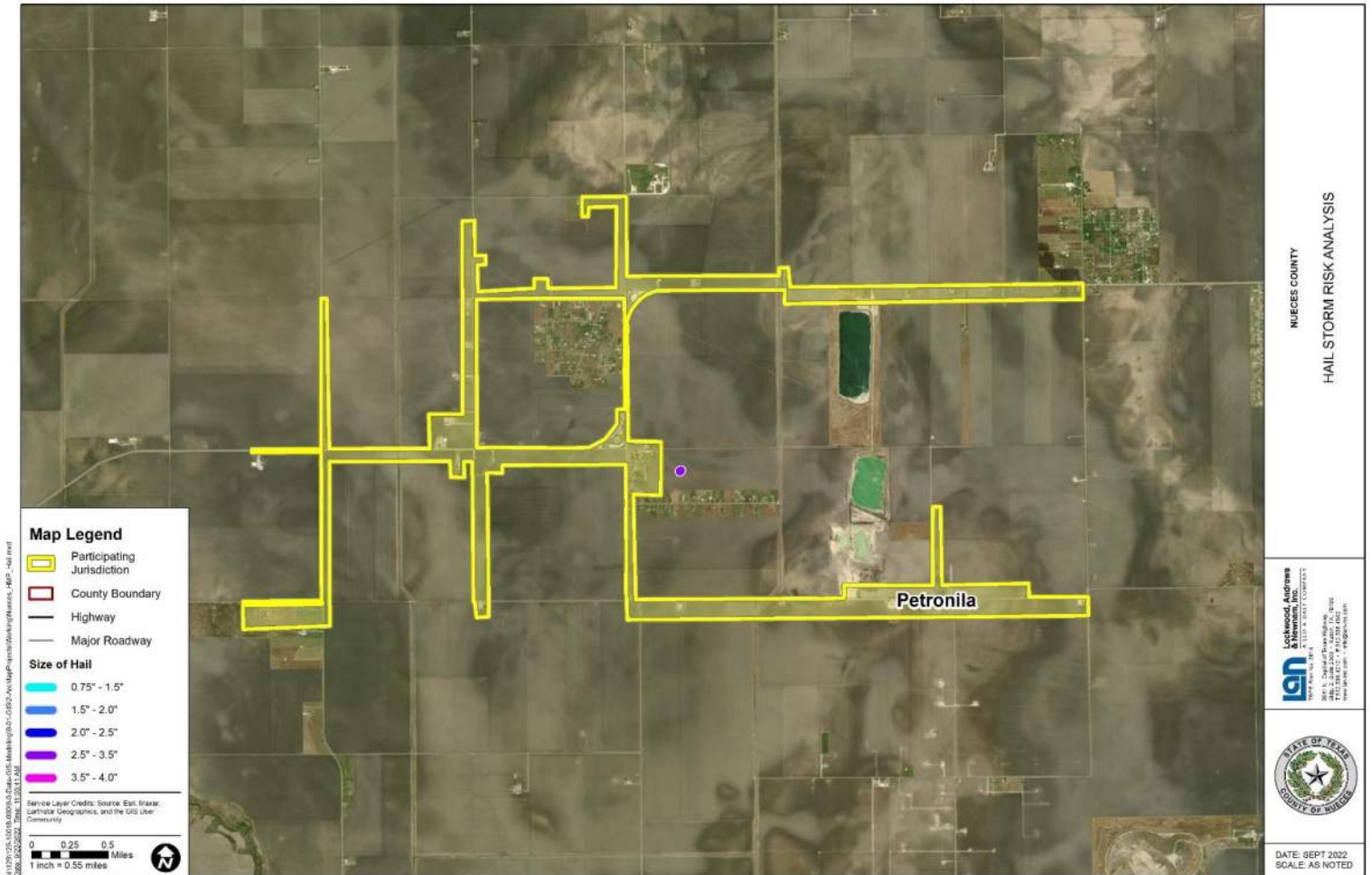
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-9. City of Petronila Hailstorm Hazard Map (1955 – 2021)



NOTE: There were no NCEC Storm Events Database recorded hailstorm occurrences in this jurisdiction from 1955 to 2021.

City of Port Aransas Hailstorm Hazard

LOCATION							
Jurisdiction Wide							
OCCURENCE	EXPECTED EXTENT*						
Number of Events 1955-2021	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
1	1	0					
PROBABILITY							
Number of Events	Record Time Period	Time Period Years	Probability				
1	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 65 YEARS				
IMPACT							
Number of Events	Deaths	Injuries	Property Damage	Crop Damage			
1	0	0	\$0	\$0			
VULNERABILITY							
Population*	Property Value**		Crop Land				
	Commercial	Residential	Acres***	Value****			
3,105	\$25,743,548,569	\$2,154,096,149	859	\$373,601			

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-10. City of Port Aransas Hailstorm Hazard Map (1955 – 2021)



City of Robstown Hailstorm Hazard

LOCATION							
City Wide							

OCCURENCE Number of Events 1955-2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	10	3	1	3	0	2	1

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
10	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 6.5 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
10	0	0	\$100,000	\$0

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
10,157	\$373,735,450	\$229,911,267	4,413	\$1,919,326

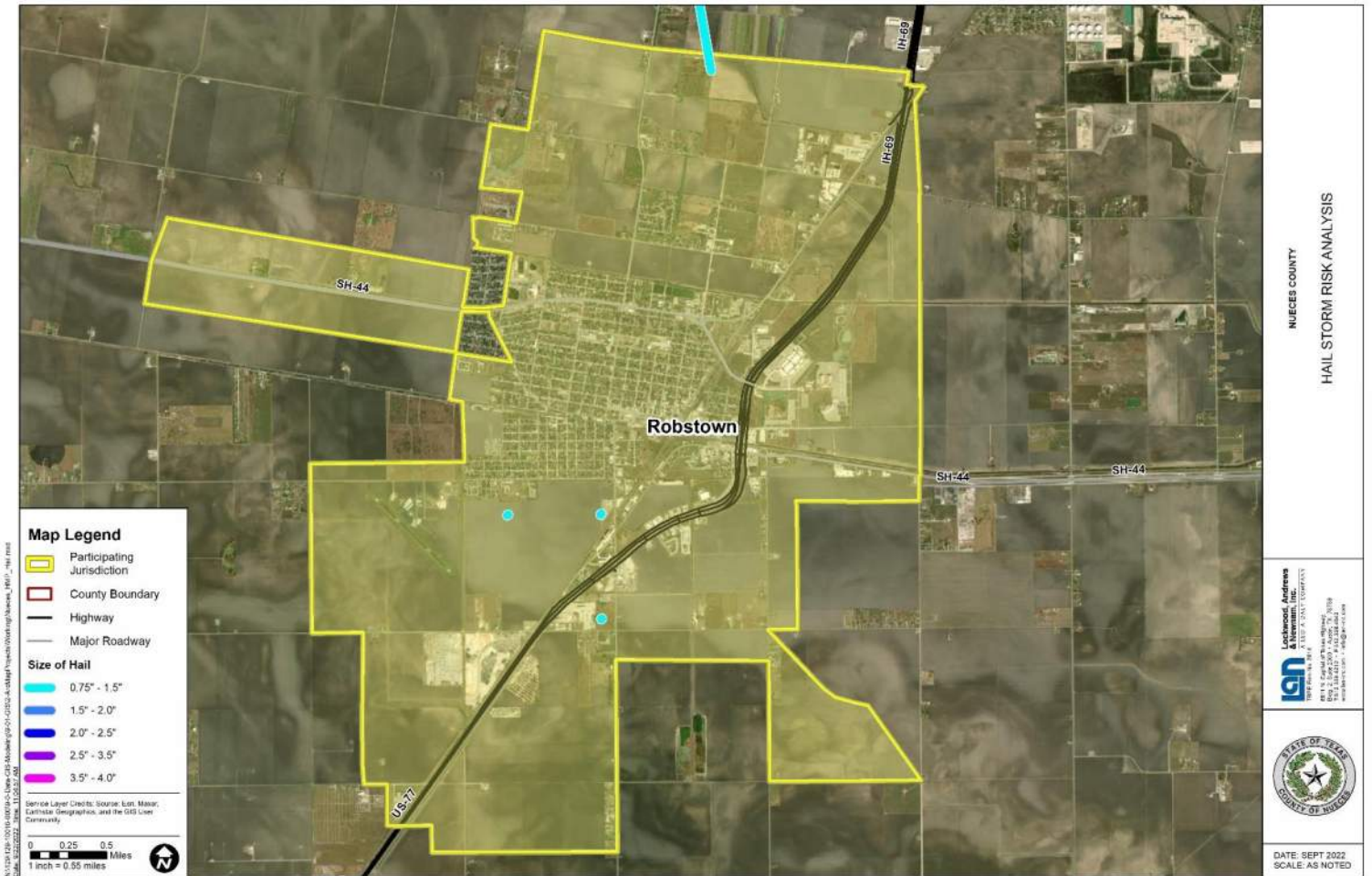
* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Figure 13-11. City of Robstown Hailstorm Hazard Map (1955 – 2021)



Nueces County Drainage District #2 Hailstorm Hazard

LOCATION							
District Wide							

OCCURENCE Number of Events 1955-2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	12	4	1	3	0	1	2

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
12	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 5.4 YEARS

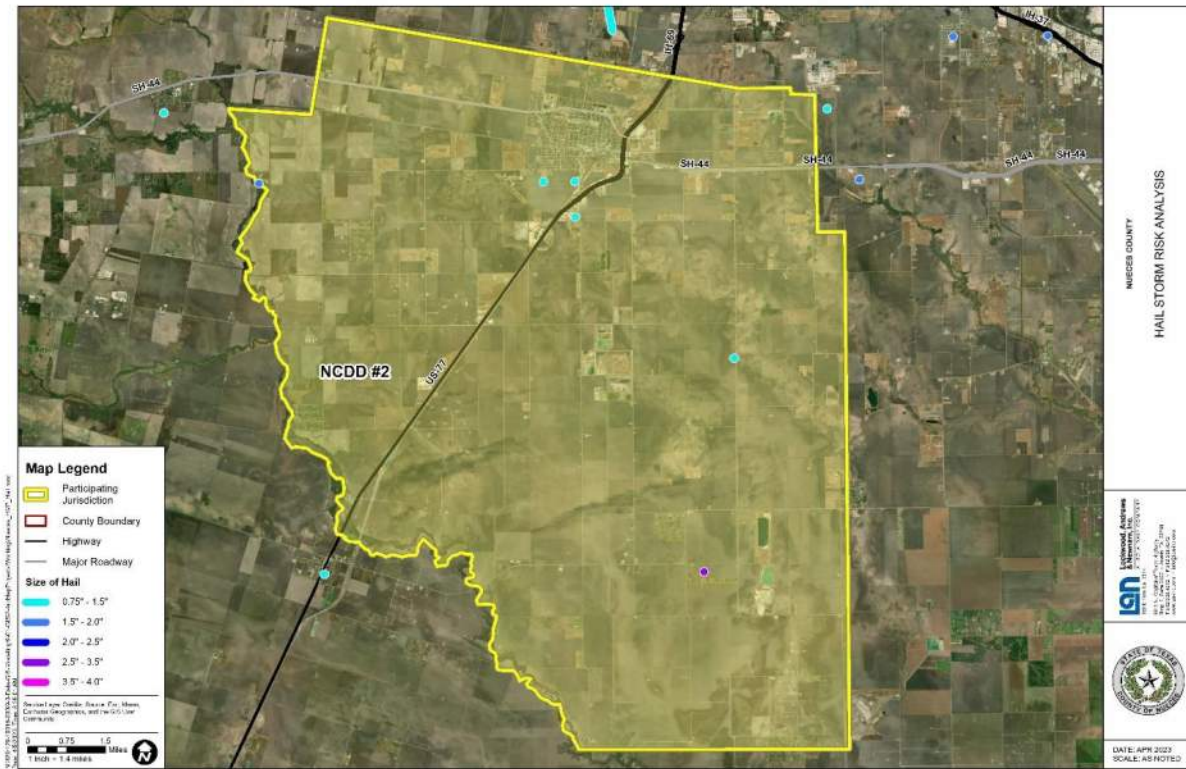
IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
12	0	0	\$50,000	\$0

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 13-12. Nueces County Drainage District #2 Hailstorm Hazard Map (1955 – 2021)



Nueces County Water Control and Improvement District #3 Hailstorm Hazard

LOCATION							
District Wide							

OCCURENCE Number of Events 1955-2021	EXTENT Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
	2	0	0	1	0	1	0

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
2	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 32.5 YEARS

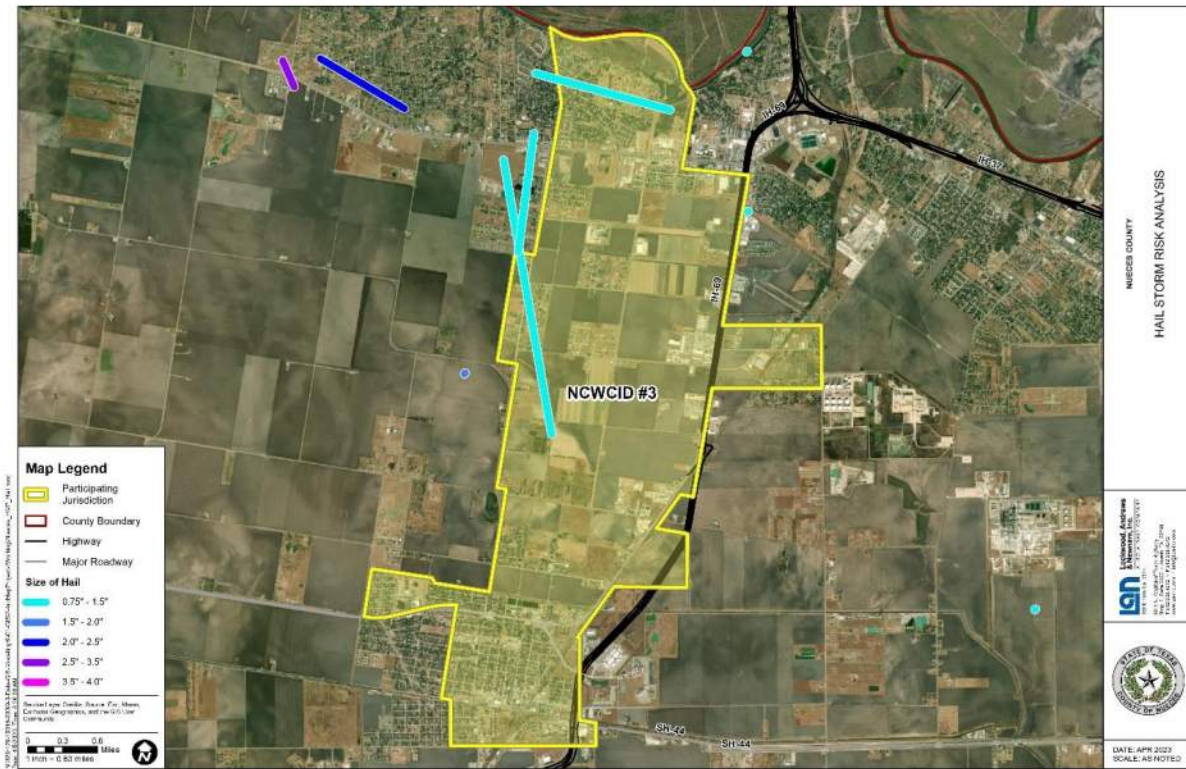
IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
2	0	0	\$125,000	\$0

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$4,719,980	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

**Figure 13-13. Nueces County Water Control and Improvement District #3
Hailstorm Hazard Map (1955 – 2021)**



Nueces County Water Control and Improvement District #4 Hailstorm Hazard

LOCATION							
District Wide							

OCCURENCE Number of Events 1955-2021	EXPECTED EXTENT*						
	Magnitude (Size of Hail)						
	3/4"	7/8"	1"	1 1/4"	1 1/2"	1 3/4"	2 3/4"
6	2	0	2	0	1	1	0

PROBABILITY			
Number of Events	Record Time Period	Time Period Years	Probability
6	3/26/1956 to 4/22/2021	65	1 HAILSTORM ESTIMATED EVERY 10.8 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
6	0	0	\$5,000	\$0

VULNERABILITY		
Population Served**		Infrastructure*
6,281		\$21,097,000
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

**Figure 13-14. Nueces County Water Control and Improvement District #4
Hailstorm Hazard Map (1955 – 2021)**



Section 14: Expansive Soils

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Expansive Soils Hazard Overview

Description

Expansive soils contain minerals such as clay that are prone to large volume changes (swelling and shrinking). Soils with a high content of expansive minerals can shrink in drier seasons forming deep cracks. This shrinkage can remove support from buildings or other structures and result in damaging subsidence.

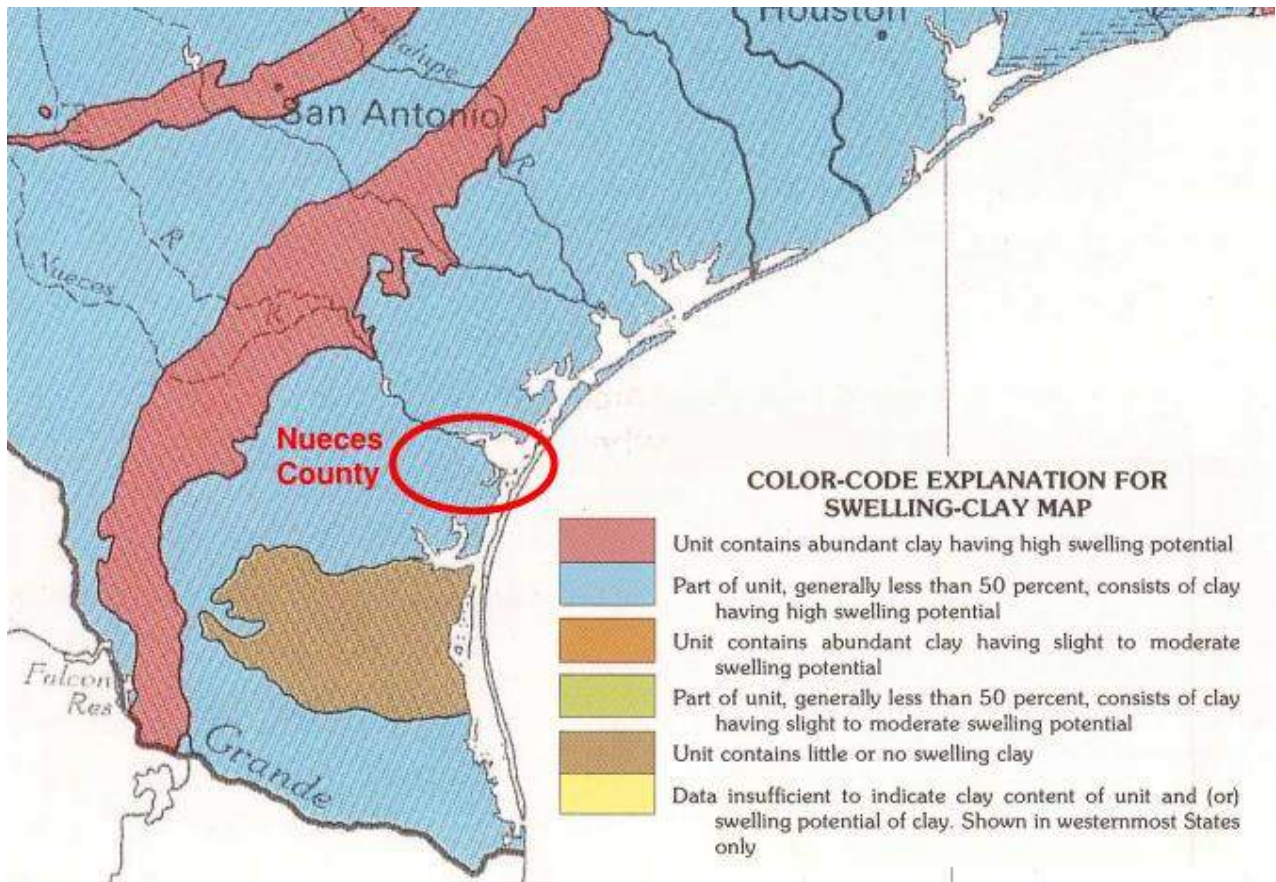
Location

Expansive soils with high clay content can expand to as much as 15 times its original volume. The soils in Nueces County, and most of the Texas Gulf Coast, typically contain less than 50 percent of clay soils that have a high swelling potential. Swelling potential in the Texas Gulf Coast is illustrated in Figure 14-1.

Location Variability

Expansive Soil Hazards are unique in comparison to hazards that affect the overall planning area due to the geographic variation of jurisdictions and their respective soil characteristics. Existing soil conditions vary per jurisdiction and their effect on infrastructure are highly dependent on the shrink/swell cycle of the jurisdictions respective soil. Variability in expansive soils hazard area affecting planning jurisdictions can be seen in **Figures 14-6 to Figures 14-17**.

Figure 14-1. Texas Gulf Coast Swelling-Clay Map¹



A USDA soil survey for Nueces County indicates that approximately 67% of Nueces County's land surface consists of clay soils as indicated in Table 14-1.

¹ USDA soil survey for Nueces County

Table 14-1. Nueces County Clay Soil Survey²

Nueces County - Percentage of Clay Soils				
Symbol	Soil Name	Acres	%	
Ba	Banquete clay	11,895	1.7%	Percentage Excluding Water Surface
Bn	Edroy clay	3,673	0.5%	
Cd	Aransas clay	3,087	0.4%	
Fc	Sinton sandy clay loam	2,184	0.3%	
Lo	Aransas clay	2,808	0.4%	
Ma	Ijam clay loam	4,836	0.7%	
Oc	Calallen sandy clay loam	4,146	0.6%	
Pt	Point Isabel clay loam	163	0.0%	
Tc	Aransas clay	4,842	0.7%	
Tf	Aransas clay	4,005	0.6%	
VcA	Victoria clay	306,476	43.8%	
VcB	Victoria clay	4,440	0.6%	
Vd2	Monteola clay	3,072	0.4%	
Vt	Victoria clay	13,151	1.9%	
Land Surface	Total Clay Soils	368,777	52.5%	
	Other Soils	179,428	25.5%	33%
	Total Land Surface	548,205		
	Water Surface	152,006	22%	
Total Nueces County		700,211	100%	

Extent

Section 618.41 of the National Soil Survey Handbook (NSSH), by the USDA’s Natural Resources Conservation Service, indicates expansive soils can be measured as a percent of the volume change of an oven-dried soil sample when it changes from moist to dry conditions. This percentage is called the Linear Extensibility Percent (LEP). The LEP is calculated as indicated in Figure 14-2.

² USDA Web Soil Survey

Figure 14-2. Linear Extensibility Percent (LEP) Formula³

$$COLE = \frac{(\text{moist length}) - (\text{dry length})}{\text{dry length}}$$

COLE = Coefficient Of Linear Extensibility

LEP = COLE x 100

The higher the LEP percentage the greater the amount the soil will shrink and swell. LEP can be expressed in four Shrink-Swell classifications from Low to Very High as indicated in Table 14-2. The shrinking and swelling of soils with Moderate to Very High LEP can damage buildings, roads, buried infrastructure such as pipelines, and other structures. High to Very High LEP soils can even damage plant roots. Figure 14-3 graphically illustrates the distribution of soils for Nueces County by LEP Shrink-Swell classifications. The soil distributions for each jurisdiction may be viewed in Figures 6 through 17.

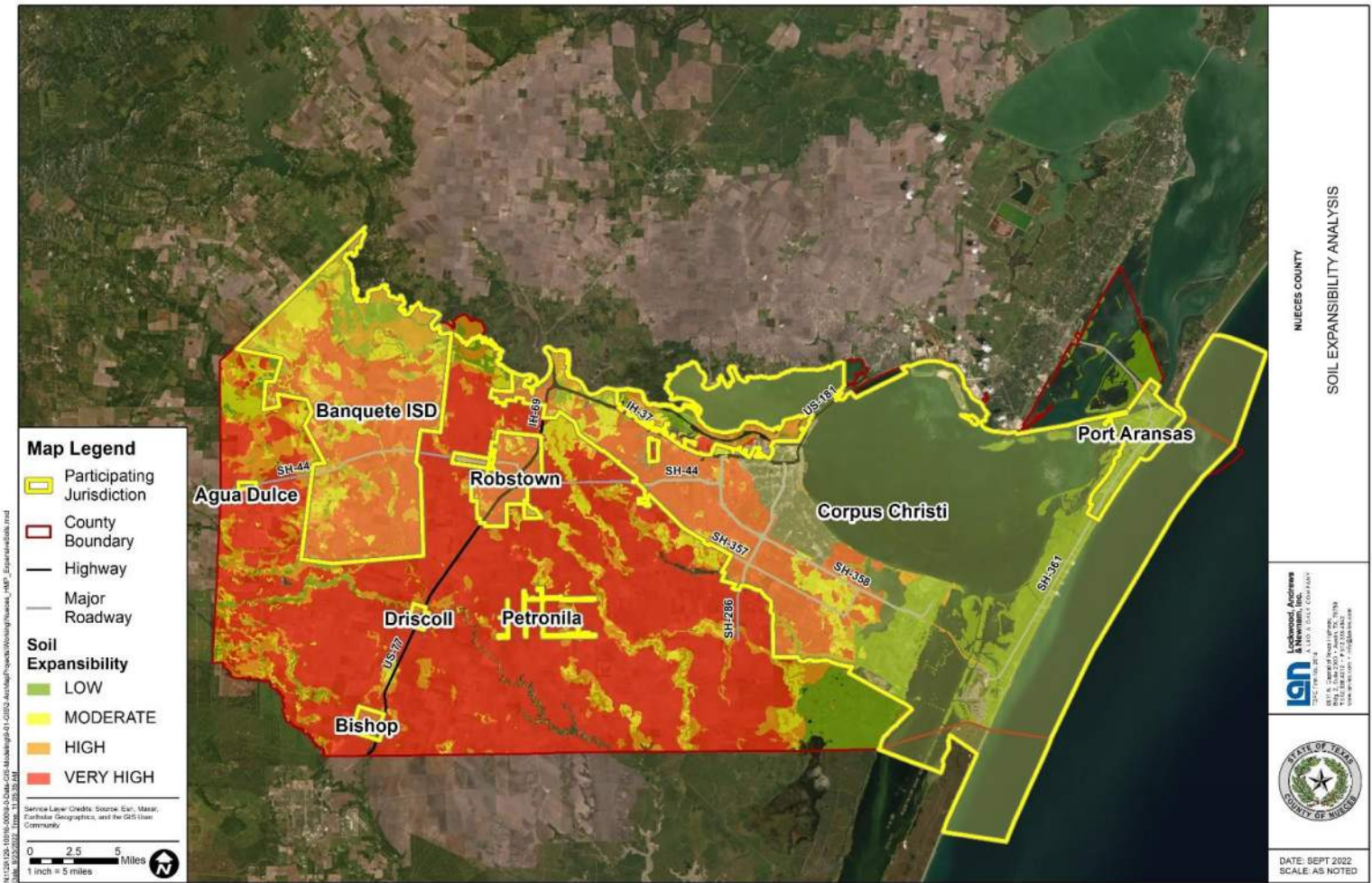
Table 14-2. Shrink-Swell Classifications⁴

Shrink-Swell Class	Linear Extensibility Percent (LEP)
Low	< 3.0%
Moderate	3.0% - 5.9%
High	6.0% - 8.9%
Very High	≥ 9.0%

³ USDA Web Soil Survey

⁴ USDA Web Soil Survey

Figure 14-3. Nueces County Soil Distribution by LEP Shrink-Swell Classification



Occurrences

Expansive soils are a condition that is native to the soil characteristics for specific geographic locations and “cannot be documented as a time-specific event, except when it leads to structural and infrastructure damage.”⁵

Damage due to expansive soils started to increase significantly in the 1960s when construction materials and foundations for residential homes started changing from pier and beam foundations with flexible sidings like wood to rigid monolithic concrete slab-on-grade foundations with brick and other masonry sidings. The rigid foundations with rigid sidings are less forgiving and are readily damaged by the differential swelling and shrinking cycles of expansive soils.

⁵ State of Texas Mitigation Plan, 2013

Probability

While damage due to expansive soils hazard is common in Nueces County, it is not well documented. Private claims documenting damages exclusively caused by expansive soils are typically not made available in the public domain. Table 14-3 lists the percentage and trend of foundation damage insurance claims made in Texas from 1960 to 2005 and includes forecasted claim percentages from 2017 to 2027. The forecasted claim percentages are based on the claim trend from 1960 to 2005 as graphically illustrated in Figure 14-4.

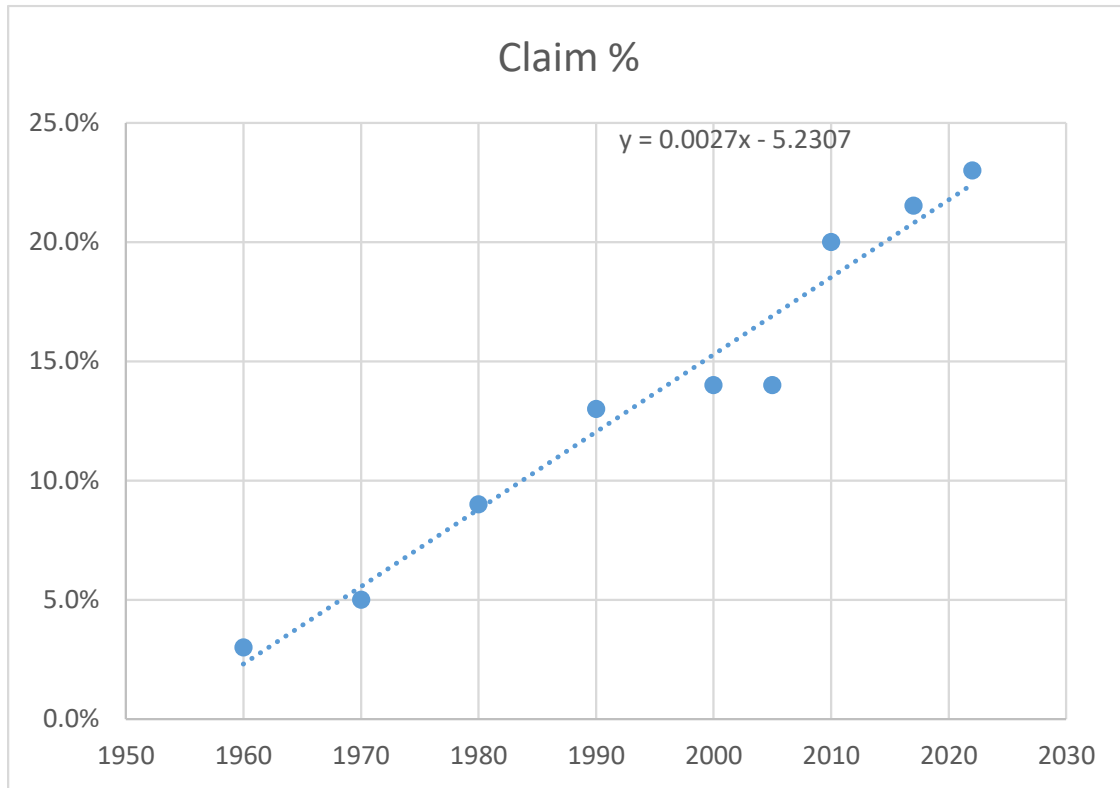
Table 14-3: Texas Foundation Damage Insurance Claims⁶

Year	Claim %
1960	3%
1970	5%
1980	9%
1990	13%
2000	14%
2005	14%
2017	21.5%*
2022	23.0%*
2027	24.0%*

*Forecasted

⁶ State of Texas Mitigation Plan, 2013

Figure 14-4. Texas Foundation Damage Insurance Claims – Trend Chart



Another indicator of historic impacts and potential future impacts is the accelerated trend of foundation repair companies opening offices in/proximity to Nueces County. As indicated in Table 14-4 and Figure 14-5, the quantity of building foundation repair companies with offices in Nueces County has increased greatly in the 15 years, from 11 in the year 2000 to 29 in 2018. The average quantity opening per year nearly doubled to 1.25 per year between 2010 to 2018, compared to the previous extended period of 0.76 per year between 1978 to 2018.

Table 14-4. Rate of Foundation Repair Companies Opening in Nueces County

Year Opened	Duration (Years)	Quantity Opened	Average Quantity Opening / Year
1978 - 2000	23	11	0.48
2001 - 2009	8	8	1
2010 - 2018	8	10	1.25
1978 - 2018	38	29	0.76

Figure 14-5. Trend of Foundation Repair Companies Opening in Nueces County

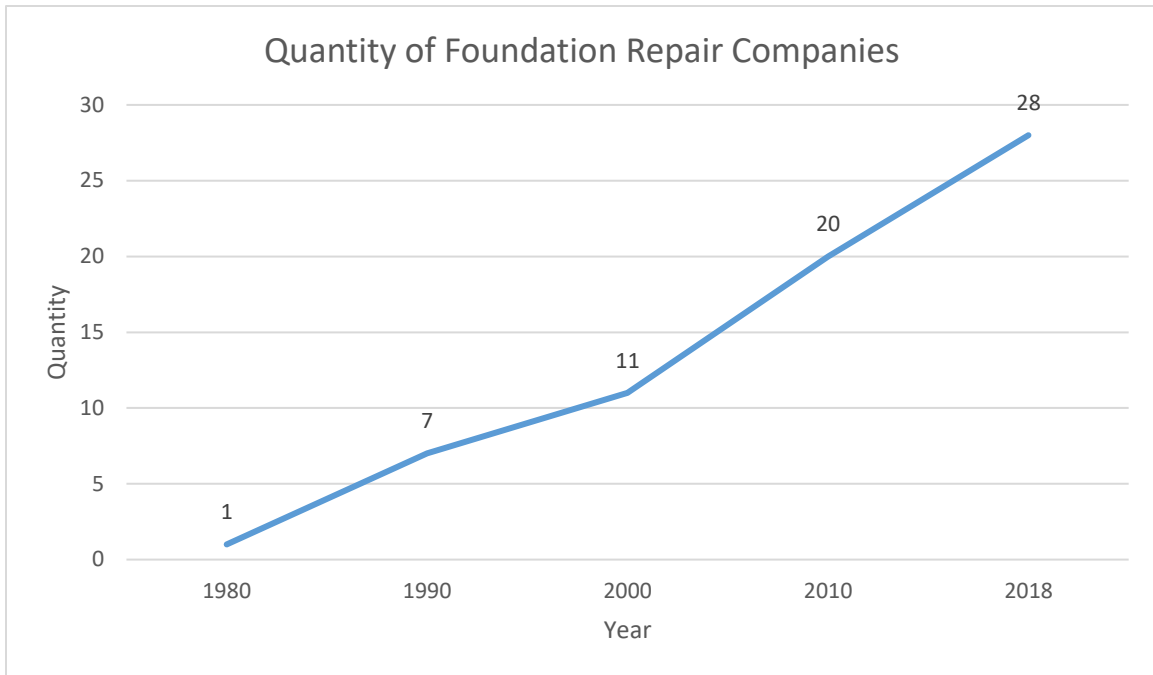


Table 14-5. Foundation Repair Companies Opening Offices in Nueces County*

	Company Name	Year Opened	Years in Business	Age	
1	Du-West Services	1978	44	20+	59%
2	Dawson Foundation Repair Inc.	1984	38		
3	ABC Foundation	1984	38		
4	CC Foundation Repair Co.	1986	36		
5	BKB Structural Repairs	1989	32		
6	Coastal Bend Foundation Repair	1989	32		
7	Gulf Coast Foundation Repair	1990	32		
8	On the Level Foundation Repair	1996	26		
9	Texas Superior Construction & Foundation Repair	1996	26		
10	Olympia Construction Company	1998	24		
11	Superior Custom Builders	1998	24		
12	Bridge Foundation Repair	2001	21		
13	Leveling and Repair	2001	21		
14	Stream Co. Foundation Repair	2001	21		
15	Area Foundation Repair	2004	18	11-19	17%
16	Hercules Foundation Repair and Remodeling	2004	18		
17	Eagle Foundation Repair	2004	18		
18	Uretek ICR South Texas	2005	17		
19	Aguila Construction	2006	16		
20	KJ Foundation Repair	2010	12		
21	Level One Foundation Repair	2011	11		
22	Crown Foundation Repair	2012	10	1-10	24%
23	Mammoth Foundation Repair	2012	10		
24	Paramount Foundation Repair	2012	10		
25	Sure Lift Foundation Repair	2013	9		
26	Wombat Excavations	2013	9		
27	USA Foundation Repair	2015	7		
28	J.C. Restorations LLC	2015	7		
29	MD Foundation Repair	2018	4		

* Based on the Better Business Bureau records. Years in business is assumed based on year the BBB opened a profile on the company.

With approximately 67% of Nueces County consisting of expansive clay soils, and the majority of Nueces County having High to Very High expansive soils as graphically illustrated in Figure 14-5, and the assumption that insurance claims for foundation damage in Nueces County follows the State trend, and that the growth of foundation repair companies in Nueces County will continue, it appears highly probable that all of the Jurisdictions in Nueces County (with the possible exceptions being Port Aransas, and the Flour Bluff and Padre Island communities of Corpus Christi) will experience property damage from expansive soils, which will further increase with anticipated population growth and development.

Probabilities of future expansive soil events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change, so too may frequencies and range of anticipated intensities of expansive soil swelling and shrinkage events.

Impact

Swelling and shrinkage typically varies depending on the amounts of moisture content and clay content. Uneven shrink/swell cycles are what causes damage to building foundations, walls, roadway pavement, sidewalks, underground piping, and other structures. Lightweight types of foundations like concrete pavement for roads and concrete slab on grade foundations are particularly susceptible to damage from the shrink/swell cycle. Cracked foundations, floors, and basement walls are typical types of damage done by swelling soils.

Private claims documenting damages exclusively caused by expansive soils are not well documented in the public domain. However, as indicated by the increasing trend of insurance claims and accelerated growth of foundation repair companies in Nueces County, varying degrees of future damage to building foundations should be anticipated as well as impacts to roads and buried infrastructure. The expansive soil hazard is not anticipated to impact the health and safety of Nueces County residents.

Impact can be measured in terms of property damage when such data is made available.

Vulnerability

Expansive soils primarily represent a threat to buildings and subterranean infrastructure. Crops and people are not typically directly threatened by expansive soils. Vulnerabilities to expansive soils are determined by examining what critical assets and properties are in different areas of soil expansibility.

Unincorporated Nueces County Expansive Soils Hazard

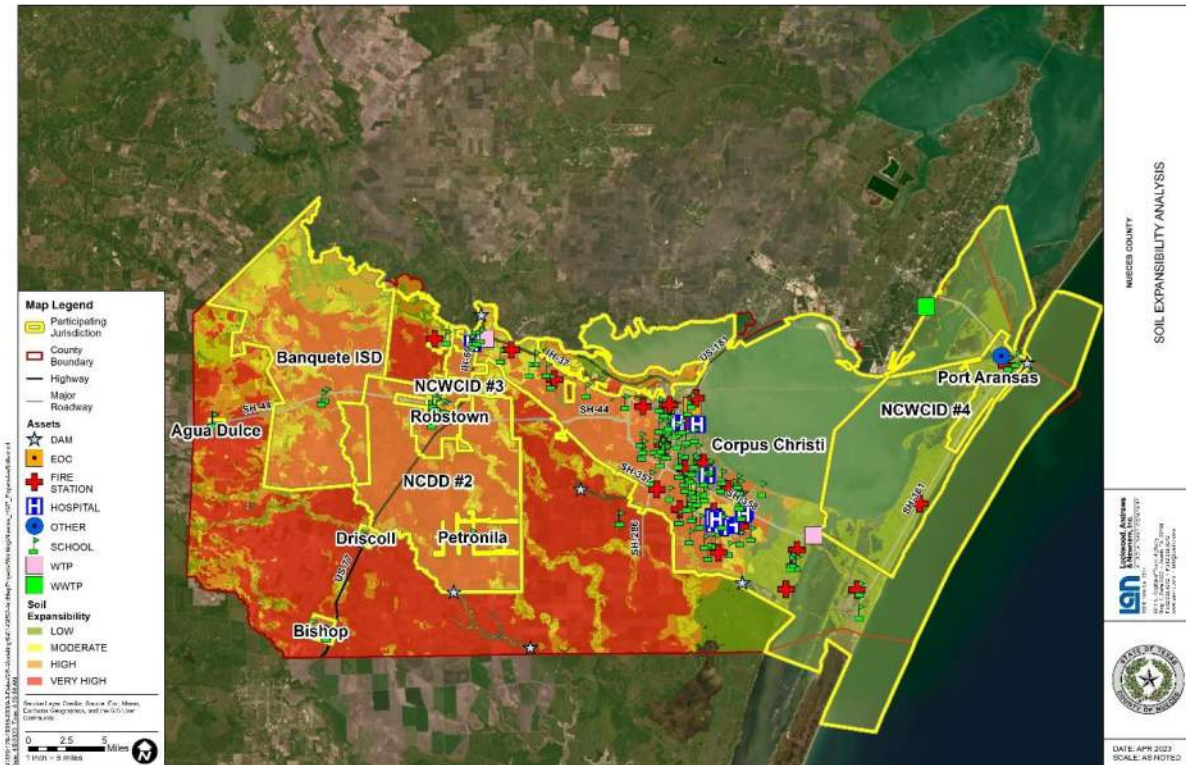
LOCATION	
County-wide, see map	
OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$33,331,645	5%	379	6%	\$271,711,906	13%	19,380	6%
MODERATE	\$126,830,668	95%	921	94%	\$427,680,038	87%	27,194	94%
HIGH	\$97,890,695		1,044		\$709,357,079		46,296	
VERY HIGH	\$479,901,093		3,936		\$630,492,744		228,811	
TOTAL	\$737,954,101		6,280		\$2,039,241,767		321,681	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
LOW	DAM	Belvy Lake Dam
		Gertrude Lubby Lake Dam
MODERATE	FIRE STATION	Nueces County Emergency Services District 1
VERY HIGH	DAM	Chapman Ranch Lake Dam
	SCHOOL	London ISD London HS
		London ISD London EL

Figure 14-6. Unincorporated Nueces County Soil Expansibility Hazard Map



City of Agua Dulce Expansive Soils Hazard

LOCATION	
City-wide, see map	

OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$0	0%	0	0%	\$0	0%	0	0%
MODERATE	\$0		0		\$0		0	
HIGH	\$353,328	100%	2	100%	\$10,169	100%	1	100%
VERY HIGH	\$19,372,841		61		\$16,354,719		72	
TOTAL	\$19,726,169		63		\$16,364,888		73	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	Agua Dulce ISD Agua Dulce HS
		Agua Dulce ISD Agua Dulce Elementary School

Banquete ISD Expansive Soils Hazard

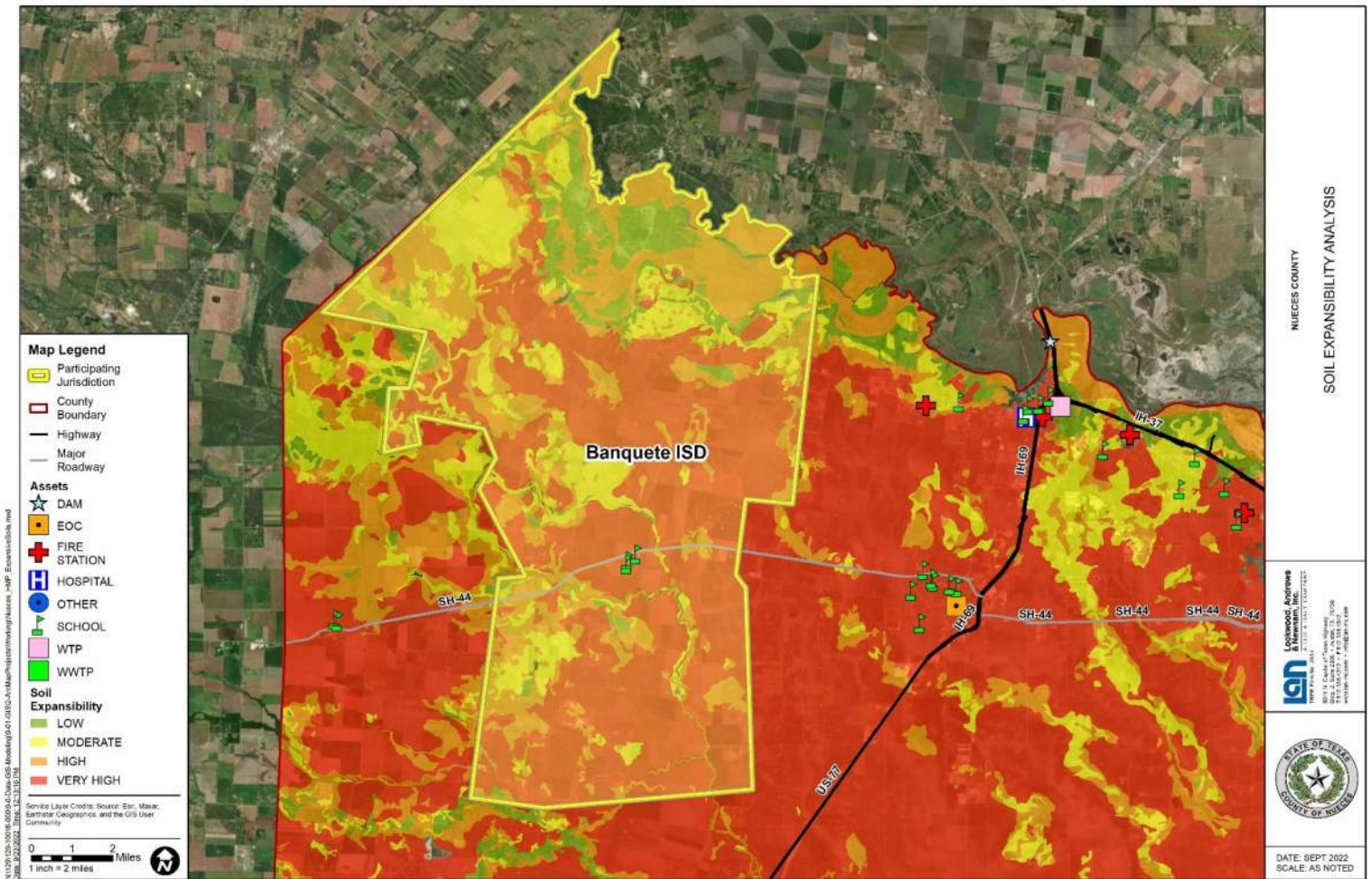
LOCATION	
Jurisdiction-wide, see map	
OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$20,925,488	9%	372	12%	\$10,701,157	6%	5,882	8%
MODERATE	\$47,835,182	91%	763	88%	\$22,870,351	94%	9,846	92%
HIGH	\$46,473,432		613		\$26,516,753		20,594	
VERY HIGH	\$107,415,805		1,314		\$133,053,159		38,713	
TOTAL	\$222,649,907		3,062		\$193,141,420		75,035	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	Banquete ISD Banquete H S
		Banquete ISD Banquete EL
		Banquete ISD Banquete J H

Figure 14-8. Banquete ISD Soil Expansibility Hazard Map



City of Bishop Expansive Soils Hazard

LOCATION	
City-wide, see map	

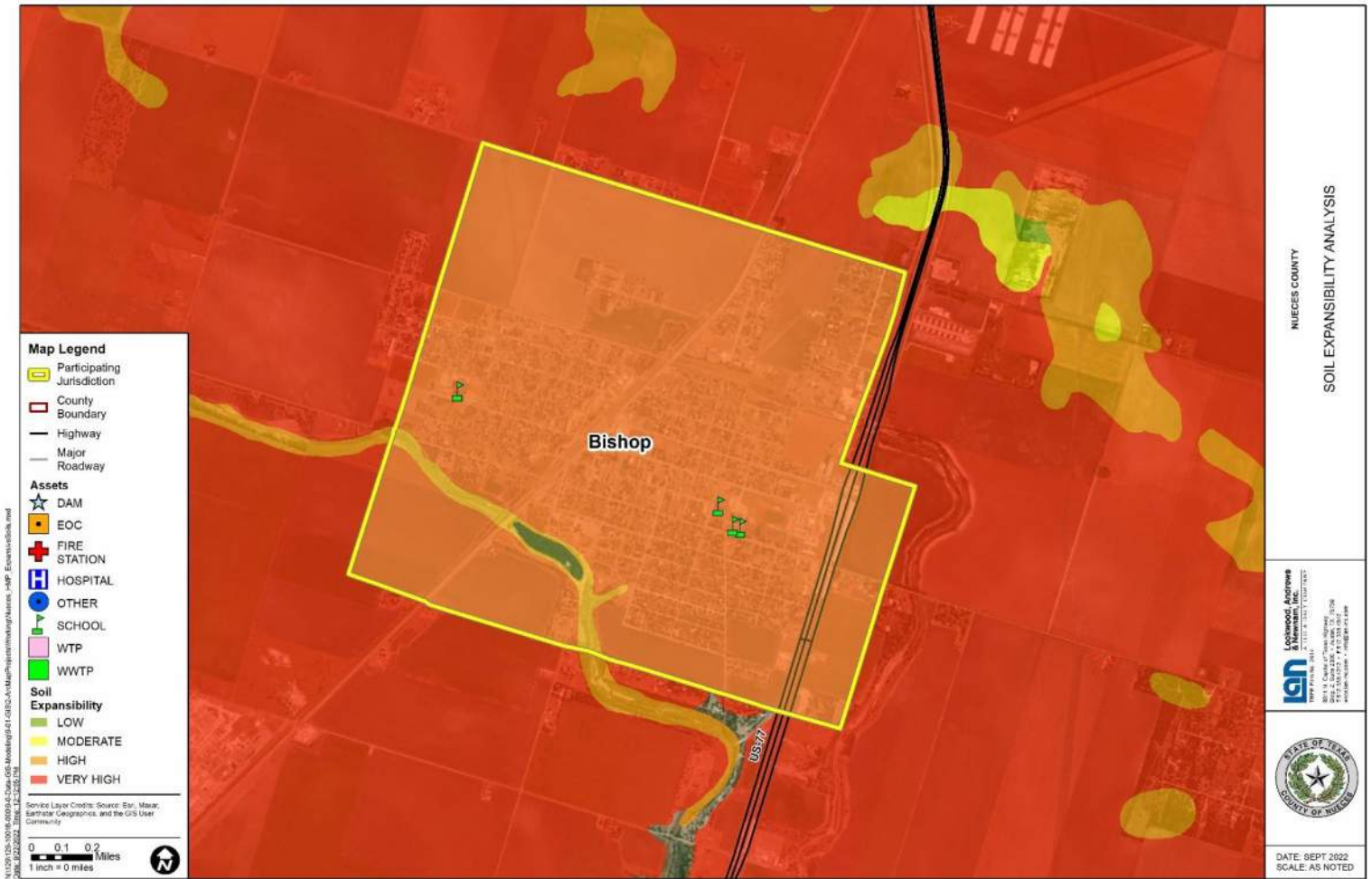
OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$0	0%	0	0%	\$0	0%	0	0%
MODERATE	\$0		0		\$0		0	
HIGH	\$64,501	100%	1	100%	\$1,934,904	100%	45	100%
VERY HIGH	\$110,754,569		379		\$127,125,064		822	
TOTAL	\$110,819,070		380		\$129,059,968		867	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	Bishop CISD Bishop PRI
		Bishop CISD Bishop EL
		Bishop CISD Bishop H S
		Bishop CISD Lillion E Luehrs J H

Figure 14-9. City of Bishop Soil Expansibility Hazard Map



City of Corpus Christi Expansive Soils Hazard

LOCATION	
City-wide, see map	
OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$1,728,905,839	15%	3,021	21%	\$1,695,758,985	11%	18,958	33%
MODERATE	\$2,112,443,233	85%	2,604	79%	\$1,236,271,432	89%	3,997	67%
HIGH	\$1,045,507,384		1,202		\$672,249,160		5,278	
VERY HIGH	\$6,578,773,396		7,376		\$11,367,172,282		29,078	
TOTAL	\$11,465,629,852		14,203		\$14,971,451,859		57,311	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)			
VULNERABLE CRITICAL FACILITIES			
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME	
LOW	DAM	Barney M Davis Cooling Reservoir Dam	
	EOC	Nueces County Emergency Operations Center	
	WWTP	Laguna Madre Wastewater	
	FIRE STATION		Nueces County Emergency Services District 2
			Fire Station 3
			Fire Station 1
			Fire Station 8
			Fire Station 7
			Fire Station 13
			Fire Station 15
			Fire Station 16
			Fire Station 5

VULNERABILITY (CONT.)

VULNERABLE CRITICAL FACILITIES

SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
LOW	HOSPITAL	Christus Spohn Hospital Corpus Christi
		Christus Spohn Hospital Corpus Christi Shoreline
		Driscoll Children S Hospital
		Dubuis Hospital of Corpus Christi
		The Corpus Christi Medical Center - Doctors Regional
	SCHOOL	Ray HS
		Seashore Charter Schools Seashore Middle Acad
		Roy Miller HS And Metro School of Design
		Hamlin Middle
		Seashore Charter Schools Seashore Learning Center
		Flour Bluff ISD Early Childhood Center
		Oak Park Special Emphasis School
		Evans Ses
		Houston EL
		Mary Helen Berlanga EL
		Crockett EL
		Allen EL
		Shaw Ses
		Collegiate HS
		Driscoll Middle
		Hicks EL
		Flour Bluff ISD Flour Bluff Int
		Zavala EL
		Flour Bluff ISD Flour Bluff Pri
		Corpus Christi Montessori School
		Flour Bluff ISD Flour Bluff JH
		Flour Bluff ISD Flour Bluff EL
		Martin Middle
		Dr M L Garza-Gonzalez Charter School Gcclr Institute of Technology
		Menger EL
Fannin EL		
Wilson EL		
Coles HS And Educational Center		
Flour Bluff ISD Flour Bluff HS		

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
LOW	SCHOOL	Windsor Park G/T
		Travis EL
		Calk EL
		Harold T Branch Academy for Career & Techn
		King HS
		Baker Middle
MODERATE	FIRE STATION	Fire Station 4
		Fire Station 14
	HOSPITAL	Bayview Behavioral Hospital, A Campus of Corpus Christi Medical
		South Texas Surgical Hospital
	SCHOOL	Carroll HS
		Tuloso-Midway ISD Tuloso-Midway Pri
		Browne Middle
		Moore EL
		Veterans Memorial HS
		Por Vida Academy Cesar E Chavez Academy
		Schanen Estates EL
Adkins Middle		
HIGH	DAM	Oso Municipal Golf Course Lake Dam
		Calallen Reservoir Dam
	HOSPITAL	Christus Spohn Hospital Corpus Christi South
		Post Acute Medical Specialty Hospital of Corpus Christi
		The Corpus Christi Medical Center - Bay Area
		The Corpus Christi Medical Center - The Heart Hospital
	SCHOOL	Tuloso-Midway ISD Tuloso-Midway Academic Career Center
		Tuloso-Midway ISD Tuloso-Midway H S
		Smith EL
		Kolda EL
		Yeager EL
		Los Encinos Ses
		Barnes EL
VERY HIGH	FIRE STATION	Annaville Fire Department
		Fire Station 6

VULNERABILITY (CONT.)

VULNERABLE CRITICAL FACILITIES

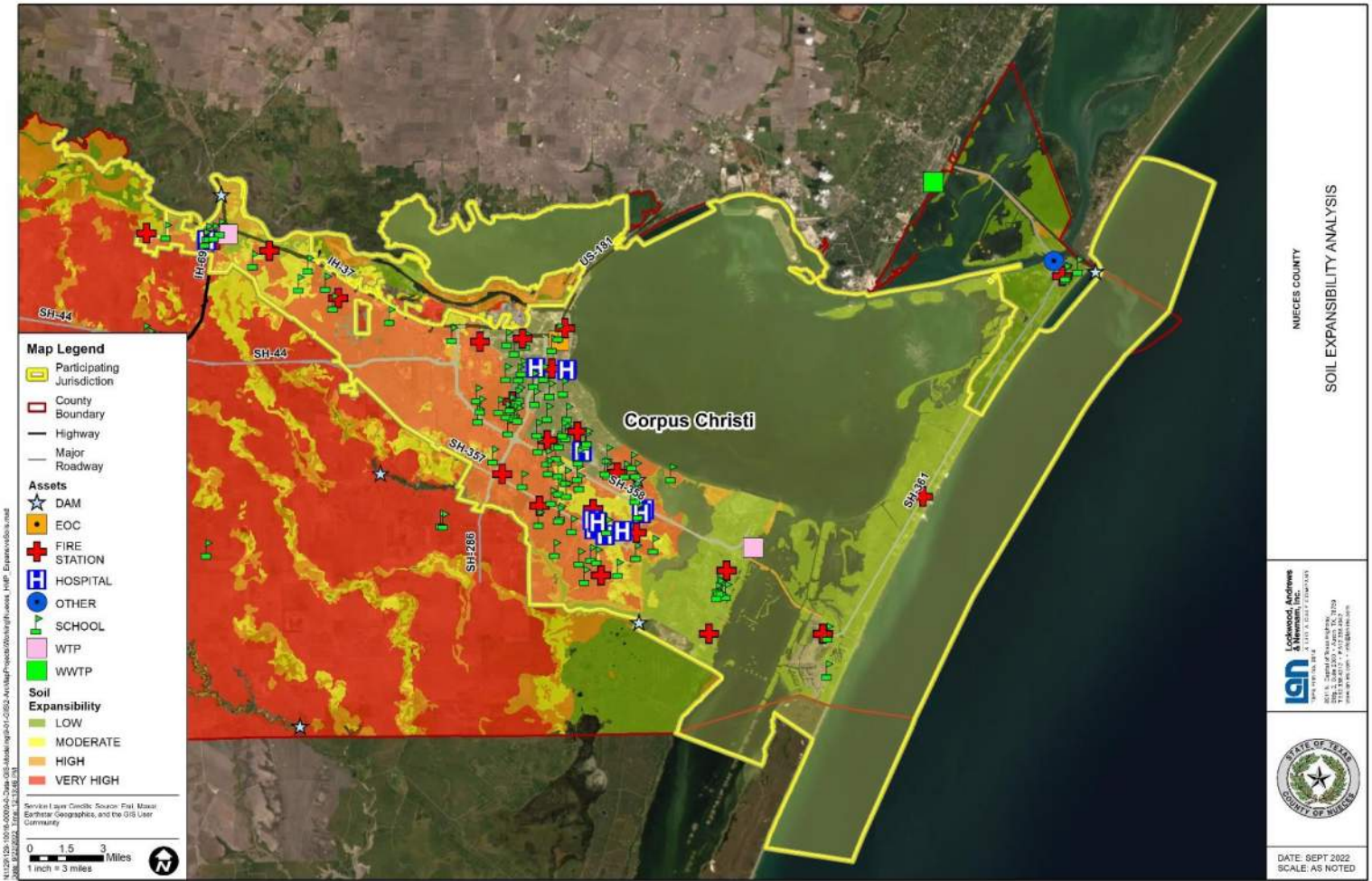
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	FIRE STATION	Fire Station 9
		Fire Station 10
		Fire Station 11
		Fire Station 2
		Fire Station 12
		Fire Station 17
		Fire Station 18
	HOSPITAL	Corpus Christi Rehabilitation Hospital
		The Corpus Christi Medical Center - Northwest
	WTP	O. N. Stevens Water Filtration Plant
	SCHOOL	Trinity Charter School Bokenkamp
		Cunningham @ South Park Middle
		Calallen ISD Calallen Wood River EL
		Moody HS
		Jones EL
		Grant Middle
		Mireles EL
		Faye Webb EL
		Por Vida Academy Corpus Christi College Prep HS
		Sanders EL
		Montclair EL
		Woodlawn EL
		West Oso ISD West Oso JH
		Kaffie Middle
		Wynn Seale Metropolitan School of Design
		Galvan EL
		Kostoryz EL
		West Oso ISD West Oso EL
		Tuloso-Midway ISD Tuloso-Midway Int
		West Oso ISD West Oso HS
Calallen ISD Calallen East EL		
Richard Milburn Alter High School		
Haas Middle		
Discovery School Of Science and Technology		

VULNERABILITY (CONT.)

VULNERABLE CRITICAL FACILITIES

SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	West Oso ISD Kennedy EL
		Early Childhood Development Ctr
		Calallen ISD Calallen Middle
		Meadowbrook EL
		Gibson EL
		Cullen Middle
		Yeager EL
		Dr M L Garza-Gonzalez Charter School Dr M L Garza-Gonzalez Charter School
		Garcia EL
		Dawson EL
		Calallen ISD Calallen Charter HS
		Tuloso-Midway ISD Tuloso-Midway Middle
		Club Estates
		Calallen ISD Magee EL
		Dr M L Garza-Gonzalez Charter School Accelerated Learning Center
		Mary Grett School
Calallen ISD Calallen HS		
Cunningham Middle		

Figure 14-10. City of Corpus Christi Soil Expansibility Hazard Map



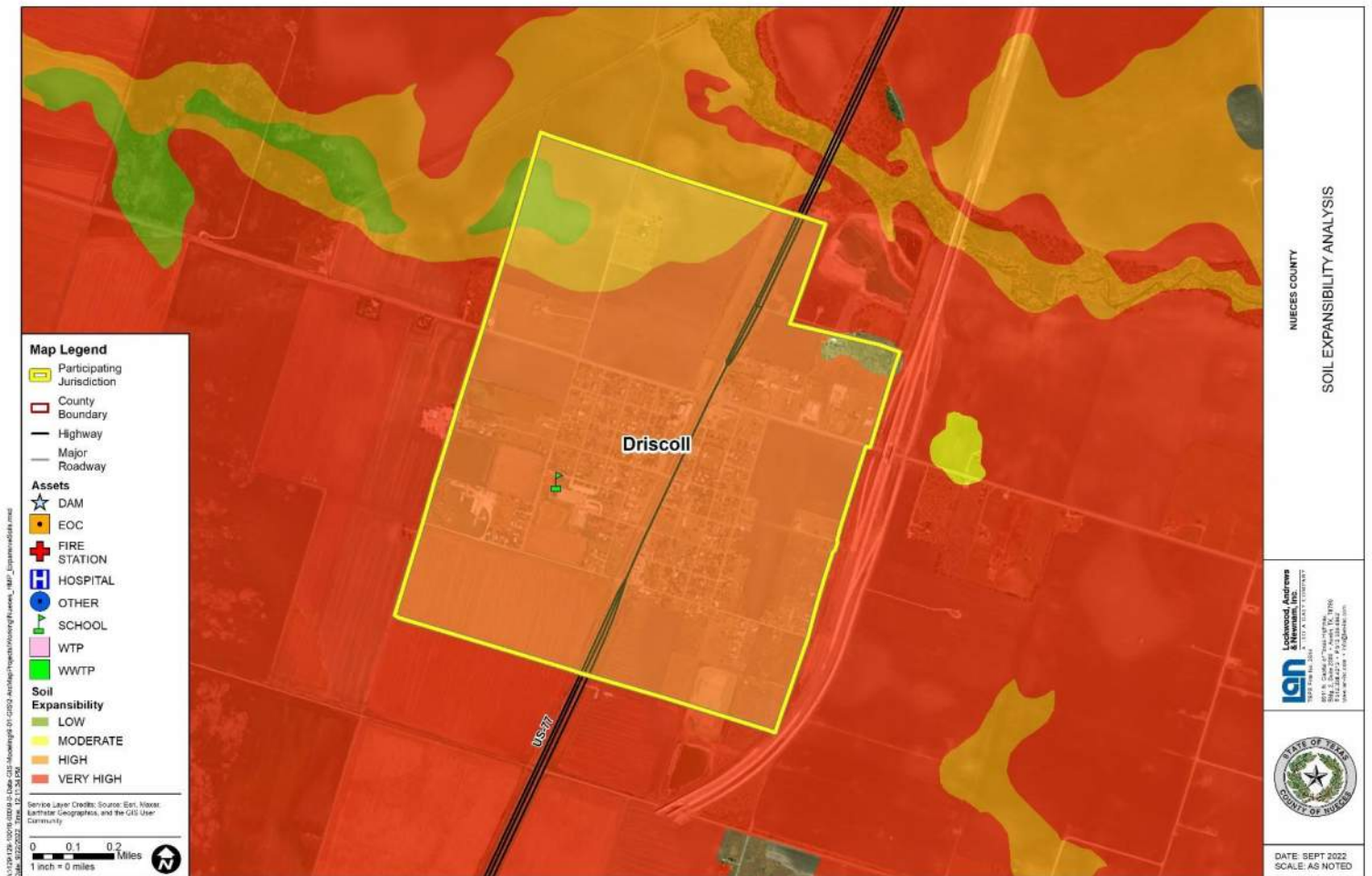
City of Driscoll Expansive Soils Hazard

LOCATION								
City-wide, see map								
OCCURRENCES				PROBABILITY				
Ongoing				Ongoing and likely increasing (see Table 14-3)				
IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$0	0%	0	0%	\$0	0%	0	0%
MODERATE	\$0		0		\$0		0	
HIGH	\$221,832	100%	9	100%	\$90,690	100%	101	100%
VERY HIGH	\$19,824,311		149		\$31,246,961		379	
TOTAL	\$20,046,143		158		\$31,337,651		480	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	Driscoll ISD Driscoll EL & Middle

Figure 14-11. City of Driscoll Soil Expansibility Hazard Map



City of Petronila Expansive Soils Hazard

LOCATION	
City-wide, see map	

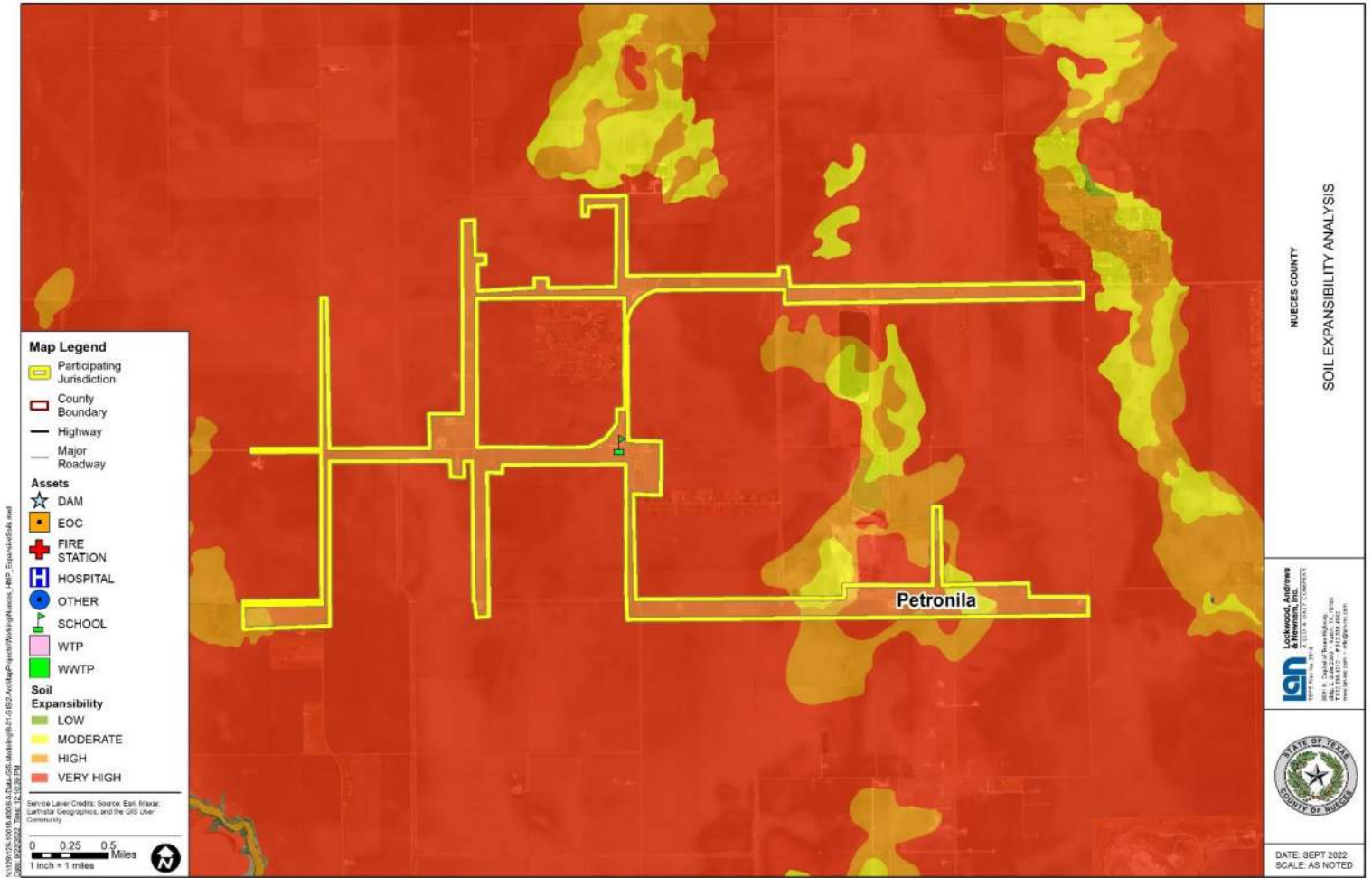
OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$0	0%	0	0%	\$0	0%	0	0%
MODERATE	\$0		0		\$0		0	
HIGH	\$0	100%	0	100%	\$60,999	100%	4	100%
VERY HIGH	\$2,988,340		57		\$1,841,952		60	
TOTAL	\$2,988,340		57		\$1,902,951		64	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	SCHOOL	Bishop CISD Petronila EL

Figure 14-12. City of Petronila Soil Expansibility Hazard Map



City of Port Aransas Expansive Soils Hazard

LOCATION								
City-wide, see map								
OCCURRENCES					PROBABILITY			
Ongoing					Ongoing and likely increasing (see Table 14-3)			
IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMT.	%	AMOUNT*	%	AMT.	%
LOW	\$2,146,187,101	100%	612	100%	\$26,007,401,887	>99%	5,630	99%
MODERATE	\$0	0%	0	0%	\$0	<1%	0	1%
HIGH	\$0		0		\$9,394,560		54	
VERY HIGH	\$0		0		\$0		0	
TOTAL	\$2,146,187,101		612		\$26,016,796,447		5,684	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)			
VULNERABLE CRITICAL FACILITIES			
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME	
LOW	DAM	South Jetty	
	FIRE STATION	Port Aransas Fire Department	
	WWTP	City of Port Aransas Wastewater Treatment Plant	
	SCHOOL		Port Aransas ISD Brundrett Middle
			Port Aransas ISD Olsen EL
			Port Aransas ISD Port Aransas H S
			University of Texas Marine Science Institute
OTHER	TXDOT Ferry Terminal		

Figure 14-13. City of Port Aransas Soil Expansibility Hazard Map



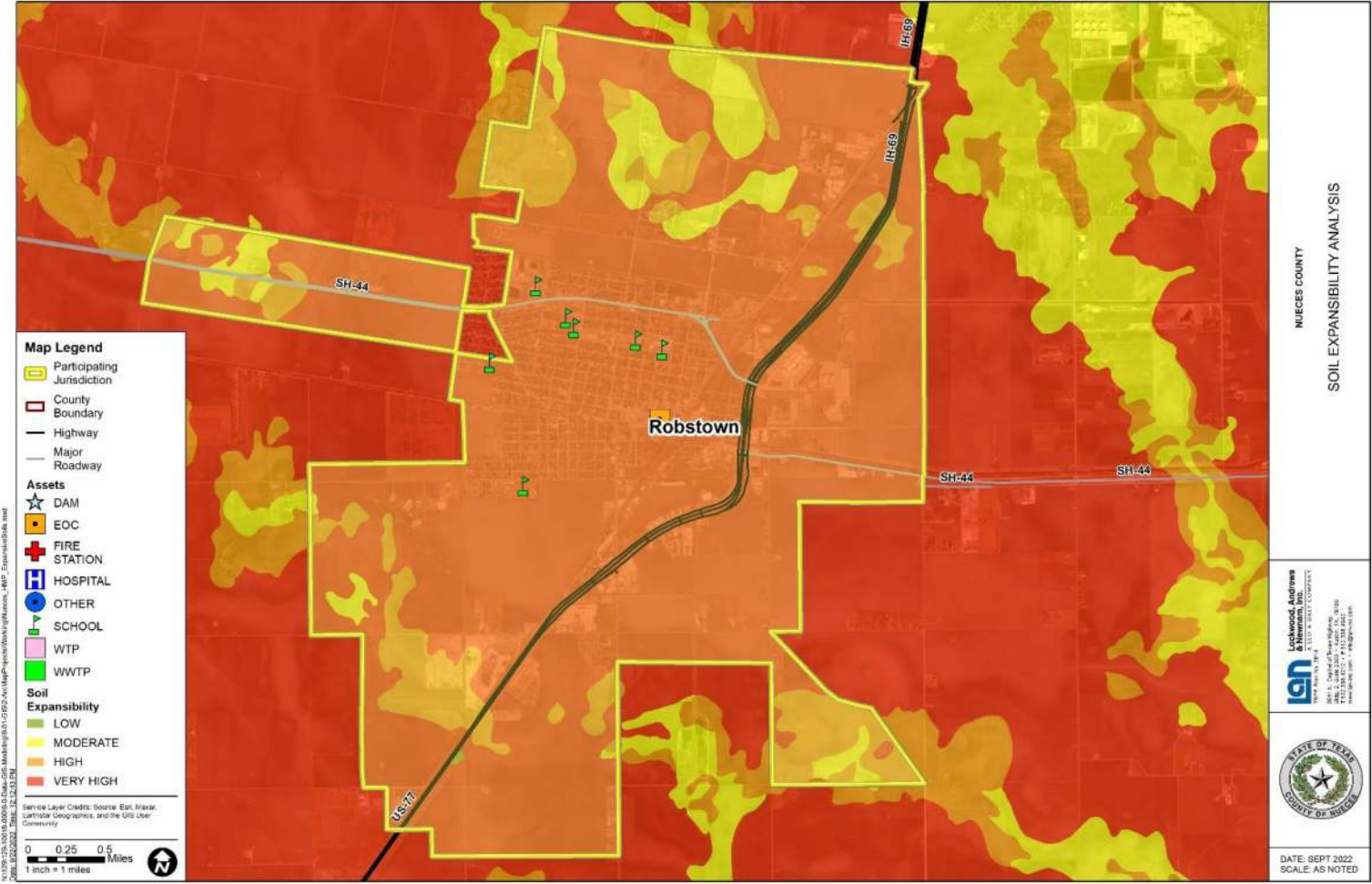
City of Robstown Expansive Soils Hazard

LOCATION								
City-wide, see map								
OCCURRENCES				PROBABILITY				
Ongoing				Ongoing and likely increasing (see Table 14-3)				
IMPACT & VULNERABILITY								
VULNERABLE NON-CRITICAL FACILITIES: PROPERTY								
SHRINK-SWELL RISK CLASS	RESIDENTIAL				COMMERCIAL (& REMAINING)			
	VALUE		ACRES		VALUE		ACRES	
	AMOUNT*	%	AMOUNT	%	AMOUNT*	%	AMOUNT	%
LOW	\$0	0%	0	0%	\$0	0%	0	0%
MODERATE	\$5,064,332	100%	21	100%	\$3,966,481	100%	454	100%
HIGH	\$8,635,577		40		1,159			
VERY HIGH	\$216,211,358		660		6,713			
TOTAL	\$229,911,267		721		\$404,358,059		8,326	

*Nueces County Appraisal District, 2022

VULNERABILITY (CONT.)		
VULNERABLE CRITICAL FACILITIES		
SHRINK-SWELL RISK CLASSIFICATION	ASSET CLASS	ASSET NAME
VERY HIGH	EOC	Robstown Emergency Operations Center
	SCHOOL	Robstown ISD Hattie Martin Early Childhood Center
		Robstown ISD Lotspeich EL
		Robstown ISD Robert Driscoll JR EL
		Robstown ISD Robstown H S
		Robstown ISD Salazar Crossroads Academy
		Robstown ISD San Pedro EL
		Robstown ISD Seale J H
		Robstown ISD Solomon P Ortiz Int

Figure 14-14. City of Robstown Soil Expansibility Hazard Map



Nueces County Drainage District #2 Expansive Soils Hazard

LOCATION	
District-wide, see map	

OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

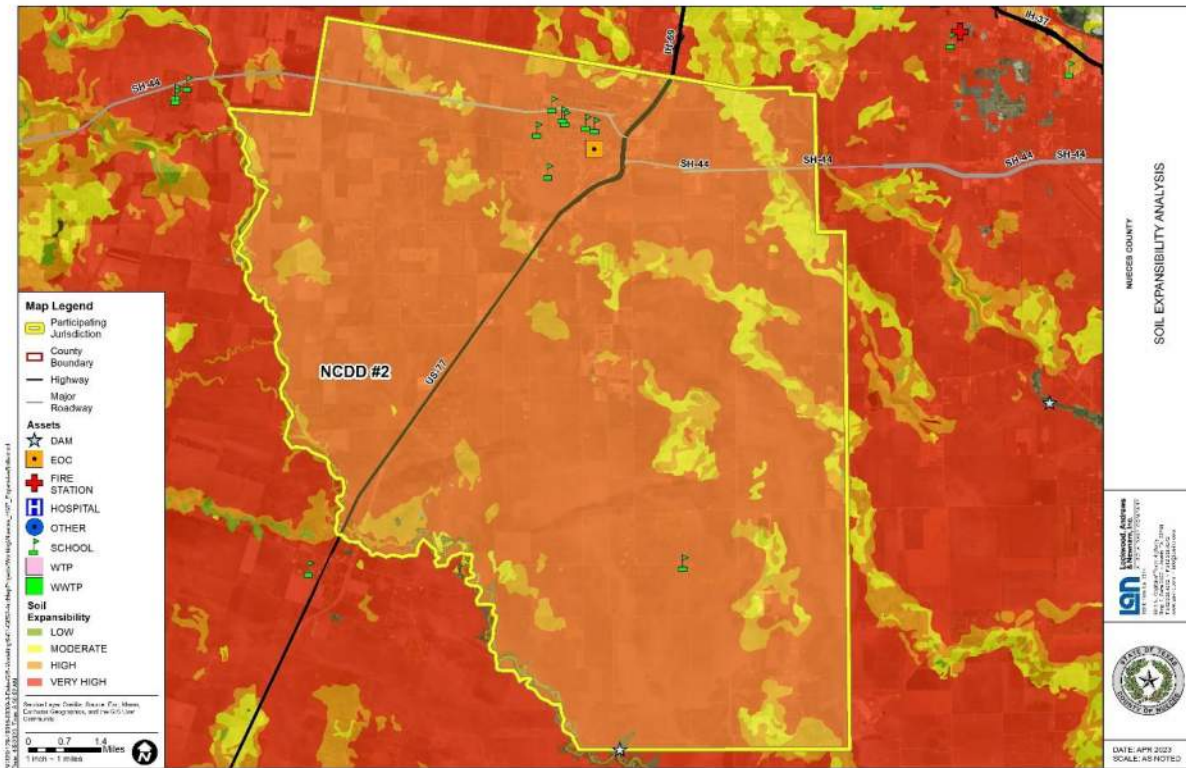
IMPACT & VULNERABILITY			
SHRINK-SWELL RISK CLASS	NO. OF PARCELS	ACRES	%
LOW	1	1	0.00%
MODERATE	196	4,374	4.92%
HIGH	285	8,911	10.03%
VERY HIGH	7,643	75,541	85.04%
TOTAL	8,125	88,826	

VULNERABILITY (CONT.)		
Population Served**	Property Value*	Infrastructure*
20,468	\$141,149	\$2,246,673

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 14-15. Nueces County Drainage District #2 Soil Expansibility Hazard Map



Nueces County Water Control and Improvement District #3 Expansive Soils Hazard

LOCATION	
District-wide, see map	

OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

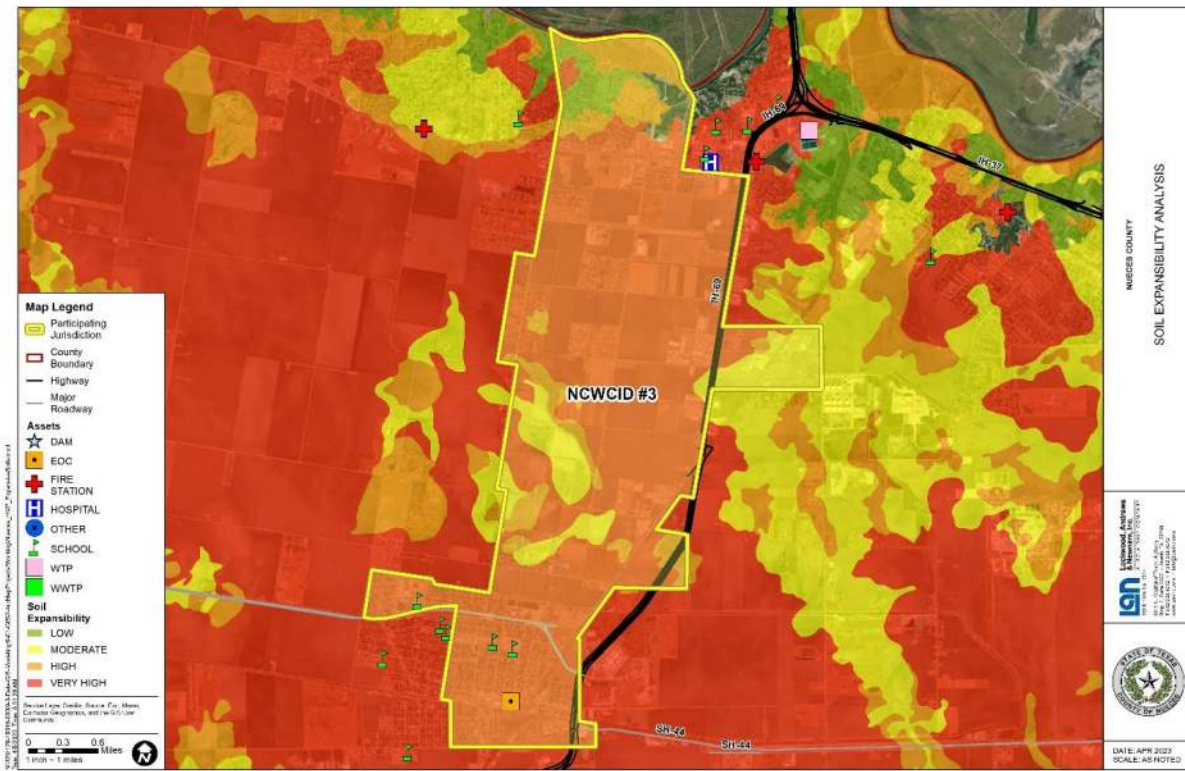
IMPACT & VULNERABILITY			
SHRINK-SWELL RISK CLASS	NO. OF PARCELS	ACRES	%
LOW	250	83	1.30%
MODERATE	164	835	13.10%
HIGH	305	630	9.89%
VERY HIGH	3,756	4,825	75.71%
TOTAL	4,475	6,374	

VULNERABILITY (CONT.)		
Population Served**	Property Value*	Infrastructure*
18,799	\$16,634,849	\$7,093,887

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 14-16. Nueces County Water Control and Improvement District #3 Soil Expansibility Hazard Map



Nueces County Water Control and Improvement District #4 Expansive Soils Hazard

LOCATION	
District-wide, see map	

OCCURRENCES	PROBABILITY
Ongoing	Ongoing and likely increasing (see Table 14-3)

IMPACT & VULNERABILITY			
SHRINK-SWELL RISK CLASS	NO. OF PARCELS	ACRES	%
LOW	10,785	17,495	98.48%
MODERATE	0	0	0.00%
HIGH	20	270	1.52%
VERY HIGH	0	0	0.00%
TOTAL	10,805	17,765	

VULNERABILITY (CONT.)		
Population Served**	Property Value*	Infrastructure*
6,281	\$0	\$292,510

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 14-17. Nueces County Water Control and Improvement District #4 Soil Expansibility Hazard Map



Section 15: Levee Failure

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Levee Failure Hazard Overview

Description

A levee is an embankment built to prevent overflow from a body of water. A levee failure is when a levee embankment fails, or is intentionally breached, causing the previously contained water to flood the land behind the levee.

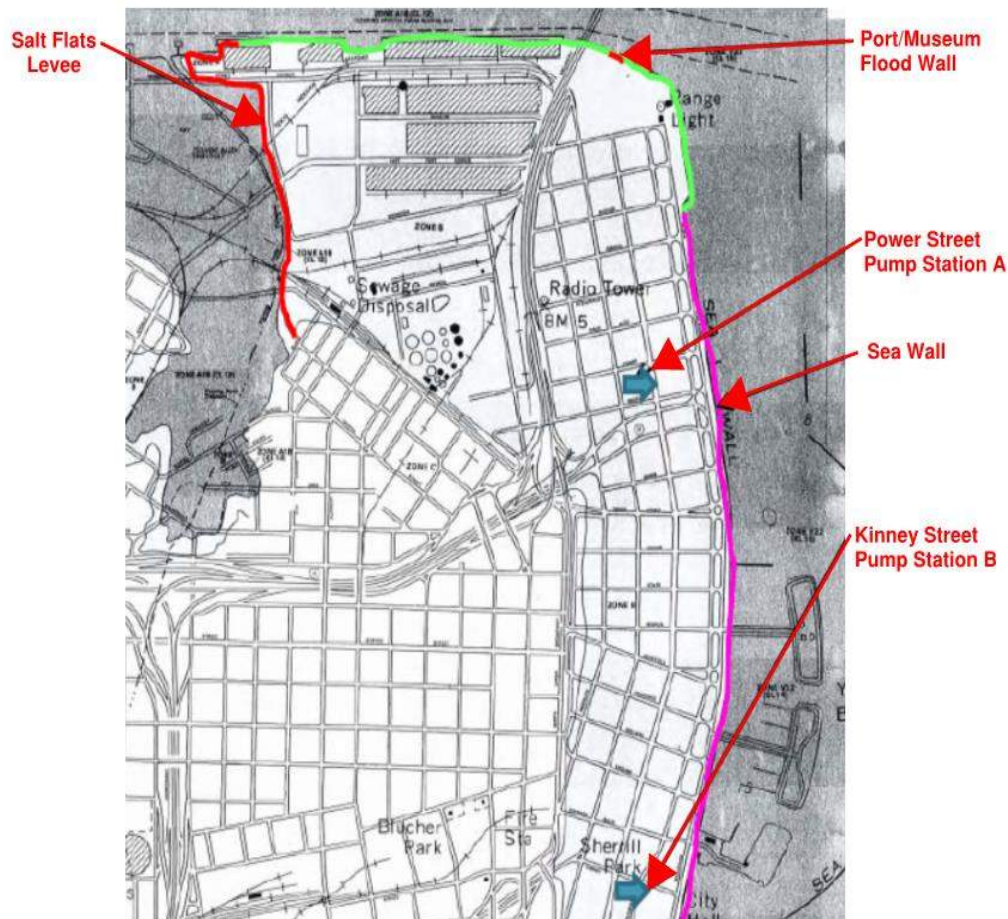
Location

Levees

Texas does not maintain a database of levees. The US Army Corps of Engineers does maintain a national levee database, but it is not an inclusive list. A search of the national database identifies only two levees within Nueces County; however, there are numerous levees owned and maintained by the City of Corpus Christi, the Port of Corpus Christi Authority, and various refineries and industries.

For example, the City of Corpus Christi owns and maintains the Salt Flats Levee and the Port/Museum Flood Wall which are part of the City’s downtown flood protection system (Figure 15-2). The Port of Corpus Christi Authority also has several levees. Additionally, many refineries and industries in the county have constructed levees around their facilities, primarily to contain potential spills, but these levees may also provide some level of protection from hurricane surge waters.

Figure 15-1. Salt Flats Levee Flood Protection System¹



Extent

A levee is a manmade embankment or structure built along a river, sea, or other body of water to protect the adjacent land from flooding. A levee failure is the systematic failure of the levee structure or levee system resulting in the uncontrolled release of water. The more common causes of levee failure include:

- Overtopping.
- Erosion.
- Structural Instability.
- Piping/under seepage.
- Settlement.²

https://cdn.ymaws.com/www.tfma.org/resource/resmgr/fall_2014_presentations/city_of_corpus_christi_salt_.pdf

² Congressional Briefing, FEMA, July 2013

There is no state inspection or safety program, and there is no database for levee systems in Texas³. FEMA requires that levees be certified to meet federal design, construction, maintenance, and operation standards to adequately reduce the risk of flooding from a major flood.

A general data deficiency exists for levee hazards. Levee-specific inundation maps and extent data do not exist. Actions are proposed in Section 19 to correct this data deficiency. When this data deficiency is corrected, clearly defined location and extent data can be incorporated into future planning efforts.

Location Variability

Levee Failure Hazards are unique in comparison to hazards that affect the overall planning area due to the geographic variation of jurisdictions and if the jurisdictions would be either upstream or downstream of a levee failure. In addition, failure of a levee can increase overall risk for various hazardous conditions like flooding, power outages, and stress on downstream infrastructure. Levee hazard area variability by jurisdiction and the entire planning area can be seen in **Figures 15-5 to 15-10**.

Occurrences of:

Levee Failures

There is not a comprehensive database with records of levee failures. Levee repair and maintenance is on-going and costly. For example, in 2012 the US Army Corps of Engineers recommended spending \$3.2M to repair levees located north of the Harbor Causeway (Hwy181) on the east side of the Inner Harbor adjacent to Nueces Bay (see Figure 15-3). These levees had been damaged by storm events and wave action, which are common contributors to levee failure.

³ The State of Texas Mitigation Plan, 2013 Update

Figure 15-2: Location of Proposed Levee Repair



Probability of:

Levee Failures

The probability of a levee failure is possible within the next 5 years based on the history of levee failures due to storm events and wave action since the CEPRA 2015 report indicates that three hurricanes impact the Texas coast every four years, and since the annual probability of a hurricane, tropical storm or tropical depression striking Nueces County is 32.4% as indicated in Section 6 – Hurricane & Tropical Storm of this plan. In addition, the minutes for the August 26, 2015, Corpus Christi Local Levee Partnership (LLPT) indicates that the City of Bishop levee and the City of Corpus Christi's Salt Flats levee system are not certified by FEMA which may indicate a greater risk for failure if these levees do not meet FEMA standards.

Probabilities of future levee failure events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise,

changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change, so too will the locations, frequencies, and range of anticipated intensities of weather-related factors that contribute to levee failure events, such as hurricanes, tropical storms, extreme rainfall events, sea levels, etc.

Impact of:

Levee Failures

Failure of the City of Corpus Christi's Salt Flats levee during a 100-year flood event would expose the City's Downtown district (Figure 15-4) to flooding that might result in property damage and possible injury or loss of life. All of the property located in the Downtown flood zone represents roughly \$1.8B.

Levee failure in Corpus Christi could have significant impacts. Levee failure during a flood event could potentially lead to the inundation of the City's downtown areas. Power and other utility services could be interrupted. Commercial property could be flooded, leading to direct damages and indirect economic impacts over time. While the downtown area of Corpus Christi is not a major residential area, there are still residential property found in the area. Damage to this residential property will lead to displaced populations.

Failure of the levees adjacent to Nueces Bay would result in flooding of the area the levee was intended to protect, which may damage property but may also result in environmental damage if materials stored behind the levees were to erode into the bay. Locations of levees in relevant jurisdictions may be viewed in Figures 15-5 through 15-8.

Figure 15-3: Map of the Downtown Corpus Christi - 100-year Flood Zone



Vulnerability

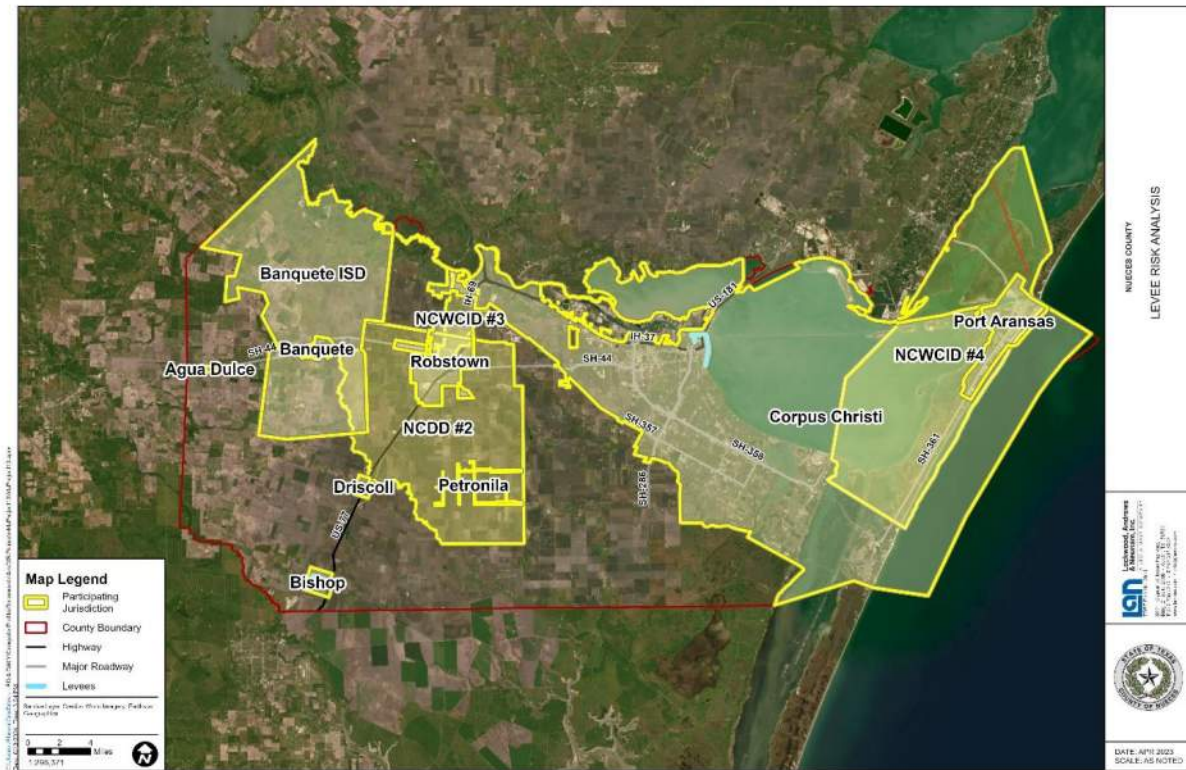
A March 21, 2016, newspaper article in the Corpus Christi Caller-Times indicates that Corpus Christi's downtown is located in a 100-year floodplain and the existing Downtown Flood Protection System does not meet current standards for protection from a 100-year event due to the uncertified Salt Flats Levee system. FEMA requires that all components of the levee be certified as "a freeboard deficient reach" which means that it is not vulnerable to a catastrophic failure. The article indicates a report prepared by one of the City's consultants indicates it would cost between \$75M and \$100M to overhaul the Downtown Flood Protection System to meet a 100-year event. As of 2021, the design process for improvements to the Salt Flats Levee system was underway.

Unincorporated Nueces County Levee Failure Hazard

Location	Extent (defined in Table 15-3)
See Map	Low
Occurrences	Probability
No levees present	Levee Failure: 1% annual chance in next 10 years
Impact	Vulnerability
Levee failure – no levees present	No major roadway, no major highways in downstream from a levee

Expected damages are restricted to nearby riparian corridors, agricultural areas, and the levees themselves.

Figure 15-4. Unincorporated Nueces County Levees



City of Agua Dulce Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

Banquete ISD Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY
This jurisdiction does not contain regulated levees.

City of Bishop Levee Failure Hazard

Location	Extent (defined in Table 15-3)
See Map	Low
Occurrences	Probability
No historical levee failures.	Levee failures: 5% annual chance in next 5 years
Impact	Vulnerability
Levee failure – damage to residential areas in the City of Bishop.	11 miles of roadway downstream of levee 1 miles of railroad downstream of levee \$41,598,249 in improved property behind levees

Figure 15-5. City of Bishop Levees



City of Corpus Christi Levee Failure Hazard

Location	Extent (defined in Table 15-3)
See Map	Low
Occurrences	Probability
Levee repairs recommended in 2012	Levee failures: 5% annual chance in next 5 years
Impact	Vulnerability
Levee failure – damage to downtown Corpus Christi	30 miles of roadway downstream of levees 6 Miles of railroad downstream of levees \$1,833,127,722 in improved property behind levees

The location of the levee system protecting downtown Corpus Christi is shown in Figure 15-2. Downtown Corpus Christi and two of the City’s Pump Stations are protected by the levee system. A levee failure would threaten the area bounded by the three levees. Approximately \$1.8 billion in improved property is protected by the levees. A failure of the levee system would threaten this property.

City of Driscoll Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY
This jurisdiction does not contain regulated levees.

City of Petronila Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

City of Port Aransas Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

City of Robstown Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

Nueces County Drainage District #2 Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

Nueces County Water Control and Improvement District #3 Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

Nueces County Water Control and Improvement District #4 Levee Failure Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

This jurisdiction does not contain regulated levees.

Figure 15-7. Nueces County Water Control and Improvement District #4 Levees



Section 16: Land Subsidence

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Land Subsidence Hazard Overview

Description

Land subsidence is the decrease in the lands surface elevation due to the loss of subsurface support. Land subsidence can be caused by both natural processes and manmade actions. Land subsidence caused by natural processes typically occurs over a long period of time, usually thousands to millions of years. Short-term land subsidence is generally the result of manmade actions such as: excessive ground-water withdrawal, oil and gas drilling, mining operations, collapse of buried infrastructure like pipelines for water, sewer and storm or the leakage of underground pipes that erode adjacent soils. Subsidence from groundwater withdrawal and oil and gas production usually occur over large areas, while subsidence from collapsed or leaking pipelines is generally localized.

Location

Nueces County is one of the Texas coastal counties at high risk for land subsidence¹. Figure 16-1 illustrates the areas with the greatest land subsidence potential in Nueces County according to subsidence data from the 2015 Preliminary Flood Insurance Study for Nueces County. There are a total of eight areas within the county which have records of historic land subsidence; Areas No. 2 through No. 8 are no longer active. The only area

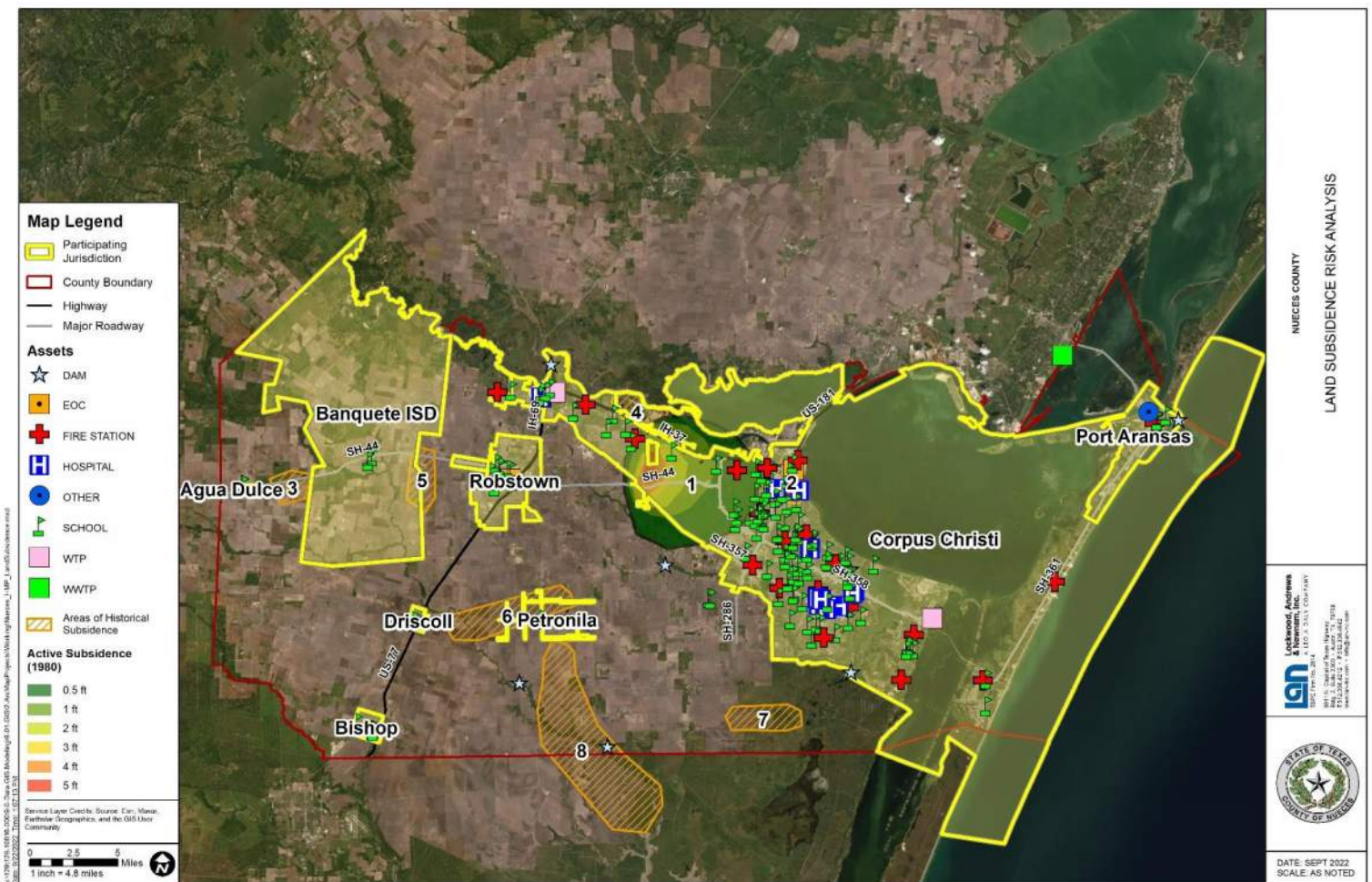
¹ The 2013 State of Texas Mitigation Plan identified.

of active subsidence identified within the county extent is the Saxet Oil and Gas Field and is located within the City of Corpus Christi; this is shown at Area No. 1.

Location Variability

Land Subsidence Hazards are unique in comparison to hazards that affect the overall planning area due to the geographic variation of jurisdictions and their proximity to oil, gas, or any resource withdrawal activities. Land subsidence hazards occurring in the jurisdictions are not as prominent/immediate as the other identified hazards and occur over a period of years. Jurisdictions with varying land subsidence hazards can be seen in **Figures 16-1 to 16-7**.

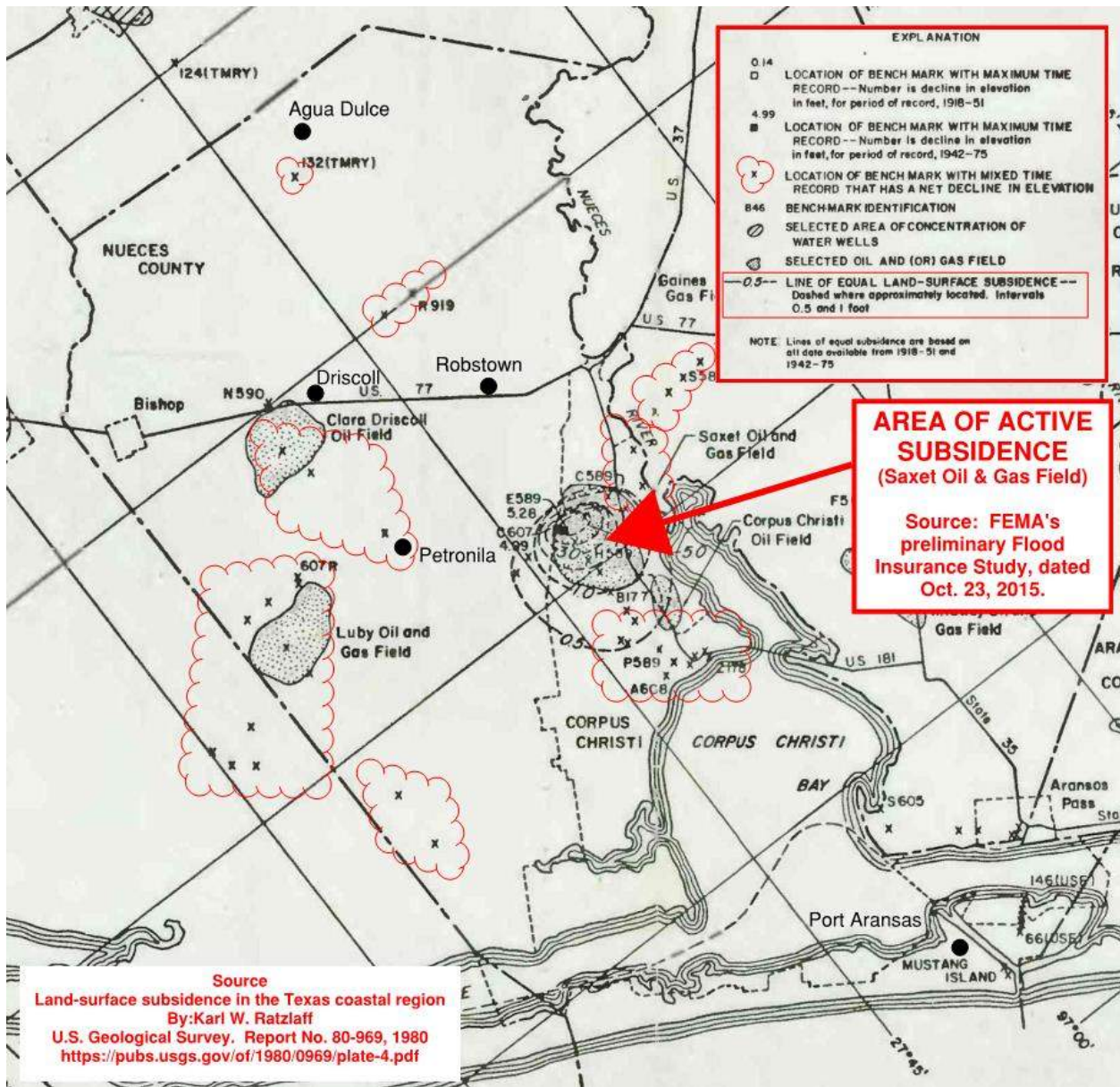
Figure 16-1. Map of Subsidence Areas in Nueces County



Extent

Land subsidence extent is determined by the decrease in the lands surface elevation measured in feet. Figure 16-2 includes benchmarks, denoted with an “X”, which indicate areas currently being observed for potential land subsidence.

Figure 16-2. Map of Historic Subsidence Areas in Nueces County



Figures 16-1 and 16-2 depict areas of both active and inactive subsidence. The City of Petronila has not experienced active subsidence since 1980. Subsidence is not expected to occur in that area in the next five years. These maps indicate active subsidence only for Unincorporated Nueces County and the City of Corpus Christi.

Occurrences

Land subsidence in Nueces County has been historically associated with ground-water withdrawal and oil and gas production. Seven areas of historical subsidence can be seen in Figures 16-1 and 16-2. The greatest period of subsidence in Nueces County took place from 1942-1975. The greatest loss of elevation experienced in Nueces County, a loss of

5.28 ft., is indicated as the Area of Active Subsidence in Figures 16-1 and 16-2. This area corresponds to the location of the Saxet Oil and Gas Field, suggesting that the subsidence experienced in this area is a result of the removal of subterranean oil, gas, and ground water. Occurrences in participating jurisdictions may be viewed in Figures 16-3 through 16-7.

Probability

Unlike other natural hazards that take place as discreet, acute events, land subsidence is a more chronic hazard. A probability presented in terms of the expected number of events per year is not an appropriate method of analysis for land subsidence. An area is either experiencing land subsidence or not. The probability of an area experiencing land subsidence is dependent upon a number of factors. Oil and gas extraction activity appears to be associated with subsidence in the area.

The State of Texas Hazard Mitigation Action Plan reports that land subsidence is generally viewed to be an unlikely event, with one event possible in the next 10 years. The 2012 Coastal Bend Mitigation Action Plan, which includes Nueces County, reports that land subsidence “has been reviewed and is not widespread.” Based upon these reports, with the exception of the area of active subsidence around the Saxet Oil and Gas field, a new land subsidence event is expected no more frequently than once every ten years for all participating jurisdictions.

The underlying causes of land subsidence in Nueces County appear to be manmade. Therefore, land subsidence in Nueces County may not be directly subject to the effects of future conditions, such as climate change. However, a sinking area of land on the coast may become more vulnerable to the effects of climate change, such as rising sea levels and changes in frequency and intensity of weather events.

Impact

Land subsidence in coastal areas can have significant environmental and socio-economic impacts. Land subsidence can cause structural damage to buildings and transportation systems such as roads and rail; damage buried infrastructure such as pipelines; cause sea level rise along the coast which increases vulnerability of coastal wetlands and beaches to coastal erosion and increased flooding. The impacts of land subsidence can be measured in terms of property damage.

Vulnerability

Land subsidence can damage vulnerable assets by causing damage to buildings, transportation infrastructure and buried pipelines. Vulnerability is included in the jurisdictional tables as a function of property value and critical assets contained within the areas of subsidence.

Land subsidence, and the decrease in elevation associated with it has the potential to increase vulnerability by the following mechanisms:

- Increase saltwater inundation in coastal areas.
- Increase the frequency of flooding.
- Increase in the extent of flooding.
- Damage to fixed infrastructure
- Losses to submerged aquatic vegetation.
- Changes to gradients in drainage channels, leading to channel erosion and sediment deposition.

In addition to direct impacts like damages to infrastructure, land subsidence may increase the impacts of flooding hazards. Impacts from flooding hazards are discussed in Section 7.

Unincorporated Nueces County Land Subsidence Hazard

OCCURRENCE		
Date	Location	Extent
1942 – Present	Subsidence cluster 1*	5.28 feet (1942 – 1975)
1918 – 1951, 1942 - 1975	Subsidence cluster 3*	Unreported
1918 – 1951, 1942 - 1975	Subsidence cluster 5*	Unreported
1918 – 1951, 1942 - 1975	Subsidence cluster 6*	Unreported
1918 – 1951, 1942 - 1975	Subsidence cluster 7*	Unreported
1918 – 1951, 1942 - 1975	Subsidence cluster 8*	Unreported

*Reference Figure 16-1

VULNERABILITY	
Property Value in Active Subsidence Zones	
Commercial	Residential
\$393,336,255	\$6,773,566
Vulnerable Assets in Active Subsidence Zones	
No assets within Active Subsidence zone.	

Figure 16-3. Unincorporated Nueces County Land Subsidence Hazard Map



City of Agua Dulce Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of historic or active land subsidence within this jurisdiction.

Banquete ISD Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of subsidence after 1980 in the Banquete ISD. Land subsidence is not expected to impact this jurisdiction and will not be profiled in this plan.

City of Bishop Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of historic or active land subsidence within this jurisdiction.

City of Corpus Christi Land Subsidence Hazard

OCCURRENCE		
Date	Location	Extent
1942 – Present	Subsidence cluster 1 (see Fig. 16-1)	5.28 feet (1942 – 1975)
1918 – 1951, 1942 - 1975	Subsidence cluster 2 (see Fig. 16-1)	Unreported
1918 – 1951, 1942 - 1975	Subsidence cluster 4 (see Fig. 16-1)	Unreported

EXTENT					
FROM	TO	ELEVATION CHANGE (FT)	DURATION (YR)	RATE (FT/YR)	SOURCE
1917	1942	4.05	25	0.162	Calculated
1942 ¹	1950	1.10	8	0.138	1
1951 ¹	1959	1.76	8	0.220	1
1960 ²	1975	2.00	15	0.133	2
1942 ³	1975	5.28	33	0.160	3
1917 ⁴	1975	9.33	58	0.161	4
2017⁵	2022	0.80	5	0.161	5

1. Geothermal Resources of the Texas Gulf Coast Environmental Concerns Arising from the Production and Disposal of Geothermal Waters, by the Bureau of Economic Development, dated 1976

2. Land-surface subsidence in the Texas coastal region, by the USGS Report No. 80-969, dated 1980

3. Report No. 272 dated November 1982, titled “Land-Surface Subsidence in the Texas Coastal Region” by the Texas Department of Water Resources

4. The Impact of Global Warming on Texas: Second Edition, by Jurgen Schmandt, et al, 2011

5. Forecasted amount of land subsidence using the average rate from 1917 to 1975, based on FEMA's 2015 preliminary Flood Insurance Study indicating subsidence is currently occurring and should be anticipated.

VULNERABILITY		
Property Value in Active Subsidence Zones		
Commercial		Residential
\$7,232,757,896		\$345,325,803
Vulnerable Assets in Active Subsidence Zones		
Cluster No.*	Asset Type	Description
1	Fire Station	Fire Station 9 - 501 Navigation Blvd. Corpus Christi, Tx 78408
	School	Corpus Christi Isd Gibson El
		Corpus Christi Isd Harold T Branch Academy for Career & Techn
		Tuloso-Midway Isd Tuloso-Midway Academic Career Center
		West Oso Isd Kennedy El
		West Oso Isd West Oso El
		West Oso Isd West Oso H S

*Reference Figure 16-1

Figure 16-5. City of Corpus Christi Land Subsidence Hazard Map



City of Driscoll Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

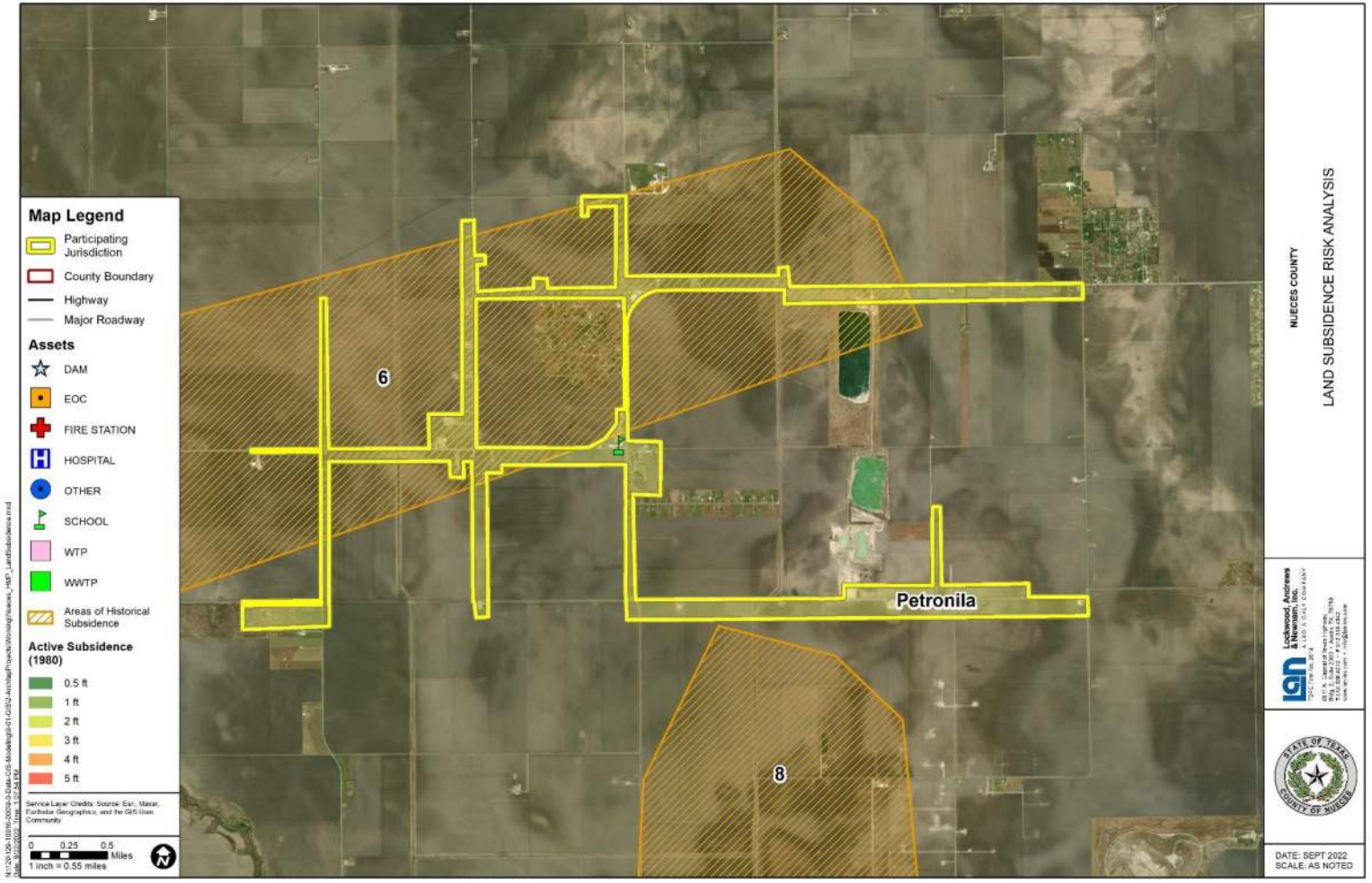
There are no records of historic or active land subsidence within this jurisdiction.

City of Petronila Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of subsidence after 1980 in the City of Petronila. Land subsidence is not expected to impact this jurisdiction and will not be profiled in this plan.

Figure 16-6. City of Petronila Land Subsidence Hazard Map



City of Port Aransas Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of historic or active land subsidence within this jurisdiction.

City of Robstown Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

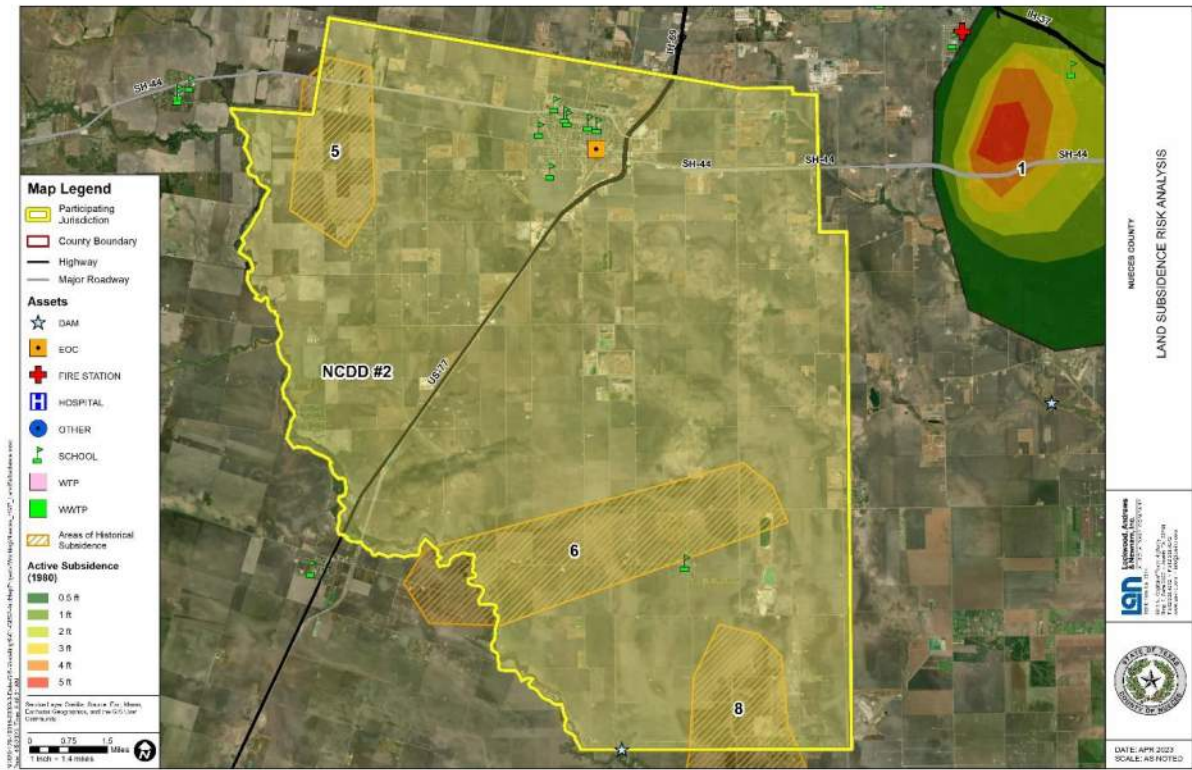
There are no records of historic or active land subsidence within this jurisdiction.

Nueces County Drainage District #2 Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of subsidence after 1980 in the Nueces County Drainage District #2. Land subsidence is not expected to impact this jurisdiction and will not be profiled in this plan.

Figure 16-7. Nueces County Drainage District #2 Land Subsidence Hazard Map



Nueces County Water Control and Improvement District #3 Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of historic or active land subsidence within this jurisdiction.

Nueces County Water Control and Improvement District #4 Land Subsidence Hazard

LOCATION, EXTENT, OCCURRENCE, PROBABILITY, IMPACT, VULNERABILITY

There are no records of historic or active land subsidence within this jurisdiction.

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Wildfire Hazard Overview

Description

A wildfire is an uncontrolled fire almost exclusively fueled by natural vegetative fuels. Fuel may come in the form of grass, brush, or trees. Wildfire risk increases with high concentrations of connected fuels. Meteorological conditions such as high temperatures, low humidity, droughts, and high wind can also increase wildfire risk. Humans are the most common source of initial ignition in wildfires. Sparks from agricultural, industrial, or automobile activity may start a wildfire. Additional information regarding wildfires can be found in the 2011 Nueces County Community Wildfire Protection Plan.

Location

Wildfires are most common in areas where wildland and urban areas abut, known as the Wildland Urban Interface (WUI). The areas of Nueces County that feature WUI are the most vulnerable to wildfire. The urban centers of communities lack the concentrations of fuels required to feed wildfires. The rural areas of the planning area lack the degree of human activity that is associated with ignition. Areas where human activity takes place and where fuel concentrations and connectivity are sufficient to fuel wildfire are the areas where wildfires are most likely.

Location Variability

Wildfire Hazards are unique when compared to other hazards that affect the overall planning area due to the variation of Wildland Urban Interfaces (WUI) between jurisdictions. WUI's driving parameters, wildfire fuel & human activity, varies between jurisdictions and will continue to change depending on urbanization. Variation of exposure to wildfire hazards within planning jurisdictions can be seen in **Figures 17-1 – 17-12**.

Extent

Risk to wildfire can be measured by using the Keetch-Byram Drought Index (KBDI). KBDI relates weather conditions and expected, potential fire behavior as shown in Table 17-1. KBDI is based upon daily water balance, precipitation, and soil moisture. KBDI ranges from 0 to 800. A KBDI score of 0 indicates no water depletion, while a score of 800 represents absolutely dry conditions.

Table 17-1. KBDI scores correspond to potential fire behavior as follows.

KBDI Value Range	Qualitative Drought Extent
0 - 200	Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of early spring following winter precipitation.
200 – 400	Fuels are beginning to dry and contribute to wildfire intensity. Heavier fuels will still not readily ignite and burn. This is often seen in late spring or early summer.
400 – 600	Lower litter and duff layers contribute to fire intensity and will burn actively. Wildfire intensity begins to increase significantly. Larger fuels could burn or smolder for several days. This is often seen in late summer and early fall.
600 – 800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep-burning fires with extreme intensities can be expected. Live fuels can also be expected to burn actively at these levels

Nueces County has an average KBDI of 298. The maximum KBDI experienced by Nueces County is 493. The minimum KBDI experienced by Nueces County is 59. This is a generally moderate level of risk. Because KBDI indicates current conditions, care should be taken to ensure that current KBDI is examined to determine risk. Droughts or extreme weather conditions may drive KBDI up or down in a short time.

Historically, the largest fire in the planning area (excluding controlled, fuel-management burns) was about 3,000 acres. In the future, the worst that is expected to occur in any participating jurisdiction is a fire size of 3,000 acres. Some of the smaller jurisdictions are not much larger than 1,000 acres in total area. It is doubtful that they would ever experience a wildfire that completely encompasses the jurisdiction. However, they could still experience a 3,000-acre wildfire that crosses jurisdictional boundaries.

Extent may also be examined in terms of fire intensity. Table 17-2 provides the Texas Forest Service Fire Intensity Rating. For future planning purposes, all jurisdictions can expect to experience a fire of Moderate intensity on the Texas Forest Service Fire Intensity rating. The Wildfire Risk associated with each jurisdiction’s area may be viewed in Figures 1 through 12.

Table 17-2 – Texas Forest Service Fire Intensity Rating

Texas Forest Service Fire Intensity Ratings	
Intensity Rating	Description
Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and nonspecialized equipment.
Low	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property
Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Occurrences

Records from the Texas Forest Service (TFS) indicate that from January 2005 to February 2020, the range of dates for which spatial wildfire data is provided, Nueces County experienced a total of 483 wildfires. 70 of these wildfires were greater than or equal to 10 acres, 22 wildfires greater or equal to 100 acres, and 5 wildfires greater than or equal to 1,000 acres resulting in a total burned area of 14,168 acres. TFS records indicate that debris burning is the most commonly known cause of fires in Nueces County, causing 56 fires. Power lines, equipment and motor vehicle operation, and children are the next most common causes of fires in Nueces County, each causing 54, 44, and 29 fires in the fifteen-year period, respectively. More than half of these wildfires have “Unknown,” “Miscellaneous-Other,” or “Miscellaneous-Null” sources of ignition. Records of occurrence for each jurisdiction are provided in the jurisdictional tables, and a partial list is provided in Table 17-3. Additional records are present in Appendix E. Historical occurrences listed in the Nueces County Community Wildfire Protection Plan (2009) are shown in Table 17-4. These record’s locations may be viewed in Figures 1 through 9.

Several other data sources report a wide range of wildfire occurrences. National Climate Data Center (NCDC) records indicate that three wildfires in Nueces County in 2011 and 2013 had a combined damage total of \$260,000. No other damages were reported. Data from the State Fire Marshall indicate that Nueces County experienced 4,105 “outdoor and other” fire events from 2006 – 2010. Online archives of the Corpus Christi Caller Times from 1998 – 2004 indicate that Corpus Christi experienced 13 fires, Nueces County experienced two fires, and Bishop experienced one fire.

Due to the wide-ranging variability in wildfire data, the data provided by the Texas Forest Service is used to calculate jurisdiction-specific hazard probability. This dataset is the most detailed available, and therefore most suited for analysis at the municipal level.

Table 17-3 Historical Wildfire Occurrences (TFS and NCDC records) *

Start Date	Acres Burned	Cause	Sub-Cause
5/21/2017	1	Campfire	Warming or cooking
5/28/2017	1	Debris burning	Burning leaves and garden spots
6/15/2017	1	Miscellaneous	Other
6/22/2017	0.5	Debris burning	Unsafe burning of household trash
7/4/2017	2	Miscellaneous	Fireworks
8/29/2017	0.2	Power lines	NULL
8/30/2017	0.1	Power lines	NULL
8/30/2017	0.5	Miscellaneous	Other
8/30/2017	0.1	Power lines	NULL
9/25/2017	0.5	Miscellaneous	Other
9/25/2017	0.25	Miscellaneous	Other
10/18/2017	1	Debris burning	Pasture and field burning (including grass, crop residues)
10/25/2017	0.1	Campfire	Warming or cooking
10/26/2017	10	Miscellaneous	Other
11/18/2017	0.01	Power lines	NULL
11/30/2017	50	Miscellaneous	Other

Table 17-3 Historical Wildfire Occurrences (TFS and NCDC records) *

Start Date	Acres Burned	Cause	Sub-Cause
12/1/2017	0.01	Miscellaneous	Other
12/8/2017	0.01	Miscellaneous	Other
12/31/2017	0.01	Miscellaneous	Fireworks
12/31/2017	0.01	Miscellaneous	Fireworks
1/12/2018	24	Miscellaneous	Other
1/12/2018	0.1	Miscellaneous	Other
1/21/2018	0.1	Debris burning	Brush pile burning
1/23/2018	5	Debris burning	Unsafe burning of household trash
2/17/2018	5	Miscellaneous	Other
3/2/2018	0.01	Miscellaneous	Other
3/19/2018	0.25	Miscellaneous	NULL
4/18/2018	0.5	Miscellaneous	NULL
5/9/2018	900	Unknown	Cause and Origin Not Identified
5/18/2018	4	Miscellaneous	NULL
5/20/2018	10	Debris burning	Subdivision development, clearing
5/27/2018	1	Miscellaneous	NULL
8/16/2018	5	Unknown	Cause and Origin Not Identified
8/22/2018	5	Unknown	Cause and Origin Not Identified
8/29/2018	10	Unknown	Cause and Origin Not Identified
9/1/2018	0.5	Campfire	Warming or cooking
2/6/2020	5	Unknown	Investigated but Undetermined
2/7/2020	5	Debris burning	Pasture and field burning (including grass, crop residues)

*There are too many wildfire occurrences to list here; additional records from 2005 through 2017 are included as Appendix E

Table 17-4 Historical Occurrences Listed in Nueces County Community Wildfire Protection Plan (2009)

Fire Department	2009 Records
Corpus Christi Fire Department	301
Naval Air Station Corpus Christi Fire Department	--
Nueces County Emergency Services Department 1	91
Nueces County Emergency Services Department 2	50
Nueces County Emergency Services Department 3	83
Nueces County Emergency Services Department 4	29
Nueces County Emergency Services Department 5	--
Port Aransas Fire Department	19
Robstown Fire Department	59
Refinery Terminal Fire Company	--
Total recorded wildfire incidents	632

Probability

Hazard probability or reoccurrence intervals are calculated based upon the number of historical events during the period of examination. For example, if four wildfires were to have taken place during a 50-year reporting period, the reoccurrence interval would be about 12.5 years, or an 8% annual chance of wildfire. Probabilities are shown below in the jurisdictional tables.

Probabilities of future wildfire events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too will the frequencies and range of anticipated intensities of wildfires. While the majority of wildfires in Nueces County are

manmade, the conditions brought by climate change may lead to larger, more intense, and harder to control wildfires.

Impact

The impact of wildfire is described in terms of property exposure. Data from the Nueces County Appraisal District and the Texas A&M Forest Service are examined to determine residential and commercial property exposure to high wildfire risk areas. The Texas A&M Forest Service data are described in greater detail in the Vulnerability section.

Vulnerability

Vulnerability and impact to wildfire is discussed in terms of asset exposure from “low” to “very high” wildfire threat. The wildfire threat data comes from the Texas A&M Forest Service and is a unitless index ranging from 1 to 7. The Forest Service assigns the qualitative descriptions of Low (1 & 2), Moderate (3 & 4), High (5 & 6), and Very High (7).

Only two of the assets described in Section 4 are in high or very high wildfire threat areas. The two assets are the Seashore Learning Center Charter School and Fire Station 16, both located in Corpus Christi.

It should be noted that the wildfire threat index is a model. Wildfires have taken place outside of areas of high risk. Conversely, there are areas of high risk that have never experienced a wildfire. When interpreting wildfire risk exposure as described by the wildfire threat model, it is important to realize that no model will ever completely capture the variability of the real world.

Pastoral and crop lands have the potential to be impacted by wildfire. Crops and pastures can become fuel for wildfires. Wildfires that do not pose a direct threat to human lives or safety can still be damaging due to their impacts on economies dependent upon crop or livestock production. The 2021 National Land Cover Database (NLCD) dataset was used to calculate pasture and crop area by jurisdiction. Pasture and crop area, combined into the term “Agricultural Area,” are outlined in the jurisdictional tables.

Unincorporated Nueces County Wildfire Hazard

LOCATION		
County Wide (Unincorporated)		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Campfire Debris Burning Equipment Use Incendiary Lightning Miscellaneous Power Lines Smoking Unknown	5223.61	3000

OCCURENCES		
Number of Fires* (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage**
149	0 deaths, 0 injuries	\$260,000

*Texas A&M Forest Service, 2020

**NCDC Storm Events Database, 2022

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
993% annual chance	1 fire every 37 days

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$129,074,297	\$303,296,538
Moderate	\$41,686,644	\$239,671,265
High	\$0	\$1,278,443
Very High	\$0	\$0

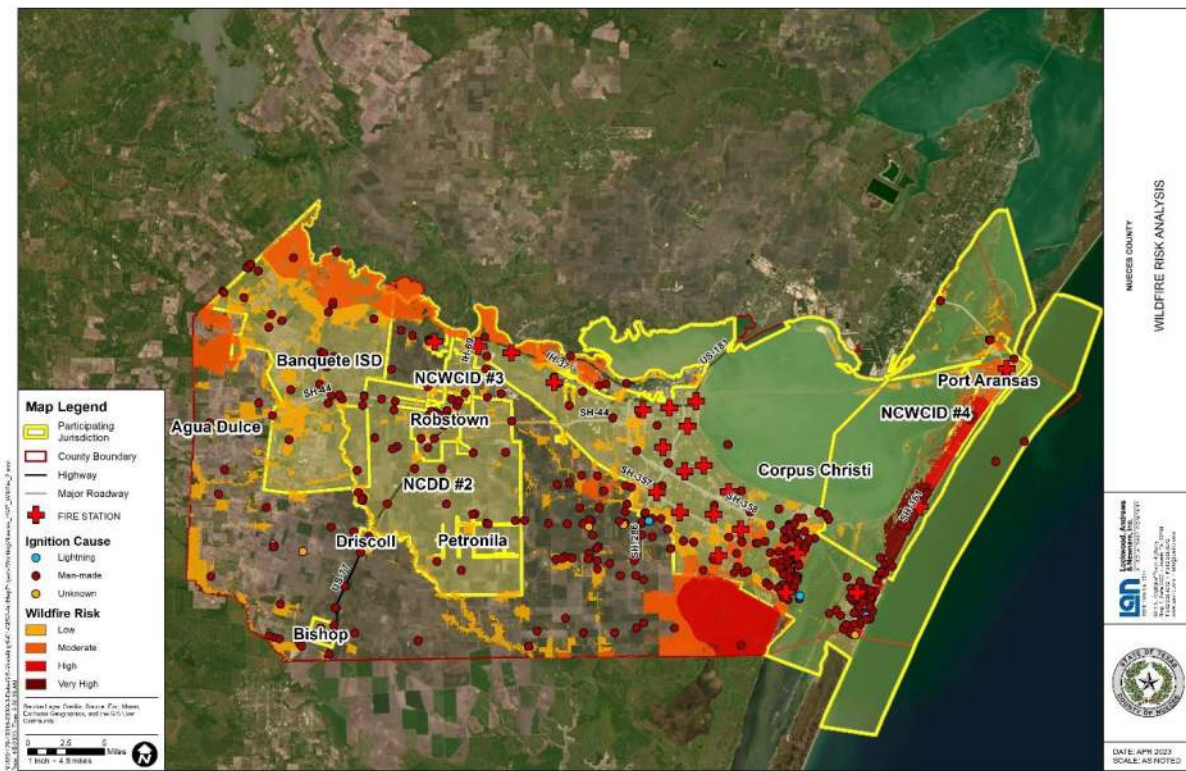
VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
13,579	280,817	816	90

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-1. Fire Locations / Origins and Wildfire Threat Index for Unincorporated Nueces County



City of Agua Dulce Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Equipment Use Debris Burning	14	10

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
2	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
13% annual chance	1 fire every 7.5 years

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$3,229,514	\$522,329
Moderate	\$0	\$0
High	\$0	\$0
Very High	\$0	\$0

VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
688	2.4	9	2

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-2. Fire Locations / Origins and Wildfire Threat Index for City of Agua Dulce



Banquete ISD Wildfire Hazard

LOCATION	
District Wide	

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Debris Burning Equipment Use Incendiary Miscellaneous Power Lines Railroads Smoking	1272.25	500

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
32	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
213% annual chance	1 fires every 5.5 months

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$107,350,342	\$35,028,120
Moderate	\$58,666,259	\$21,963,817
High	\$0	\$0
Very High	\$0	\$0

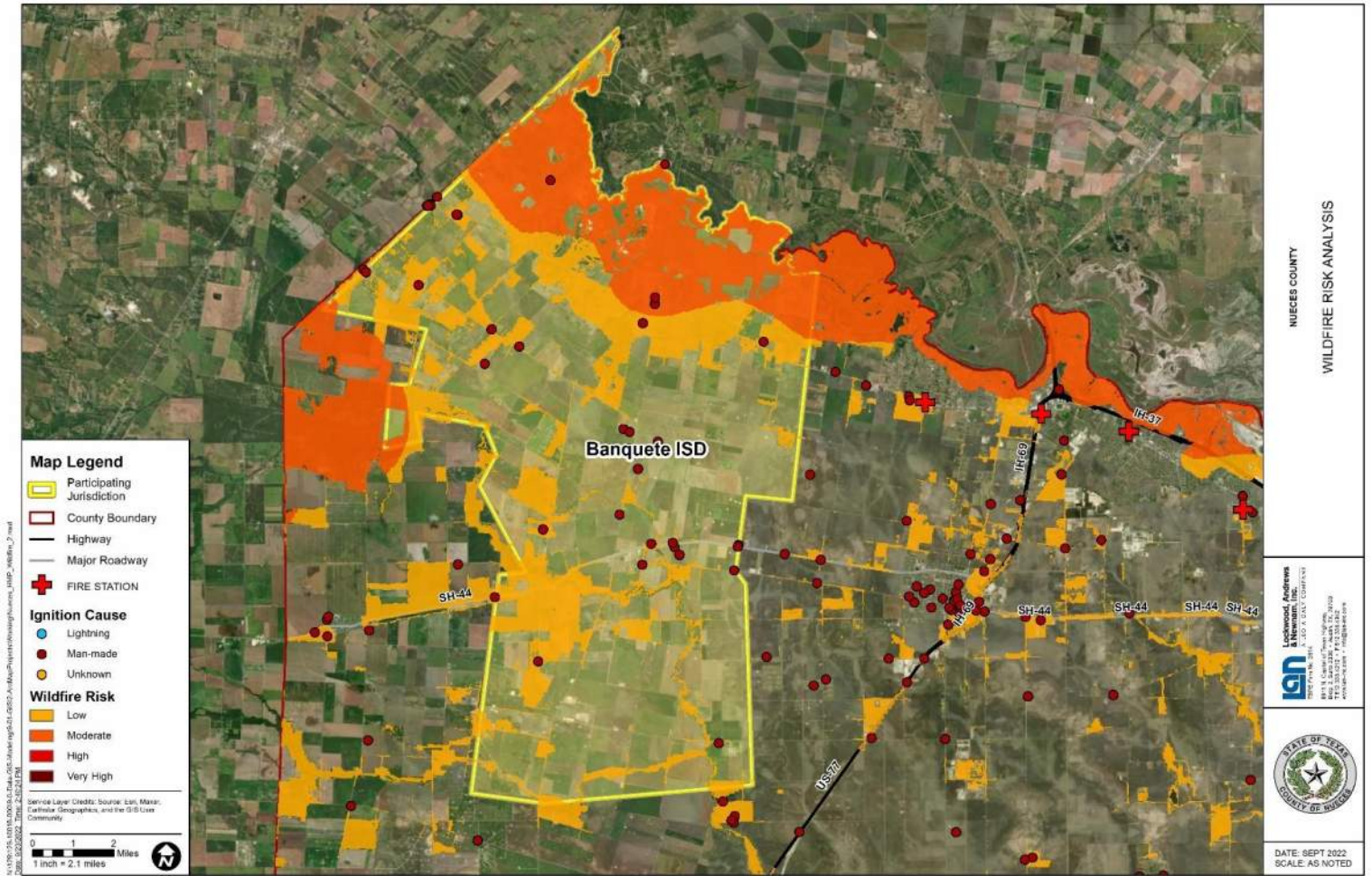
VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
3,862	61,968	185	7

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-3. Fire Locations / Origins and Wildfire Threat Index for Banquete ISD



City of Bishop Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Equipment Use Smoking	2.5	2

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
3	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
20% annual chance	1 fire every 5 years

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$0	\$0
Moderate	\$0	\$0
High	\$0	\$0
Very High	\$0	\$0

VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
3,155	232	31	2

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-4. Fire Locations / Origins and Wildfire Threat Index for City of Bishop



City of Corpus Christi Wildfire Hazard

LOCATION	
City Wide	

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Campfire Children Debris Burning Equipment Use Incendiary Lightning Miscellaneous Power Lines Smoking Unknown	7529.93	1,000

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
235	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
1567% annual chance	1 fire every 23 days

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$1,570,128,179	\$1,340,851,770
Moderate	\$1,842,098,101	\$608,776,497
High	\$290,332,004	\$290,636,745
Very High	\$48,089,729	\$130,637,347

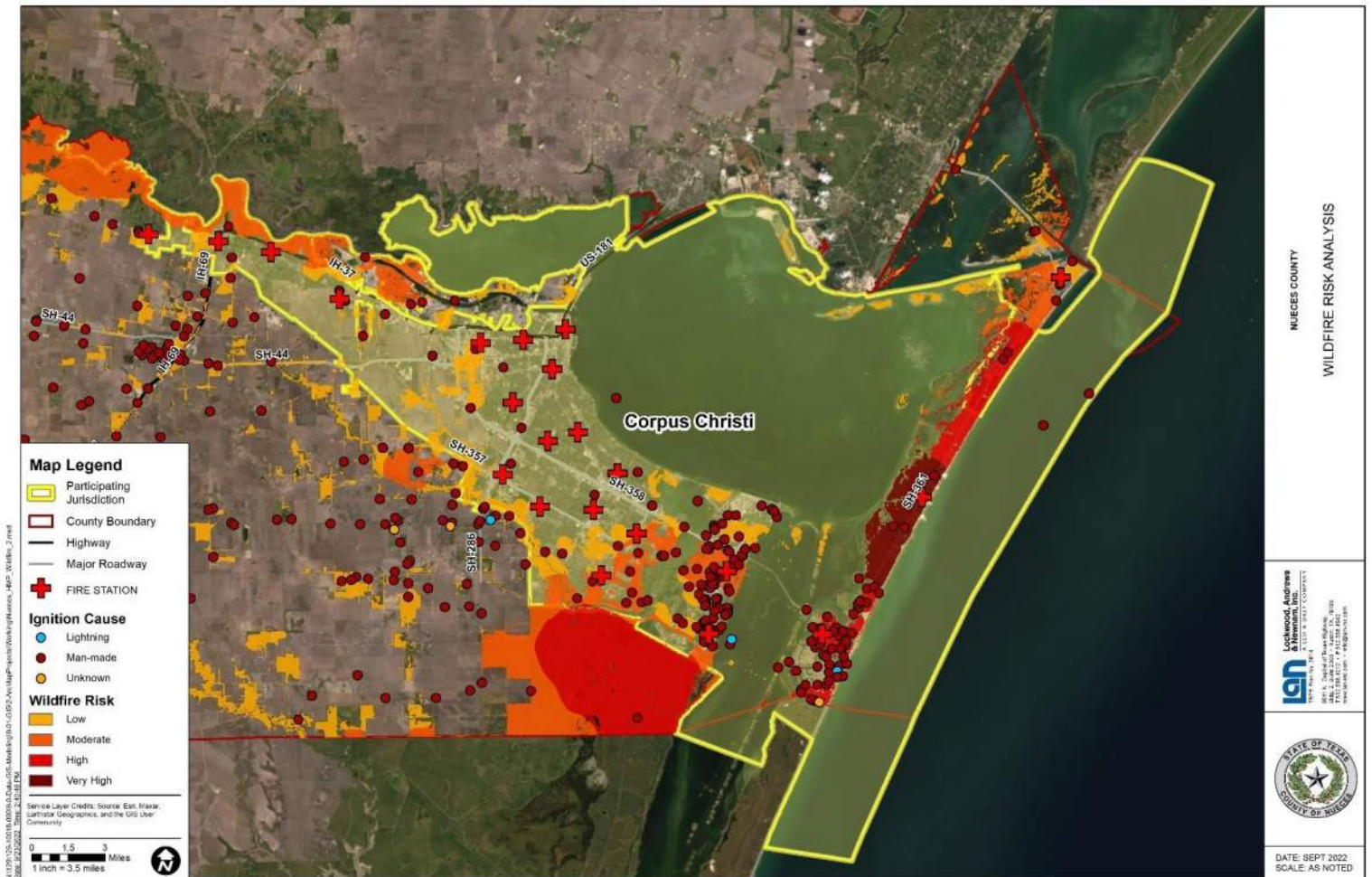
VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
317,773	21,392	1701	48

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-5. Fire Locations / Origins and Wildfire Threat Index for City of Corpus Christi



City of Driscoll Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Smoking	1	1

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
1	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
7% annual chance	1 fire every 15 years

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$8,378,705	\$1,828,081
Moderate	\$0	\$0
High	\$0	\$0
Very High	\$0	\$0

VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
673	439	13	2

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-6. Fire Locations / Origins and Wildfire Threat Index for City of Driscoll



City of Petronila Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Debris Burning Miscellaneous	0.75	0.5

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
2	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
13% annual chance	1 fire every 7.5 years

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$1,258,276	\$964,360
Moderate	\$0	\$0
High	\$0	\$0
Very High	\$0	\$0

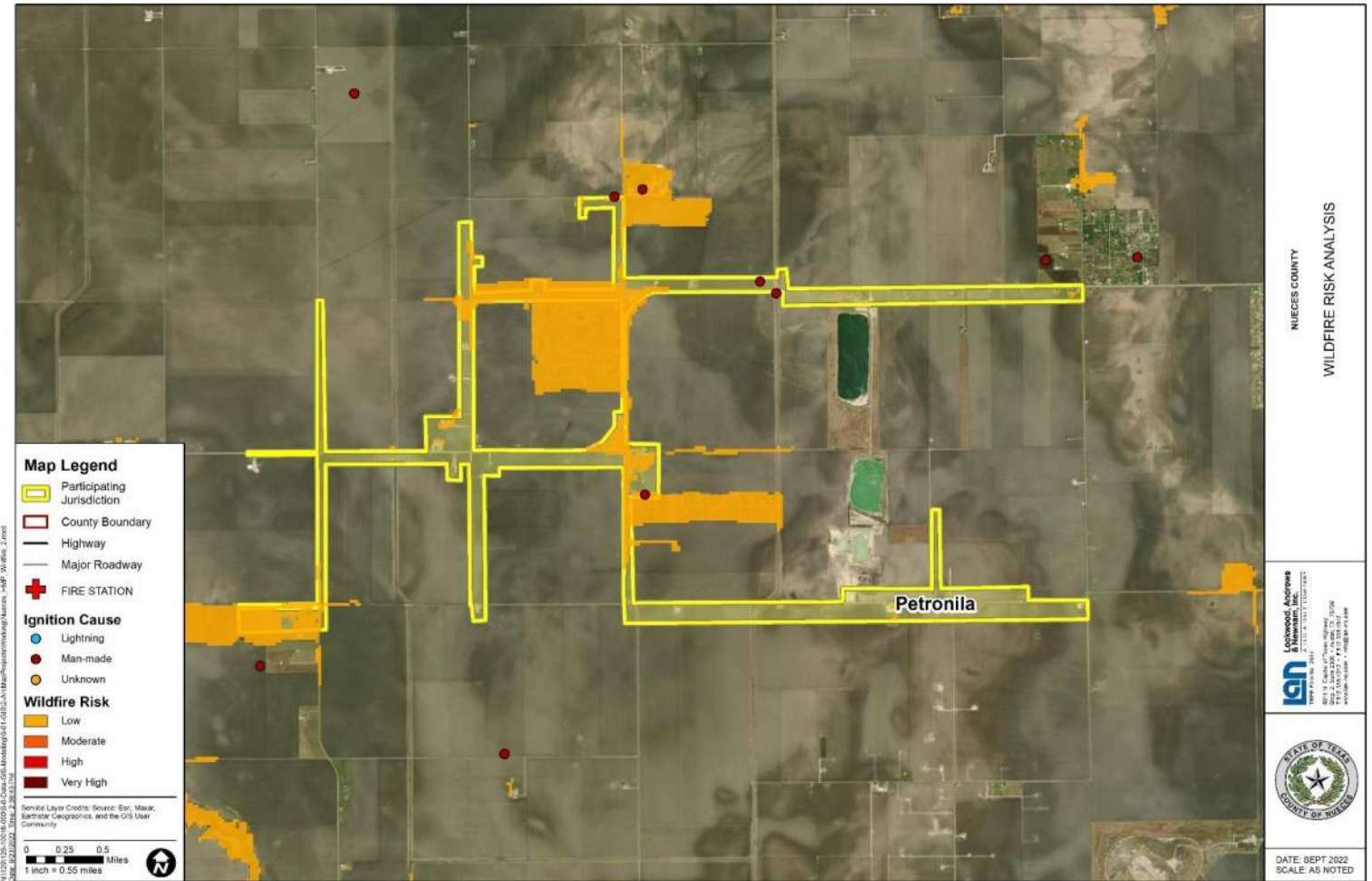
VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
87	108	22	0

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-7. Fire Locations / Origins and Wildfire Threat Index for City of Petronila



City of Port Aransas Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Equipment Use Miscellaneous Power Lines	54.5	30

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
5	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
33% annual chance	1 fire every 3 years

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$128,240,575	\$137,763,602
Moderate	\$773,629,928	\$19,752,881,604
High	\$575,483,588	\$166,815,840
Very High	\$0	\$0

VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
3,105	859	50	0

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Figure 17-8. Fire Locations / Origins and Wildfire Threat Index for City of Port Aransas



City of Robstown Wildfire Hazard

LOCATION		
City Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Debris Burning Equipment Use Miscellaneous	69.79	60

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
54	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
360% annual chance	1 fire every 3 months

IMPACT		
Wildfire Risk	Residential Property Risk**	Non-Residential Property Risk**
Low	\$17,635,944	\$76,693,853
Moderate	\$0	\$0
High	\$0	\$0
Very High	\$0	\$0

VULNERABILITY			
People at Risk*	Crop Land (Acres)***	Roadway in Jurisdiction (Mile)	Railroad in Jurisdiction (Mile)
10,157	4,413	116	12

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

Nueces County Drainage District #2 Wildfire Hazard

LOCATION		
District Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Debris Burning Equipment Use Incendiary Miscellaneous Power Lines Smoking	245.04	100

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
85	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
566% annual chance	1 fire every 2 months

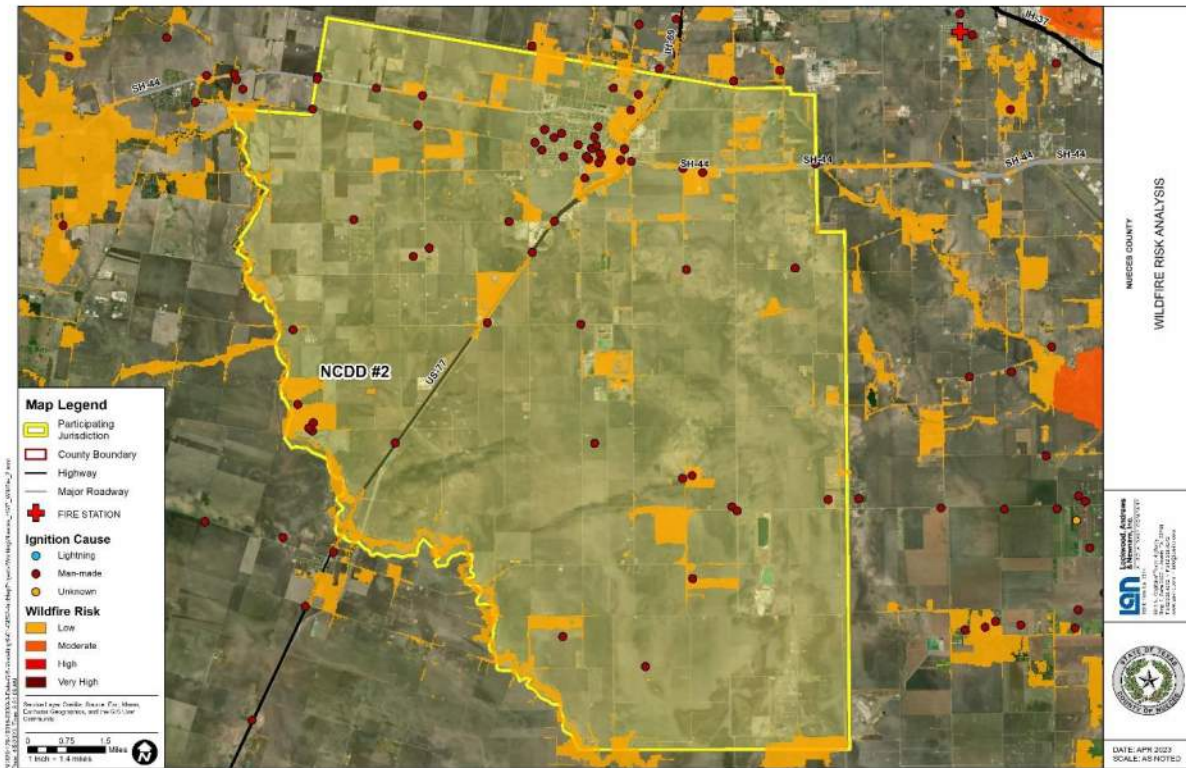
IMPACT			
Wildfire Risk	No. of Parcels	Acres	%
Low	1,076	4,415.30	4.95%
Moderate	0	0	0.00%
High	0	0	0.00%
Very High	0	0	0.00%
TOTAL	1,076	4,415.30	4.95%

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$111,677	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 17-10. Fire Locations / Origins and Wildfire Threat Index for Nueces County Drainage District #2



Nueces County Water Control and Improvement District #3 Wildfire Hazard

LOCATION		
District Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Debris Burning Equipment Use Miscellaneous	71.32	60

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
44	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
293% annual chance	1 fire every 4 months

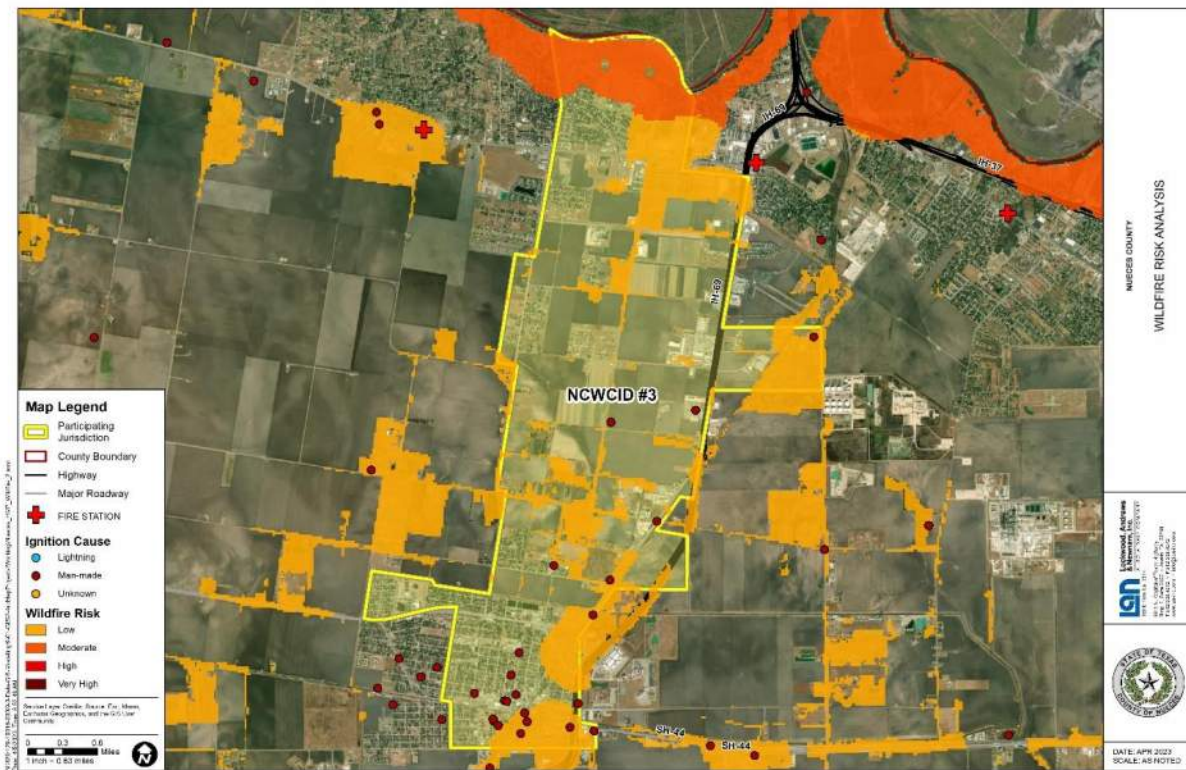
IMPACT			
Wildfire Risk	No. of Parcels	Acres	%
Low	600	996.76	15.49%
Moderate	204	426.50	6.63%
High	0	0	0.00%
Very High	0	0	0.00%
TOTAL	804	1,423.26	22.12%

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$14,435,420	\$405,950
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$1,604,995	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Figure 17-11. Fire Locations / Origins and Wildfire Threat Index for Nueces County Water Control and Improvement District #3



Nueces County Water Control and Improvement District #4 Wildfire Hazard

LOCATION		
District Wide		

EXTENT*		
Sources of Ignition	Total Burned Acreage	Maximum Single Fire Acreage
Campfire Debris burning Equipment Use Incendiary Miscellaneous Power Lines Smoking	2149.03	1000

OCCURENCES		
Number of Fires * (Range: 2005-2020)	Risk to Health and Safety (No. Incidences by Type)	Property Damage
24	0 deaths, 0 injuries	\$0

*Texas A&M Forest Service, 2020

PROBABILITY	
Future Wildfire Events Likelihood	Reoccurrence Interval
160% annual chance	1 fire every 7.5 months

IMPACT			
Wildfire Risk	No. of Parcels	Acres	%
Low	516	970.87	4.98%
Moderate	4,881	1,886.70	9.69%
High	1,828	3,327.39	17.08%
Very High	277	5,353.82	27.48%
TOTAL	7,502	11,538.78	59.24%

VULNERABILITY		
Population Served**	Infrastructure*	
6,281	\$17,017,000	
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Section 18: Severe Winter Storms

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Severe Winter Storms Hazard Overview

Description

A severe winter storm event is defined as a storm with snow, ice, or freezing rain. Severe winter storms are rare for the Texas Coastal area. Severe winter storms may include snowstorms, blizzards, cold waves, and ice storms. Snowstorms include four or more inches of snow in a 12-hour period. Blizzards are characterized by low temperatures and strong winds in excess of 35 mph with large amounts of drifting snow. A cold wave is a winter cold front with a drastic drop in temperature. An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground.¹

Location

Winter storms vary in location, intensity and duration but are considered rare occurrences in Nueces County and participating jurisdictions. It is assumed that all of the jurisdictions are uniformly exposed to winter storm events; therefore, all areas of the county are equally exposed.

¹ State of Texas Mitigation Plan Update 2013

Location Variability

Winter storms are a widespread hazard and impact all participating jurisdictions within the planning area equally. Winter storms are not expected to affect any of the jurisdictions differently.

Extent

Table 18–1 below displays the magnitude of severe winter storms. The wind–chill factor is further described in Figure 18–1. This is an index developed by the National Weather Service, although the chart is not applicable when temperatures are over 50° or winds are calm.

Table 18-1. Extent Scale - Winter Weather Alerts

Alert Type	Description
Winter weather advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter storm watch	Severe winter weather conditions may affect your area (freezing rain, sleet or heavy snow may occur separately or in combination).
Winter storm warning	Severe winter weather conditions are imminent.
Freezing rain or freezing drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard warning	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost/freeze warning	Below freezing temperatures are expected and may cause significant damage to plants, crops and fruit trees.
Wind chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind–chill factor.

Table 18-2 Historical Extents*

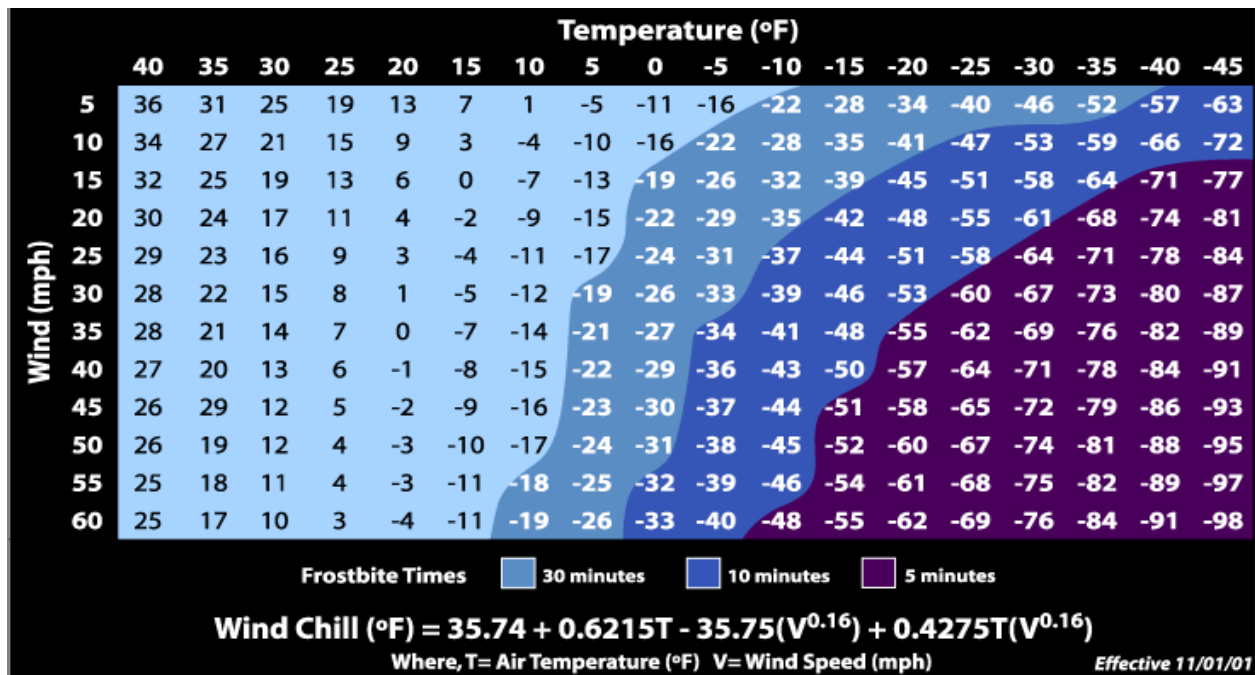
Jurisdiction	Temperature (°F)	Snowfall (inches)
Unincorporated Nueces County	12°	0"
Agua Dulce	15°*	Unreported
Bishop	19°	4"
Corpus Christi	13°	4.4"
Driscoll	15°*	Unreported
Petronila	15°*	Unreported
Port Aransas	15°*	Unreported
Robstown	14°	5.1"
Port of Corpus Christi Authority	15°*	Unreported

*Records are limited by the presence of a National Weather Service weather station within the jurisdiction. Marked records are interpolated estimates.

Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body, similar to the heat index for extreme heat (Figure 18–1). Since wind can dramatically accelerate heat loss from the body, a blustery 30° day would feel just as cold as a calm day with 0° temperatures. Nueces County has never experienced a blizzard, but based on previous occurrences, the region has been subject to winter storm watches, warnings, freezing rain, sleet, snow, and wind chill. Historic low temperatures and snowfall amounts have been recorded in Table 18-2.

Based upon historical data, the worst that can be expected in the future in the planning area is six inches of snow and 10° Fahrenheit. Wind chill factors would further lower the apparent temperature, potentially as low as -19 degrees.

Figure 18-1. Wind Chill Chart²



Occurrences

Severe winter storm events in Nueces County are rare. January is the month when snow, sleet or freezing rain is most likely to be observed; yet winter weather conditions can occur at any time during the winter and early spring months. Table 18-3 shows historical occurrences for the area since 2004 as well as the type of event and the amount of damage provided by the National Climatic Data Center (NCDC). Although there have been relatively few storms, it is likely that several occurrences have gone unreported. The NCDC has one reported death among these events. During this 2018 event, an elderly man passed away due to exposure to the cold temperatures after he fell from his wheelchair in Corpus Christi.

² NOAA

Table 18-3. Historical Winter Storm Events, 2004-2022³

Date	Event Type	Fatalities	Injuries	Property Damage	Crop Damage	Jurisdiction
12/24/2004	Heavy Snow	0	0	0	0	Nueces County
12/8/2006	Winter Weather	0	0	0	0	Nueces County
1/16/2007	Winter Weather	0	0	0	0	Nueces County
1/8/2010	Frost/Freeze	0	0	0	0	Nueces County
2/3/2011	Ice Storm	0	0	\$750,000	0	Nueces County
12/7/2017	Heavy Snow	0	0	\$50,000	0	Nueces County
1/1/2018	Cold/Wind Chill	1	0	0	0	Nueces County
2/14/2021	Cold/Wind Chill	0	0	\$7,200,000	0	Nueces County
2/14/2021	Ice Storm	0	0	0	0	Nueces County
2/16/2021	Ice Storm	0	0	0	0	Nueces County
1/20/2022	Cold/Wind Chill	0	0	0	0	Nueces County
2/3/2022	Cold/Wind Chill	0	0	0	0	Nueces County
2/4/2022	Cold/Wind Chill	0	0	0	0	Nueces County
2/4/2022	Ice Storm	0	0	0	0	Nueces County

Probability

Hazard probability or reoccurrence intervals are calculated based upon the number of historical events during the period of examination. For example, since fourteen Winter Storm events have taken place during an 18-year reporting period, the reoccurrence interval would be about 1.3 years, or a 77.8% annual chance of a winter storm event. This indicates an event is likely in the next five years.

Probabilities of winter storm events are also subject to the effect of future conditions, such as climate change. The effects of climate change include sea level rise, changes in weather patterns like drought and flooding, and much more. As long-term weather patterns and average temperatures change so too will the frequencies and range of anticipated intensities of winter storm events.

Impact

Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures. The leading cause of death during winter storms is transportation accidents. Hypothermia and frostbite are other dangers from very cold winter temperatures.

³ NCDC Storm Events Database, <https://www.ncdc.noaa.gov/stormevents/>

Historical evidence shows that most of the area has a low risk of winter storm activity; however, past reported property damages indicate that, while winter events (typically consisting of snow and ice) do occur, their economic impacts are typically not severe across the entire study area. All buildings and facilities are considered to be exposed to this hazard and could potentially be impacted because it cannot be predicted where a winter storm event may cause damage or disruption. The agricultural industry in the Nueces County is not usually affected by winter storms as crops are not usually planted during the winter months.

Vulnerability

Table 18-4 shows potential annualized property losses for each jurisdiction based on past reports of property and crop damages in each jurisdiction (NCDC, 1950–2022) and exposure values. NCDC records only keep property damage values for the county as a whole, so annualized losses are calculated as a percentage of the total property damage (\$8,000,000) divided by the length of the recording period (18 years). “Negligible” indicates that the annualized expected property losses are less than \$5,000. Property damage recorded usually came in the form of pipes bursting, car crashes, or other sporadic events. Winter storm events typically do not pose great risk to property in the same way other hazard events such as hurricanes, tornados, or earthquakes do. NCDC did not record any crop damages caused by these events.

Table 18-4. Potential Annualized Losses by Jurisdiction (Severe Winter Storm)

JURISDICTION	TOTAL EXPOSURE*	% EXPOSURE	ANNUALIZED LOSS (AL)***	ANNUALIZED LOSS RATIO(ALR)
Nueces County	\$1,724,545,247	2.7%	\$11,998	0.00%
Agua Dulce	\$34,977,673	0.1%	Negligible	0.00%
Banquete ISD	\$325,495,995	0.5%	Negligible	0.00%
Bishop	\$234,813,036	0.4%	Negligible	0.00%
Corpus Christi	\$33,010,995,159	51.7%	\$229,655	0.00%
Driscoll	\$49,412,853	0.1%	Negligible	0.00%
Petronila	\$3,656,118	0.0%	Negligible	0.00%
Port Aransas	\$27,897,644,718	43.7%	\$194,082	0.00%
Robstown	\$603,646,717	0.9%	Negligible	0.00%
TOTALS FOR STUDY AREA	\$63,885,187,516		\$444,445**	0.00%

*Total residential and commercial property value, Nueces County Appraisal District, 2022

**NCDC Records, \$8,000,000 over 18 years

***Values less than \$5,000 for dollar amounts are classified as “Negligible in the table.

Unincorporated Nueces County Severe Winter Storms Hazard

LOCATION					
County Wide (Unincorporated)					

OCCURENCE	EXTENT				
Number of Events 2004-2022	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	\$11,998	Negligible

VULNERABILITY				
Population (County)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
13,579	\$968,938,581	\$755,606,666	280,817	\$122,134,449

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Agua Dulce Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
688	\$15,251,504	\$19,726,169	2.45	\$1,066

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Banquete ISD Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,862	\$102,846,088	\$222,649,907	61,968	\$26,951,458

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Bishop Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
Number of Events 2004-2022	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,155	\$123,993,966	\$110,819,070	232	\$100,903

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Corpus Christi Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	1	0	\$229,655	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
317,773	\$16,744,675,468	\$16,266,319,691	21,392	\$9,303,924

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Driscoll Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
673	\$29,366,710	\$20,046,143	438	\$190,497

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Petronila Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
Number of Events 2004-2022	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
87	\$667,778	\$2,988,340	108	\$46,972

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Port Aransas Severe Winter Storms Hazard

LOCATION	
Jurisdiction Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	\$194,082	Negligible

VULNERABILITY				
Population*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
3,105	\$25,743,548,569	\$2,154,096,149	859	\$373,601

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

City of Robstown Severe Winter Storms Hazard

LOCATION	
City Wide	

OCCURENCE	EXTENT				
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill
Number of Events 2004-2022					
14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY				
Population (City)*	Property Value**		Crop Land	
	Commercial	Residential	Acres***	Value****
10,157	\$373,735,450	\$229,911,267	4,413	\$1,919,326

* Census Bureau Population Estimate 2021

**Nueces County Appraisal District, 2022

***USDA Crop Land and National Land Cover Dataset, 2021

****USDA Nueces County Census of Agriculture, 2017

Nueces County Drainage District #2 Severe Winter Storms Hazard

LOCATION	
District Wide	

OCCURENCE	EXTENT					
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill	
Number of Events 2004-2022	14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
20,468	\$141,782	\$36,354
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$2,256,741	\$705,306	\$1,776,711

* NCDD#2 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #3 Severe Winter Storms Hazard

LOCATION	
District Wide	

OCCURENCE	EXTENT					
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill	
Number of Events 2004-2022	14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	Negligible	Negligible

VULNERABILITY		
Population Served**	Property Value*	Property Contents*
18,799	\$17,013,842	\$529,000
Infrastructure*	Vehicles and Machinery*	Mobile Equipment*
\$7,255,507	\$438,239	\$389,033

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Nueces County Water Control and Improvement District #4 Severe Winter Storms Hazard

LOCATION	
District Wide	

OCCURENCE	EXTENT					
	Frost/Freeze	Winter Weather	Ice Storm	Heavy Snow	Cold/Wind Chill	
Number of Events 2004-2022	14	1	2	4	2	5

PROBABILITY			
Number of Events 2004-2022	Record Time Period	Time Period Years	Probability
14	3/26/2004 to 4/22/2022	18	1 EXTREME WINTER EVENT ESTIMATED EVERY 1.3 YEARS

IMPACT				
Number of Events	Deaths	Injuries	Property Damage	Crop Damage
14	0	0	\$194,082	Negligible

VULNERABILITY		
Population Served**		Infrastructure*
6,281		\$21,097,000
Property Value*	Vehicles and Machinery*	Mobile Equipment*
\$6,500,000	\$1,248,000	\$128,500

* NCWCID#3 Appraised Value

** Census Bureau Population Estimate 2021.

Section 19: Mitigation Actions

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Mitigation Strategy

The Planning Team reviewed the goals and objectives from the 2017 Nueces County Multi-Jurisdictional Hazard Mitigation Action Plan. Mitigation actions, new and old, are prioritized to reflect overall mitigation strategy, which is to reduce and eliminate the long-term risk of loss of life and property damage from the full range of disasters affecting the planning area. Each mitigation action is presented by jurisdiction in the section below. Each mitigation action included is in priority order (high, moderate, low), by best estimate of cost, if applicable, by potential funding source, by which department or agency will administer the action and by the action timeline.

Each jurisdiction has multiple authorities to implement the mitigation strategy. Authority includes, but is not limited to, local planning and zoning, public works efforts, emergency management, tax authority, annual operation budgets, building codes and ordinances. The participating jurisdictions, with the exception of Petronila, participate in the NFIP. The City of Petronila

does not participate in the NFIP because the city’s jurisdiction is primarily limited to the ROW limits within the town center; the surrounding developed and agricultural parcels are part of the county. General hazard mitigation goals for the participating jurisdictions are defined below.

The participating communities used very similar methods for ranking their mitigation actions. Each action was scored with a 1-5 score for the following criteria: Social Acceptability; Technical Feasibility; Administrative Capability; Political Support; Legal Authority; Economic Evaluation; and Environmental Impact. A raw score was added for the seven criteria and was used to rank the actions. Unincorporated Nueces County and the Cities of Bishop, Driscoll, Petronila, and Agua Dulce used this method but rated low or no cost actions higher due to the ease of implementation. The City of Corpus Christi used three primary factors to rank actions: benefits to public safety, cost, and economic impact.

Goal 1

Protect public health and safety.

Objective 1.1

Implement mitigation actions that will assist in protecting lives and property by making homes, businesses, public facilities, and infrastructure more resistant to high-risk hazards.

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

Ensure that public and private facilities and infrastructure meet established building codes and enforce the codes to address any deficiencies.

Goal 2

Protect new and existing properties.

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](#)

Review existing ordinances, building codes, and safety procedures and enforce regulatory measures to ensure they protect lives and property.

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 to help communities with local match requirements for implementing hazard mitigation actions to reduce risk.

[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.

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.

Mitigation Action Status Update

All mitigation actions included in the previous hazard mitigation plan continue to be relevant, and have been included in the updated action plan, since the participants have had no change in priority. Incomplete actions from the previous plan have been added in **bold** to the mitigation action tables for the Hazard Mitigation Plan update. Completed actions from the 2017 HMP are denoted by an action completion date listed in the timeline field. All other actions listed in this update are new mitigation actions. It is important to note that many of the hazard mitigation actions from the previous HMP remain active due to the need for annual implementation or long-term project timelines.

Developmental Changes

Since the approval of the previous plan there have been no developmental changes that have increased or decreased the vulnerability of hazard prone areas within the participating jurisdictions from the previous plan. Development has occurred within the jurisdiction but has not ultimately affected the jurisdictions' relative hazard vulnerability. The previous plan's participating jurisdiction's vulnerability remains the same, the mitigation actions and plans incorporated into future planning mechanisms will reflect the, same, expected overall vulnerability within the previous plan's jurisdictions. Developmental changes cannot be determined for participating jurisdiction that did not participate in the previous plan.

Unincorporated Nueces County Mitigation Actions

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Conduct Annual Risk Assessment	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Levee Failure, Land Subsidence, Wildfire, and Winter storms.	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	N/A	Short Term (1 Year)
Review and Update Business Continuity Plan	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Levee Failure, Land Subsidence, Wildfire, and Winter storms	Medium	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Continuity of Operations Plan	N/A	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review and Update Damage Assessment Policy	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Levee Failure, Land Subsidence, Wildfire, and Winter storms	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	N/A	Short Term (1 Year)
Implement Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Levee Failure, Land Subsidence, Wildfire, and Winter storms	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Education and Awareness	N/A	N/A	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Special Needs Public Education and Outreach	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Coastal Erosion, Tornado, Hailstorms, Expansive Soils, Levee Failure, Land Subsidence, Wildfire, and Winter storms	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Education and Awareness	N/A	N/A	Short Term (1 Year)
Update Dune Protection Plan /Erosion response plan	Coastal Erosion, Flood	High	HMGP, CMP, Nueces County Coastal Parks Department Budget	Nueces County Coastal Parks Department	Local Plans and Regulations, Natural Systems Protection	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)
Implement Nueces County North Beach Wetlands Restoration and Enhancements Project	Coastal Erosion, Flood	Medium	HMGP, CMP, Nueces County Coastal Parks Department Budget	Nueces County Coastal Parks Department	Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Develop/Adopt Shoreline Erosion Plan	Coastal Erosion, Flood	Medium	HMGP, CMP, Nueces County Coastal Parks Department Budget	Nueces County Coastal Parks Department	Local Plans and Regulations, Natural Systems Protection	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)
Conduct Dam & Levee Failure Impact Study	Levee Failure	Low	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations, Structure and Infrastructure	Emergency Operations Plan	Will provide protection to new and existing buildings	Short Term (1 Year)
Implement 2016 Master Drainage Plan	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, FMA, Nueces County Public Works Department Budget	Nueces County Public Works Department	Local Plans and Regulations, Structure and Infrastructure	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Install Emergency Generators for Emergency Operations & Logistics Support	Levee Failure, Flood, Hurricane/ Tropical Storm	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Structure and Infrastructure	Emergency Operations Plan	New and existing buildings will benefit from uninterrupted power	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Nueces County (Agua Dulce Region) Petronila Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Implement Nueces County (Bishop Region) Petronila Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Implement Nueces County (Chapman Ranch Region) Oso Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Nueces County (Driscoll Region) Petronila Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Implement Nueces County (Petronila Region) Petronila Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Implement Nueces County (Upper Oso Region) Oso Creek Watershed Restoration and Protection Project	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Nueces County Hazel Bazemore Park and Riverbank Enhancements	Levee Failure, Flood, Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Inland Parks Department Budget	Nueces County Inland Parks Department	Local Plans and Regulations, Structure and Infrastructure, Natural Systems Protection	Capital Improvement Plan	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)
Identify flood prone and repetitive loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties.	Levee Failure, Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations, Structure and Infrastructure	Acquisition of Land for Open Space/Recreation Use	Will provide protection to new and existing buildings	Short Term (1 Year)
Adopt a drought-resistant landscape ordinance for public facilities.	Drought	High	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Local Plans and Regulations	Zoning Ordinance	N/A	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Create Reserve Potable Water Supply	Drought	High	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	Emergency Operations Plan	N/A	Moderate Term (2 – 4 Years)
Develop and implement a program to regularly water the foundation of public buildings.	Drought, Expansive Soils	Low	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	N/A	Short Term (1 Year)
Review and Update Heat Safety Policy	Extreme Heat	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	N/A	Short Term (1 Year)
Install Ancillary Air Conditioning in appropriate facilities/assets.	Extreme Heat, Hail, Hurricane/ Tropical Storm, Lightning, Windstorm	Medium	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	Provide A/C to existing buildings	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review and Update Severe Weather Property Protection Policy	Flood, Hail, Hurricane/ Tropical Storm, Tornado, Windstorm, Winter storm	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)
Carry out feasibility study for underground utilities	Flood, Hail, Hurricane/Tropical Storm, Tornado, Windstorm, Winter storm	Medium	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	Will provide protection to utilities for new and existing buildings	Moderate Term (2 – 4 Years)
Develop a plan for alternate EOC	Hurricane/ Tropical Storm	Medium	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Plans and Regulations	Emergency Operations Plan	N/A	Moderate Term (2 – 4 Years)
Identify and implement flood proofing methods appropriate for existing facilities.	Hurricane/ Tropical Storm, Flooding	High	HMGP, FMA, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	Will provide protection to new and existing buildings	Moderate Term (2 – 4 Years)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review and Update Shelter in Place Policy	Hurricane/ Tropical Storm	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	N/A	Short Term (1 Year)
Harden Island Park Facilities	Hurricane/ Tropical Storm, Windstorm	High	HMGP, Nueces County Coastal Parks Department Budget	Nueces County Coastal Parks Department	Structure and Infrastructure	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)
Protect facilities with storm shutters or impact windows	Hurricane/ Tropical Storm, Windstorm	High	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)
Install a Lighting Alert System	Lightning	Low	HMGP, Nueces County Public Works Department Budget	Nueces County Public Works Department	Structure and Infrastructure	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Update Community Wildfire Protection Plan	Wildfire	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	Will provide protection to new and existing buildings	Short Term (1 Year)
Conduct Community Wildfire Risk Assessment	Wildfire	High	HMGP, Nueces County Emergency Management Department Budget	Nueces County Emergency Management Department	Local Plans and Regulations	Emergency Operations Plan	Will provide protection to new and existing buildings	Short Term (1 Year)

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Update Nueces County Community Wildfire Protection Plan (CWPP)	Wildfires	High	County Annual Operating Budget	County Risk Management Office	Structure and Infrastructure	Protecting buildings from wildfires will reduce the damage caused by wildfires and allow the county to provide uninterrupted services.	Loss Prevention Plan	Annually
Establish drought tolerance criteria for new landscaping and modify existing as appropriate to prevent loss and future erosion at county owned facilities.	Drought	Moderate	Local Budget	Nueces County Facilities Department	Local Plans and Regulations Structure and Infrastructure	Exiting landscaping will be replaced with drought tolerant landscaping and new buildings will be required to plan drought tolerant landscaping	Facilities Department Regulations	2-3 Years
Buy-out Repetitive Loss Properties that are on FEMA's Repetitive Loss List for Nueces County.	Hurricanes, Floods, Levee Failure	Low	HMGP	Nueces County Public Works Department	Structural and Infrastructure	Existing buildings will be purchased by the county and replacement structures will be placed outside of flooded areas.	N/A	4 Years

UNINCORPORATED NUECES COUNTY MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Purchase portable air conditioning units to provide support for critical operations and information systems for use during HVAC or power outage.	Hurricanes, Windstorm, Extreme Heat, Lightning, Tornado	Moderate	Local Budget	Nueces County Facilities Department	Structure and Infrastructure	Having portable A/C units will keep electronic equipment working properly and county staff will be to keep working at county facilities.	Nueces County Facilities Regulations/Procedures.	2-3 Years
Establish an alternate backup site suitable to continue essential Emergency Operations Center duties in the event the current Emergency Operations Center is not accessible.	Hurricanes/Tropical Storms	Moderate	State and Homeland Security Grants	Nueces County Department of Emergency Management	Structure and Infrastructure	A new building will have to be built and outfitted with necessary equipment to become an alternate EOC.	Nueces County Emergency Operations Plan	3 Years

City of Agua Dulce Mitigation Actions

CITY OF AGUA DULCE MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install Backup Generators	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Structure and Infrastructure	New and existing buildings will benefit from uninterrupted power	N/A	Short Term (1 Year)
Develop and Implement Extreme Temperature Risk and Safety Awareness Program	Extreme Heat, Winter storm	Medium	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Education and Awareness	N/A	N/A	Short Term (1 Year)
Incorporate Flood Mitigation in Local Planning	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Local Plans & Regulations, Structure & Infrastructure	Will provide protection to new and existing buildings to prevent flooding	N/A	Short Term (1 Year)

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve Stormwater Management Planning	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Local Plans & Regulations, Structure & Infrastructure	Will provide protection to new and existing buildings to prevent flooding	N/A	Short Term (1 Year)
Improve Stormwater Drainage System Capacity	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Structure & Infrastructure	Will provide protection to new and existing buildings to prevent flooding	N/A	Moderate Term (2 – 4 Years)
Assess Vulnerability to Severe Wind	Windstorm	Medium	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Protect Power Lines and Infrastructure	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Structure & Infrastructure	New and existing buildings will benefit from uninterrupted power	N/A	Moderate Term (2 – 4 Years)
Design/Implement drought management plan	Drought	Medium	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Develop and implement multi-hazard public awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Agua Dulce Public Safety Department Budget	City of Agua Dulce Public Safety Department	Education and Awareness	N/A	N/A	Short Term (1 Year)

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement an annual program for clearing debris from bridges, drains and culverts	Flooding	High	Regular Department Budget	Public Works/Nueces County/TXDOT	Structure and Infrastructure	Protect new/existing building from flooding	N/A	Annual
Store books, manuals, permits, and other critical government records on the upper floor (s) and/or on shelves above the base flood elevations.	Flooding	High	Regular Department Budget	Mayor/Council/City Secretary	Structure and Infrastructure	No adverse impact to new or existing building.	N/A	Annual
Work with neighboring communities to establish common watershed planning directives.	Flooding	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	Flooding vulnerability is reduced for all new and existing buildings in the watershed	N/A	Annual

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Prepare and advertise the local emergency evacuation plan, such as escape routes, in coordination with Dept. of Transportation	Flood, Hurricane, Tornado, Wind	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations, Education and Awareness	New and existing buildings will benefit from the behavioral improvements of a hazard-educated public	N/A	Annual
Update public community facilities to include severe weather action plans and designated tornado shelter areas	Flood, Hurricane, Tornado, Wind	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations Structure and Infrastructure	No adverse impact to new or existing building.	N/A	4 Years
Purchase NOAA "All Hazards" radios for early warning and post-event information and place in area schools/businesses /critical facilities	Hurricanes & Tropical Storms, Floods, Windstorms, Lightning, Tornado, Hailstorms, Levee Failure, Wildfire, Winter Storms, and Drought	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	No adverse impact to new or existing building.	N/A	1 Years

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review damage assessment policies, establish best practice and update procedures as determined appropriate incorporating the use of an Asset Management System.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	New and existing buildings will benefit from the behavioral improvements of a hazard-educated public	N/A	Update Process & Review Annually
Special Needs Public Education and Outreach	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	An educated populace will be able to reduce vulnerability to natural hazards	N/A	Update Process & Review Annually

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Community Wildfire Risk Assessment	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	New and existing buildings will benefit from the overall decrease in wildfire vulnerability	N/A	1 Year
Community Wildfire Protection Plan update	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	New and existing buildings will benefit from the overall decrease in wildfire vulnerability	N/A	1 Year
Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service.	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	An educated populace will be able to reduce vulnerability to natural hazards	N/A	1 Year

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Creation of Master Drainage Plan for implementation	Hurricane & Tropical Storm, Flood, Levee Failure	High	Regular Department Budget, HMGP	Mayor /Council/City Secretary	Local Plans and Regulations	New and existing buildings will benefit from the overall reduction to flooding hazards	N/A	4 Years
Obtain certification of communities by the National Weather Service as "Storm Ready" communities.	Hurricane & Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	N/A	N/A	1 year
Assess performance & impact zoning to set risk-based standards for land development. Establish "agricultural use districts" in zoning ordinance to limit densities in known hazard areas.	Levee Failure, Drought, Flood, Hurricane, Severe Thunderstorm , Wildfire	Moderate	Regular Department Budget, HMGP	Mayor /Council/City Secretary	Local Plans and Regulations	New and existing buildings will benefit from the overall hazard reduction derived from an updated master development plan	N/A	2-3 year

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Work with county, state, and federal agencies to maintain up-to-date hazard data, maps, etc.	Levee Failure, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	New and existing buildings will benefit from the overall reduction to flooding hazards	N/A	2 Years
Install emergency generator for critical facility-police dispatch/city hall.	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Public Works/Nueces County/TXDOT	Structure and Infrastructure	New and existing buildings will benefit from the support provided by generator-equipped critical facilities	N/A	4 Years
Install quick-connect emergency generator hook-ups for critical facility-school.	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Public Works/Nueces County/TXDOT	Structure and Infrastructure	New and existing buildings will benefit from the support provided by generator-equipped critical facilities	N/A	4 Years

CITY OF AGUA DULCE MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	An educated populace will be able to reduce vulnerability to natural hazards	N/A	1 Year

Banquete ISD Mitigation Actions

BANQUETE ISD MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install Backup Generators	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Structure and Infrastructure	New and existing buildings will benefit from uninterrupted power	N/A	Short Term (1 Year)
Develop and Implement Extreme Temperature Risk and Safety Awareness Program	Extreme Heat, Winter storm	Medium	HMGP, Banquete ISD Teaching & Learning Department Budget	Banquete ISD Teaching & Learning Department	Education and Awareness	N/A	N/A	Short Term (1 Year)
Incorporate Flood Mitigation in Local Planning	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Local Plans & Regulations, Structure & Infrastructure	Will provide protection to new and existing buildings	N/A	Short Term (1 Year)

BANQUETE ISD MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve Stormwater Management Planning	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Local Plans & Regulations, Structure & Infrastructure	Will provide protection to new and existing buildings	N/A	Short Term (1 Year)
Improve Stormwater Drainage System Capacity	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Structure & Infrastructure	Will provide protection to new and existing buildings	N/A	Moderate Term (2 – 4 Years)
Assess Vulnerability to Severe Wind	Windstorm	Medium	HMGP, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)
Protect Power Lines and Infrastructure	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Structure & Infrastructure	New and existing buildings will benefit from uninterrupted power	N/A	Moderate Term (2 – 4 Years)

BANQUETE ISD MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Design and implement drought management plan	Drought	Medium	HMGP, Banquete ISD Federal Programs Department Budget	Banquete ISD Federal Programs Department	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)
Develop and implement multi-hazard public awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Banquete ISD Teaching & Learning Department Budget	Banquete ISD Teaching & Learning Department	Education and Awareness	N/A	N/A	Short Term (1 Year)

City of Bishop Mitigation Actions

CITY OF BISHOP MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Design and implement improvements to the Bishop Wastewater Plant, 5435 CR 4 to prevent overflows to prevent flooding. Update Wastewater Plant infrastructure.	Flood, Hurricane/ Tropical Storm	High	HMGP, City of Bishop Public Works Department Budget	City of Bishop Public Works Department	Structure & Infrastructure	Will provide protection to new and existing buildings	Capital Improvements Plan	by 09/30/2023
Design and implement drainage improvements to prevent flooding on West Oregon Street. Work on drainage infrastructure to prevent flooding on West Oregon Street.	Flood, Hurricane/ Tropical Storm	High	HMGP, FMA, City of Bishop Public Works Department Budget	City of Bishop Public Works Department	Structure & Infrastructure	Will provide flooding protection to new and existing buildings	Stormwater Management Plan	by 09/30/2023
Develop and implement a multi-hazard public awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm,	High	HMGP, City of Bishop Public Works	City of Bishop Public Works Department	Education and Awareness	N/A	Emergency Operations Plan	Short Term (1 Year)

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
	Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms		Department Budget					
Install backup generators in critical facilities	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Coastal Erosion, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Bishop Public Works Department Budget	City of Bishop Public Works Department	Structure & Infrastructure	Critical facilities will benefit from uninterrupted power	Emergency Operations Plan	Short Term (1 Year)

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Design/Implement drought management plan	Drought	High	HMGP, City of Bishop Public Works Department Budget	City of Bishop Public Works Department	Local Plans and Regulations	New and existing buildings will be less affected by drought	N/A	Short Term (1 Year)
Develop/Designate cooling/heating centers to assist the public during extreme weather events.	Extreme Heat/Winter Storm	High	HMGP, City of Bishop Public Works Department Budget	City of Bishop Public Works Department	Structure & Infrastructure	Will use existing or new facilities to protect community from hazards	Emergency Operations Plan	Short Term (1 Year)
Implement an annual program for clearing debris from bridges, drains and culverts	Flooding	High	Regular Department Budget	Public Works/Nueces County/TXDOT	Structure & Infrastructure	New and existing buildings will be protected from flooding by ensuring drainage systems operate well	N/A	Annual
Implement an annual program for clearing debris from bridges, drains and culverts.	Flooding	Moderate	Regular Department Budget	Public Works/Nueces County/TXDOT	Structure & Infrastructure	New and existing buildings will be protected	N/A	2 Years

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Store books, manuals, permits, and other critical government records on the upper floor (s) and/or on shelves above the base flood elevations.	Flooding	High	Regular Department Budget	Mayor/Council/City Secretary	Structure and Infrastructure	New and existing buildings will benefit from the overall reduction to flooding hazards	N/A	Annual
Work with neighboring communities to establish common watershed planning directives	Flooding	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	New and existing buildings will benefit from sound watershed-wide planning practices	N/A	Annual
Prepare and advertise the local emergency evacuation plan, such as escape routes, in coordination with Dept. of Transportation	Flood, Hurricane, Tornado, Wind	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	No adverse impact to new and existing buildings	N/A	Annual

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Update public community facilities to include severe weather action plans and designated tornado shelter areas	Flood, Hurricane, Tornado, Wind	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Structure and Infrastructure Education and Awareness	No adverse impact to new and existing buildings	N/A	4 Years
Purchase NOAA “All Hazards” radios for early warning and post-event information and place in area schools/ businesses/ critical facilities	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	No adverse impact to new or existing buildings.	N/A	1 Years

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review damage assessment policies, establish best practice and update procedures as determined appropriate incorporating the use of an Asset Management System.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations	An asset management system will allow for better management of assets in new or existing buildings	N/A	Update Process/Review Annually
Special Needs Public Education and Outreach	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	No adverse impacts to new or existing buildings	N/A	Update Process/Review Annually

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Community Wildfire Risk Assessment	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations Education and Awareness	New and existing buildings will benefit from a better understanding of wildfire hazards	N/A	1 Year
Community Wildfire Protection Plan update	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Local Plans and Regulations Education and Awareness	New and existing buildings will benefit from a better understanding of wildfire hazards	N/A	1 Year
Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service	Wildfire	Moderate	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	Education and Awareness	N/A	1 Year

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Creation of Master Drainage Plan for implementation	Hurricane/Tropical Storm, Flood, Levee Failure	High	Regular Department Budget, HMGP	Mayor/Council/City Secretary	Local Plans and Regulations	New & existing buildings benefit from improved stormwater management of master drainage plan	N/A	4 Year
Obtain certification of communities by the National Weather Service as StormReady communities.	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	Local Plans and Regulations Education and Awareness	New and existing buildings benefit from community's StormReady certification.	N/A	1 Year
Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management /Mayor/Council	Education and Awareness	No adverse impacts to new or existing buildings	N/A	Update Process/Review Annually

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Assess use performance/impact zoning to set risk-based standards for land development. Establish "agricultural use districts" in zoning ordinance to limit densities in known hazard areas. Establish procedure to utilize overlay zones for requiring mitigation techniques in high-hazard districts.	Failure, Drought, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget, HMGP	Mayor/Council/City Secretary	Local Plans and Regulations	New and existing buildings, particularly new buildings, will benefit from improved planning and zoning standards.	N/A	2-3 Years
Work with county, state and federal agencies to maintain up-to-date hazard data, maps, etc	Levee Failure, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	Local Plans and Regulations Education and Awareness	New and existing buildings, especially new buildings, will benefit from updated hazard data and maps	N/A	2 Years

CITY OF BISHOP MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Retrofit fire facility to hazard-resistant levels	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/Emergency Service District 3	Structure and Infrastructure	New and existing buildings will benefit from a more hazard-resistant fire facility	N/A	4 Years
Install emergency generator for critical facility- city hall	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Public Works/Nueces County/TXDOT	Structure and Infrastructure	New and existing buildings will benefit from a generator-equipped city hall	N/A	4 Years
Install quick-connect emergency generator hook-ups for critical facility-school.	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/Bishop ISD	Structure and Infrastructure	No adverse impact on new and existing buildings	N/A	4 Years

City of Corpus Christi Mitigation Actions

CITY OF CORPUS CHRISTI MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Upgrade bulkhead along south shoreline between CC Natural History & Science Museum and the USACE Property- Construction of new bulkhead in CC Bay along the south side shoreline of Corpus Christi	Hurricanes, Floods, Levee Failure, Coastal Erosion	High	\$10,500,000; Sales Tax Proceeds	Corpus Christi Engineering Services	Structure and Infrastructure	Deter coastal erosion and mitigation potential flooding of existing properties situated at the northern section of downtown	Capital Improvements Plan	4-10yrs
Improve the Salt Flats Levee System- Make improvements needed to avoid a potential total failure during a catastrophic event and continued maintenance to ensure that the system will function as originally designed and to be sufficient to be certified by FEMA.	Hurricanes & Floods	High	\$3,000,000; Certificates of Obligation	Corpus Christi Engineering Services	Structure and Infrastructure	Improvements on the Salt Flat Levee system will help mitigate flooding of existing buildings situated in downtown Corpus Christi. Failure to achieve FEMA certification would greatly impact the City of Corpus Christi and downtown business insurance costs.	Capital Improvements Plan	2-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Update the Corpus Christi Stormwater Master Plan- Development of a comprehensive, updated, consistent storm water master plan based on adopted storm water criteria and design manual to respond to development, environmental issues, and better define & prioritize on going and future drainage capital improvement projects.	Hurricanes, Floods, Levee Failure	High	\$4,084,900; Bonds	Corpus Christi Storm Water Department	Local Plans and Regulations	Prioritization of major drainage improvements considering level of service and return on investment could greatly impact the operating budget and will help eliminate the flooding that impacts all of Corpus Christi	Capital Improvements Plan	2-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Excavate Drainage Master Channel 31- Excavate silt and debris in Drainage Master Channel 31 caused by erosion on sides and bottom, provide critical improvements to restore and improve the drainage profile and include erosion control measures such as side slope stabilization, soil treatment, vegetative cover, and other best management practices	Hurricanes & Floods	High	\$2,819,800; Bonds	Corpus Christi Storm Water Department & Engineering Services	Structure and Infrastructure	Regain the carrying capacity of the channel and help eliminate flooding of existing buildings that occurs in the area of Corpus Christi this channel is supposed to help	Capital Improvements Plan	3-4yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve side slopes on Schanen Ditch- The existing profile of Schanen Ditch exceeds the recommended slope of 4:1 and maximum of 3:1 This is resulting in major slope stabilization failure. Work will include excavation/backfill to widen and create 3:1 side slopes with stabilization matting, new culvert and outfalls, riprap, and ditch bottom improvements, seeding, irrigation adjustments, traffic controls, dewatering and other miscellaneous items.	Hurricanes & Floods	High	\$2,756,100; Bonds	Corpus Christi Storm Water Department & Engineering Services	Structure and Infrastructure	Restoration of channels and ditches is critical to avoid potential "washouts" that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes	Capital Improvements Plan	3-4yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Excavate La Volla Creek (Phase 1)- Improvement will provide 100-year capacity for conveyance to the Oso Creek. Phase 1 improvements include the removal of vegetation from the channel north of Saratoga Blvd. and channel widening south of Saratoga Blvd.	Hurricanes, Floods, Levee Failure	High	\$4,152,800; Bonds	Corpus Christi Storm Water Department & Engineering Services	Structure and Infrastructure	Restoration of channels and ditches is critical to avoid potential "washouts" that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes	Capital Improvements Plan	1-2yrs
Adopt FEMA Flood Insurance Rate Map- Participate in the FEMA FIRM process that includes appeals, planning, hazard mitigation items and adopt the preliminary FIRMS	Floods	High	Low Cost- Staff Time; Local Budget	Corpus Christi Public Works Department	Local Plans and Regulations	Increased participation in available flood insurance	Capital Improvements Plan	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve CRS Rating- City of Corpus Christi is currently a class 8 community, eligible for 10% discount on flood insurance premiums. The project is intended to improve the rating to class 6, increasing the premium discount by 15%.	Floods	High	Low Cost- Staff Time; Local Budget	Corpus Christi Public Works Department	Local Plans and Regulations	Increased participation in available flood insurance	CRS Program, Floodplain Regulations, and Stormwater Regulations	1-2yrs
Implement a Desalination Program- a proactive step to begin determining the feasibility of developing a drought proof future water supply using brackish groundwater and seawater. The program will provide the city with the reliability, security, sustainability and availability of brackish groundwater and seawater as possible future water sources	Drought	High	\$2,859,400; Water Operations funds, raw water supply fund and bureau of reclamation grant	City of Corpus Christi	Structure and Infrastructure	The desalination program can be a secure source of freshwater to avoid disruption to essential utilities, eliminate the risk of potential economic loses.	N/A	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Secure the integrity of the Wesley Seale Dam System- Provides improvements to the original instrumentation system including annual safety inspection, integration with O.N. Stevens WTP process controls, the Howell-Bunger Valve, the downstream sluice gates, and the dewatering system. The project will protect the integrity of the Wesley Seal Dam System (1957), to provide for proper inspection and updated regulatory reports per TCEQ	Floods, Drought, Levee failure	High	\$5,850,000; Revenue Bond	City of Corpus Christi Water Department	Structure and Infrastructure	The project will ensure the city can provide reservoir supplies to its customers and other downstream water right-holders and will secure the structural integrity of the dam through established dam safety protocols.	N/A	3-4yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Maintain and adopt most current building codes- The City of Corpus Christi will adopt, with local amendments, the 2021 Building Codes effective May 1, 2023, the International Code council (ICC), 2021 editions of the International Building Code, Existing Building Code, Fuel Gas code, Mechanical Code, Plumbing Code, and Residential Code for one-and-two family dwellings, the 2015 Energy Code, and the 2020 National Fire Prevention Association (NFPA) National Electric Code. The city will be periodically updating the codes with code cycles that become available.	Hurricanes, Flood, Windstorm, Coastal Erosion, Hailstorm, Tornado, Expansive Soils, Land Subsidence	High	Low Cost; Staff Time	City of Corpus Christi Development Services	Local Plans and Regulations	By maintaining the most updated building codes, the city is required	N/A	2-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve side seals on the Wesley Seale Dam Spillway to maintain spillway's integrity- the dam has 60 crest gates located in two sperate spillways: the south spillway includes 27 gates, and the north spillway includes 33 gates. The project will provide the necessary improvements including seal replacement, miscellaneous structural repairs, and application of a protective coating system for the Dam.	Floods & Levee Failure	High	\$22,800,000; Revenue Bond	City of Corpus Christi Water Department	Structure and Infrastructure	This project will increase the service life of the structure and prevent future corrosion, subsequent section loss and connection deterioration which will potentially lower the probability of increased flooding	N/A	4-10yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Construct a flood wall along Corpus Christi Bay at the Science and Natural History Museum to help eliminate flooding-Construction of a new floodwall (or a coastal structure) that would follow a "hypotenuse" alignment between the existing Promenade and the USACE bulkhead. The project would also backfill the triangle to make it function more like a coastal structure and provide additional land area for future use.	Hurricanes, Floods, Levee Failure	High	\$3,500,000; Certificates of Obligation	City of Corpus Christi Engineering Services	Structure and Infrastructure	Building a flood wall will help eliminate flooding of existing buildings that occurs in the downtown area of Corpus Christi	Capital Improvements Plan	4-5yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
<p>Improve Channel Ditches City-Wide-Make improvements to the erosion on sides and bottom; the side slopes and bottom are severely eroded resulting in poor drainage and encroachment of ditch outside the city right-of-way. The project will provide critical improvements to restore and improve the drainage profile and include erosion control measures such as side slope stabilization, soil treatment, vegetative cover, and other best management practices. This project is planned in multiple phases as funding allows</p>	Hurricanes & Floods	High	\$600,000; Bonds	Corpus Christi Public Works Department	Structure and Infrastructure	The effect of making improvements to Drainage Master Channel 31 will regain the carrying capacity of the channel and help eliminate flooding of existing buildings that occurs in the area of Corpus Christi this channel is supposed to help	Capital Improvements Plan	2-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Rehabilitate and/or replace aging storm water infrastructure city-wide. Project will assess existing conditions of storm water pipe, ditches, channels, and other aging systems that have reached the end of their useful service life and correct as warranted. Projects such as Glenoak Dr., Williams Ditch and Tanglewood Subdivision will be included in the Indefinite Delivery Indefinite Quantity (IDIQ) design and construction contract	Hurricanes & Floods	Medium	\$6,000,000; Bonds	City of Corpus Christi Storm Water Department	Structure and Infrastructure	Making improvements will help eliminate flooding of existing buildings in various areas of Corpus Christi.	Storm water master plan and regulations	4-5yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Assess feasibility of upgrades of all storm water outfalls in Corpus Christi that drain into Corpus Christi Bay- Provide an updated assessment of the eight major storm water outfalls and more than 100 other outfalls that allow runoff to drain into Corpus Christi Bay. Project may include the Brawner/proctor and Gollihar outfalls and other outfalls, pending results of the initial assessment, and providing recommendations for repairs, improvements, and rehabilitation, as necessary.	Hurricanes & Floods	Medium	\$600,000; Bonds	Corpus Christi Storm Water Department & Engineering Services	structure and Infrastructure	Restoration of the storm water conveyance systems is critical to avoid potential "washouts" that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes	Storm water master plan and regulations	2-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Implement the Oso Creek Channel Bottom Rectification and Green Infrastructure project. This will advance long-term resilience by enhancing the capacity of the stormwater system and improving water quality. The project will improve a 12-mile section of Oso Creek from Greenwood Drive to Yorktown Boulevard and the 37 miles of earthen channels that convey stormwater to Oso Creek. The City is requesting funds for planning and design of the project.	Hurricanes & Floods	Medium	\$4,715,400; Bonds	Corpus Christi Storm Water Department & Engineering Services	Structure and Infrastructure	Restoration of the storm water conveyance systems is critical to avoid potential "washouts" that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes	Storm water master plan and regulations	4-5yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Enhance BCEGS Rating- Insurance Services Office, Inc. (ISO) conduct another assessment to improve the building department Building Code Effectiveness Grading Schedule (BCEGS) rating. The City will be adopting the 2021 International Building Codes and 2021 International Residential codes for one- and two-family dwellings, among others, to be eligible for an improved grade. This will affect how the community enforces its codes, with special emphasis on mitigation of losses from natural hazards, and influence the cost of insurance coverage in the community	Hurricanes, Flood, Windstorm, Coastal Erosion, Hailstorm, Tornado, Expansive Soils, Land Subsidence	Medium	Low-Cost Staff Time; Local budget	Corpus Christi Development Services Department	Local Plans and Regulations	Public participation in available insurance discount options on homeowners' insurance policies.	Building Code Regulations, CRS, Floodplain Regulations	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Williams Ditch/Corpus Christi Bay Basin Mitigation-Mitigate potential flooding of low-lying neighborhoods. The original drainage system was sized to convey a 5-year storm event. This project will design for a 25-year event starting upstream at Rodd Field Road and head downstream to Corpus Christi Bay, running along a one-mile section of earthen ditch. The city will construct underground drainage structures, employ green infrastructure, expand the open channel, and add culverts.	Hurricanes & Floods	High	\$30,876,917; Revenue Bonds & Other funding sources	Corpus Christi Public Works Department & Engineering Services	Structure and Infrastructure	The project will increase resilience to disasters, reduce or eliminate the long-term risk of upstream flooding and damage to structures, a reduction in risk of loss of life, injury, and property damage due to flash flooding, localized flooding in the adjoining neighborhoods, and will accelerate recovery following a disaster by protecting bridge infrastructure.	Capital Improvements Plan	4-5yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

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Design & Construct La Volla Creek Improvements- Design and Construction of four additional relief culverts at North Padre Island Drive to eliminate a current choke point, as well as design, land acquisition, and construction of a 130-acre detention pond near the confluence of La Volla creek and Airport Tributary	Hurricanes & Floods	High	\$24,060,794; Revenue Bonds & GLO Grant	Corpus Christi Public Works- Storm water Department & Engineering Services	Structure and Infrastructure	Restoration of channels and ditches is critical to avoid potential "washouts" that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes	Capital Improvements Plan	1-3yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement a multi-hazard public awareness program- Creating and disseminating a pamphlet, calendar, coloring books, and other educational materials that will cover what to do before, during and after the following hazards: Extreme Heat, Extreme Cold, Floods, Tornadoes, Hurricanes, Power Outages, Fires, and Drought	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, Lightning Storms, Wildfires, and Drought	Medium	Low-Cost Staff Time; Local Budget	Corpus Christi Public Works Department & Office of Emergency Management	Education and Awareness	Homeowners will know what types of mitigation actions they can do to protect their lives and properties from the hazard risks.	CRS Program	Create Year 1, Review and disseminate annually
Adopt a local lightning ordinance- Consider adopting local language that would require commercial structures over 50 feet withing the city that are exposed to the threat of lightning to have adequate lightning protection.	Lightning	Medium	Low-Cost Staff Time; Local Budget	Corpus Christ Development Services Department	Local Plans and Regulations	By adopting this type of higher standard in the city building codes, we are adding additional protection that could possibly reduce the risk of damages.	Building Codes	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Adopt a local ordinance requiring all habitable structures have air conditioning- The City will be considering adopting language that would require all habitable spaces have adequate air condition to reduce the effects that extreme heat has on the city's population	Extreme Heat	Medium	Low-Cost Staff Time; Local Budget	Corpus Christ Development Services Department	Local Plans and Regulations	By requiring habitable spaces to be air conditioned, it will provide for added protection for the building occupant in the during an extreme heat event.	Building Codes	1-2yrs
Educate the public how to reduce and improve storm water runoff while enhancing local landscaping aesthetics- Produce educational materials- Storm water runoff guides; Brochures on xeriscape gardens and other low maintenance garden/irrigation projects to help with runoff and localized flooding;	Flood	Medium	Low-Cost Staff Time; Local Budget	City of Corpus Christi Public Works Department	Education and Awareness	Homeowners will know what types of ways they can divert/store/utilize storm water runoff and how to beautify the community with low maintenance projects while helping with localized flooding	CRS Program	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement a fuels management program to reduce hazardous vegetative fuels. Developing a vegetation management plan will help regulate and minimize wildfire hazards.	Wildfire	Medium	Low-Cost staff time; Local Budget	City of Corpus Christi Public Works Department	Local Plans and Regulations	By implementing the management plan, it will help keep trees, shrubs and plants growth maintained and prevent potential hazards.	N/A	1-2yrs
Educate homeowners and builders on how to protect pipes against Extreme cold by producing educational materials and outreach projects to help prevent pipes bursting, which may cause flooding inside a building.	Extreme Winter Storm	Medium	Low-Cost staff time; Local Budget	Corpus Christ Development Services & Utilities Department	Education and Awareness	Citizens will learn ways to protect their pipes against extreme cold with low maintenance projects while helping minimize the chance of pipes bursting which may cause flooding inside a building.	N/A	1-2yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Greenwood WWTP improvements. Major improvements to include Site grading, piping, and flooding way improvements; Flooding walls for identified plant structures; a new effluent pump station (EPS) of firm capacity up to 36 MGD; Miscellaneous improvements; Installation of emergency generators; instrumentation and electrical control system for automatic switch between AEP power and emergency generators;	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms	High	CDBG-MIT	City of Corpus Christi Water/ Utilities Department	Structure and Infrastructure	Mitigate potential flood damages to the Greenwood WWTP and allow the plant to maintain integrity of the treatment process during extreme weather events such as hurricanes and tropical storms. Protect structures that are most susceptible to flooding inside the plant along with interior drainage system improvements and grading improvements to collect stormwater from the critical areas within the plant that are prone to ponding in and around plant facilities	N/A	2-4yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Oso WWTP Improvements. Installation of emergency generators with full power capacity; Instrumentation and electrical control system for automatic switch between AEP power and emergency generators; Miscellaneous improvements related to emergency generators.	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms	High	CDBG-MIT	City of Corpus Christi Water/ Utilities Department	Structure and Infrastructure	In February of 2021, Winter Storm Uri swept across the Texas state, and the Oso WWTP was one of the victims of power outages. The partially equipped emergency was unable to fully run the plant treatment equipment and resulted in TCEQ permit violations. The new generator and upgrades will help maintain the integrity of the treatment process during extreme weather events.	N/A	2-4yrs

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Make improvements to Power Street Pump Station	Hurricanes, Floods, Levee Failure.	High	Certificates of Obligations	Corpus Christi Engineering and Development Services	Structure and Infrastructure	This project will improve operational efficiencies, save money on electrical costs, and help keep the downtown area from flooding during heavy rain conditions.	Capital Improvements Plan	2-3 Year
Participate in the FEMA Flood Map Modernization Process	Floods	High	Local Budget	Corpus Christi Development Services	Local Plans and Regulations	Increased participation in available flood insurance.	Capital Improvements Plan	1-2 Years
Build the Catulla Reservoir in the upper reaches of the Nueces River which would include a pipeline to divert water directly into Choke Canyon Reservoir.	Floods, Drought	High	USACE will cover 50% and Non-Federal Sponsors will cover the remaining 50%.	City of Corpus Christi	Structure and Infrastructure	Mitigate life-threatening hazards to buildings within the upper reaches of the Nueces River, while providing for a source of surface water to avoid disruption to essential utilities, eliminate the risk of potential economic losses.	Nueces River Basin Reconnaissance Study	Summer of 2018

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Utilize the city adopted “Developer Agreement” that they can use with developers to help cover the cost of installing over-sized stormwater drainage.	Hurricanes and Floods	Moderate	Bonds	Corpus Christi Storm Water Department and Development Services	Structure and Infrastructure	The effect of making improvements to Drainage Master Channel 31 will regain the carrying capacity of the channel and help eliminate flooding of existing buildings that occurs in Corpus Christi this channel is supposed to help.	Stormwater Master Plan and Regulations	4-5 Years
Complete an assessment of the needed repairs and improvements on all 8 major and 100 minor stormwater outfalls that drain into Corpus Christi Bay	Hurricanes and Floods	Moderate	Bonds	Corpus Christi Storm Water Department and Engineering Department	Structure and Infrastructure	Restoration of the storm water conveyance systems is critical to avoid potential “washouts” that may result in encroachment, flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes.	Stormwater Master Plan	2-3 Years

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Complete a feasibility study of Oso Creek at the confluence of La Volla Creek to determine if any construction projects will help the creek conveyance capacity during high flow events.	Hurricanes and Floods	Moderate	Bonds	Corpus Christi Storm Water Department and Engineering Department	Structure and Infrastructure	Restoration of the storm water conveyance of Oso Creek is critical to avoid potential rising surface water elevations that would result in encroachment flooding and undermining of adjacent public/private structures including streets, bridges, utility lines, buildings, and homes.	Stormwater Master Plan	Began implementation 1 and a half years ago, project will span 4-5 Years
Map and assess the vulnerabilities the city may face for Coastal Erosion, Expansive Soils, Land Subsidence, and Wildfires	Coastal Erosion, Expansive Soils, Land Subsidence, Wildfires	Moderate	Local Budget	Corpus Christi Development Services and GIS	Local Plans and Regulations	By identifying the hazards, the city can provide advice as to previous hazards for future construction or preservation purposes.	Building Codes	1-2 Years

CITY OF CORPUS CHRISTI MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Installation of groins and/or breakwaters to the areas behind the bulkhead to retrofit the areas that are eroding	Coastal Erosion	Moderate	Coastal Erosion Planning and Response Program (CEPRA) and the Texas Parks and Wildlife Outdoor Recreation Grant Program	Corpus Christi Parks Department	Natural Systems Protection	N/A	N/A	24 – 30 Months
Design and implement a dam breach study for dams in Corpus Christi.	Levee Failure	Low	HMGP	Nueces County Public Works Department	Local Plans and Regulations Natural Systems Protection	New and existing buildings will benefit from improved hazard information	Petronila Creek Water Restoration and Protection Plan	4 Years

City of Driscoll Mitigation Actions

CITY OF DRISCOLL MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install Backup Generators	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	HMGP, Office of Emergency Management Budget	Office of Emergency Management	Structure & Infrastructure	Protect & Reduce Risk at Existing Bldgs.	Emergency Operations Plan	Short Term (1 Year)
Educate Property Owners About Flood Mitigation Techniques	Flood, Hurricane/Tropical Storm	Medium	HMGP, FMA, Office of Emergency Management Budget	Office of Emergency Management	Education & Awareness	Protect & Reduce Risk at Existing Bldgs.	Emergency Operations Plan	Short Term (18 Mos)
Design/Implement drought management plan	Drought	Medium	HMGP, Office of Emergency Management Budget	Office of Emergency Management	Local Plans and Regulations	Will provide protection to new and existing buildings	N/A	Short Term (18 Mos)

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement a multi-hazard public awareness program and existing Code Enforcement Program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	HMGP, Office of Emergency Management Budget	Office of Emergency Management	Education and Awareness	Reduce Risk to Existing Bldgs. Commercial/Residential	Emergency Operations Plan	Short Term (18 Mos)
Develop/Designate cooling/heating centers to assist the public during extreme weather events.	Extreme Heat/Winter Storm	Medium	HMGP, Office of Emergency Management Budget	Office of Emergency Management	Structure & Infrastructure	Will use new or existing buildings to protect people from hazards	Emergency Operations Plan	Short Term (1 Year)
Conduct Annual Risk Assessment	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	HMGP, Office of Emergency Management Budget	Office of Emergency Management	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install/Replace new equipment to Wastewater Plant Facility and 2 Lift Stations	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	Est. \$180,000 to \$200,000; GLO	Nueces River Authority	Structure & Infrastructure	Reduce Risk of Health Hazards to Existing Bldgs. Commercial/Residential	Emergency Operations Plan	Short Term (1 Year)
Implement an annual program for clearing debris from bridges, drains and culverts	Flooding	High	Regular Department Budget	Public Works/Nueces County/TXDOT	N/A	N/A	N/A	Annual
Implement an annual program for clearing debris from bridges, drains and culverts	Flooding	Moderate	Regular Department Budget	Public Works/Nueces County/TXDOT	N/A	N/A	N/A	2 Years

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Store books, manuals, permits, and other critical government records on the upper floor (s) and/or on shelves above the base flood elevations.	Flooding	High	Regular Department Budget	Mayor/Council/City Administrator	N/A	N/A	N/A	Annual
Work with neighboring communities to establish common watershed planning directives.	Flooding	High	Regular Department Budget	NC Emergency Management /Mayor/Council	N/A	N/A	N/A	Annual
Prepare and advertise the local emergency evacuation plan, such as escape routes, in coordination with Dept. of Transportation	Flood, Hurricane, Tornado, Windstorm	High	Regular Department Budget	NC Emergency Management /Mayor/Council	N/A	N/A	N/A	Annual

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Update public community facilities to include severe weather action plans and designated tornado shelter areas	Flood, Hurricane, Tornado, Windstorm	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	4 years
Purchase NOAA “All Hazards” radios for early warning and post-event information and place in area schools/businesses/critical facilities	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	1 year

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Special Needs Public Education and Outreach	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	Update Process / Review Annually
Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	Update Process / Review Annually

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Community Wildfire Risk Assessment	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	1 Year
Community Wildfire Protection Plan update	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	1 Year
Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service.	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/Mayor/Council	N/A	N/A	N/A	1 Year
Creation of Master Drainage Plan for implementation	Hurricane & Tropical Storm, Flood, Levee Failure	High	Regular Department Budget, HMGP	Mayor/Council/ City Administrator	N/A	N/A	N/A	4 Year

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Obtain certification of communities by the National Weather Service as "Storm Ready" communities.	Levee Failure, Terrorism, Hazardous Material Release, Pipeline Failure, Pandemic	Moderate	NC Emergency Management /Mayor/ Council	Regular Department Budget	N/A	N/A	N/A	1 Year
Assess use performance / impact zoning to set risk based standards for land development. Establish "agricultural use districts" in zoning ordinance to limit densities in known hazard areas. Establish procedure to utilize overlay zones for requiring mitigation techniques in high-hazard districts.	Levee Failure, Drought, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget, HMGP	Mayor/Council/City Administrator	N/A	N/A	N/A	2-3 Year
Work with county, state and federal agencies to maintain up-to-date hazard data, maps, etc.	Levee Failure, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	2 Years

CITY OF DRISCOLL MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Retrofit fire facility to hazard-resistant levels	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/ Emergency Service District 3	N/A	N/A	N/A	4 Years
Install emergency generator for critical facility police dispatch/city hall	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Public Works/Nueces County/TXDOT	N/A	N/A	N/A	4 Years
Install quick-connect emergency generator hookups for critical facility-school	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/ Driscoll CISD	N/A	N/A	N/A	1 Years
Review damage assessment policies, establish best practice and update procedures as determined appropriate incorporating the use of an Asset Management System.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Update Process/ Review Annual

City of Petronila Mitigation Actions

CITY OF PETRONILA MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement a multi-hazard public awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Petronila Budget	City of Petronila	Education and Awareness	N/A	N/A	Short Term (1 Year)
Install of backup generators in critical facilities	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, City of Petronila Budget	City of Petronila	Structure & Infrastructure	New and existing buildings benefit from uninterrupted power	N/A	Short Term (1 Year)

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Design/Implement drought management plan	Drought	High	HMGP, City of Petronila Budget	City of Petronila	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)
Develop/Designate cooling/heating centers to assist the public during extreme weather events.	Extreme Heat/Winter Storm	High	HMGP, City of Petronila Budget	City of Petronila	Structure & Infrastructure	Will use existing or new buildings to protect citizens from hazards.	N/A	Short Term (1 Year)
Expand existing drainage systems to provide additional drainage capacity, i.e., enlarging culverts, creating new culverts, retention features	Flood	High	HMGP Funds, Clean Water State Revolving Fund, Texas Water Development Fund, City of Petronila Budget	City of Petronila	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	Moderate Term (2-3 years)

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Purchase NOAA “All Hazards” radios for early warning and post-event information and place in area schools/businesses/critical facilities	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Moderate	Regular Department Budget	Mayor/Council	N/A	N/A	N/A	1 Year

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install highwater markers for motorist direction at low areas of City roadways	Flooding	High	Regular Department Budget	Mayor/Council	N/A	N/A	N/A	Annual
Provide additional means of access into single entry neighborhoods in order to prevent residents from becoming trapped in a hazardous area during a flood	Flooding	Low	CO/Street Bonds	Mayor/Council	N/A	N/A	N/A	4 Years
Implement an annual program for clearing debris from bridges, drains and culverts	Flooding	High	Regular Department Budget	Mayor/Council	N/A	N/A	N/A	Annual
Store books, manuals, permits, and other critical government records on the upper floor (s) and/or on shelves above the base flood elevations.	Flooding	High	Regular Department Budget	Mayor/Council	N/A	N/A	N/A	Flooding

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Work with neighboring communities to establish common watershed planning directives	Flooding	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Annual
Prepare and advertise the local emergency evacuation plan, such as escape routes, in coordination with Dept. of Transportation	Flood, Hurricane, Tornado, Wind	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Annual
Update public community facilities to include severe weather action plans and designated tornado shelter areas	Flood, Hurricane, Tornado, Wind	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	4 Years

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review damage assessment policies, establish best practice and update procedures as determined appropriate incorporating the use of an Asset Management System	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Update Process/ Review Annual
Special Needs Public Education and Outreach	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Update Process/ Review Annual

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	Update Process/ Review Annual
Community Wildfire Risk Assessment	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	1 Year
Community Wildfire Protection Plan update	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	1 Year

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service.	Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	1 Year
Creation of Master Drainage Plan for implementation	Hurricane/ Tropical Storm, Flood, Levee Failure	High	Regular Department Budget	Mayor/Council	N/A	N/A	N/A	4 Years
Obtain certification of communities by the National Weather Service as "Storm Ready" communities.	Hurricane/ Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	1 Year
Work with county, state and federal agencies to maintain up-to-date hazard data, maps, etc.	Levee Failure, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget	NC Emergency Management/ Mayor/Council	N/A	N/A	N/A	2 Years

CITY OF PETRONILA MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Assess use performance/impact zoning to set riskbased standards for land development. Establish "agricultural use districts" in zoning ordinance to limit densities in known hazard areas. Establish procedure to utilize overlay zones for requiring mitigation	Levee Failure, Drought, Flood, Hurricane, Severe Thunderstorm, Wildfire	Moderate	Regular Department Budget, HMGP	Mayor/Council	N/A	N/A	N/A	2-3 Year
Retrofit fire facility to hazard-resistant levels	Hurricane/Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/Emergency Service District 3	N/A	N/A	N/A	4 Years
Install quick-connect emergency generator hookups for critical facility- school	Hurricane & Tropical Storm, Flood, Levee Failure	Moderate	Regular Department Budget, HMGP	Mayor/Council/ Bishop CISD	N/A	N/A	N/A	4 Years

City of Port Aransas Mitigation Actions

CITY OF PORT ARANSAS MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Conduct Annual Risk Assessment	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Coastal Erosion, Levee Failure, Wildfire, and Winter storm	High	City Budget	OEM	Local Plans & Regulations	N/A	N/A	Annual
Install emergency early warning siren	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Coastal Erosion, Levee Failure, Wildfire, and Winter storms	Low	\$75,000, HMPG, City Budget	OEM	Structure & Infrastructure, Education and Awareness	N/A	N/A	2-3 years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review and Update Damage Assessment Policy	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Coastal Erosion, Levee Failure, Wildfire, and Winter storms	High	City Budget	OEM	Local Plans & Regulations	N/A	N/A	Update Process/Review Annually
Develop and implement Public Education programs to educate population on dangers and mitigation options.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Coastal Erosion, Levee Failure, Wildfire, and Winter storms	High	City Budget	OEM	Education and Awareness	N/A	N/A	Update Process/Review Annually

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Create Reserve Potable Water Supply	Drought	Low	\$7,500, City Budget/HMPG	City Facilities, Public Works	Structure and Infrastructure		N/A	2 Years
Review and Update Heat Safety Policy	Extreme Heat	Medium	City Budget	EMS	Local Plans & Regulations	N/A	N/A	Annual
Identify repetitive loss properties for future Hazard Mitigation Grant Program funding	Flood	Medium	City Budget	Planning Department	Local Plans & Regulations	Existing buildings could be in the Repetitive Loss area for possible acquisition	N/A	Annual
Develop Shoreline Erosion Plan	Flood, Coastal Erosion	Medium	\$300,000, City Budget, HMPG	Planning Department	Local Plans & Regulations	Reduces risk to existing buildings and new buildings	N/A	2 Years
Update Dune Protection Plan /Erosion response plan	Flood, Coastal Erosion	High	\$50,000, Regular Department Budget, Coastal Erosion Control Grant	Planning Department	Local Plans & Regulations	Reduces risk to existing buildings and new buildings	N/A	2 Years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review and Update Severe Weather Property Protection Policy	Hailstorm, Hurricane/Tropical Storm, Windstorm, Severe Winter Storm, Tornado, Flood	High	City Budget	City Admin	Local Plans & Regulations	N/A	N/A	Annual
Update local ordinance to prohibit granting of variances in SFHA	Flood, Coastal Erosion	Medium	City Budget	Planning Department	Local Plans & Regulations	Building codes could affect new buildings	N/A	
Develop plans for designating/co-locating an alternate EOC	Hurricane/Tropical Storm	Medium	City Budget	OEM	Structure and Infrastructure	N/A	N/A	Annual
Review and Update Shelter in Place Policy	Hurricane/Tropical Storm	High	City Budget, HMPG	OEM	Local Plans & Regulations	N/A	N/A	Annual
Protect Muni Facilities w/ Storm Shutters or Impact Windows	Hurricane/Tropical Storm, Windstorm	Medium	\$100,000, City Budget, HMGP	City Facilities Department	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	2-3 years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Conduct City Wildfire Risk Assessment	Wildfire	High	City Budget	PA VFD, OEM	Local Plans & Regulations	N/A	N/A	Update Process/Review Annually
Update City Wildfire Protection Plan	Wildfire	High	Regular Department Budget	PA VFD, OEM	Local Plans & Regulations	Reduces risk to existing buildings and new buildings	N/A	Update Process/Review Annually
Install Portable Generators for Emergency Operations & Logistics Support	Hurricane/ Tropical Storm, Flood, Levee Failure	Medium	\$275,000, EMPG/HMPG	OEM, Police	Structure and Infrastructure	New and existing buildings will benefit from uninterrupted power	N/A	3 years
Conduct Port Aransas-Nature Preserve Bulkhead Enhancement	Flood, Hurricane	Medium	\$700,000, City Budget, HMGP	Development Services, OEM	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	2-3 years
Create a GIS map of National Flood Insurance Rate Map	Flood, Hurricane	Medium	\$20,000, City Budget, HMGP	Development Services, OEM	Local Plans & Regulations	N/A	N/A	1-2 Years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Join the Community Rating System program or increase a community's rating under the CRS program.	Flood	Medium	City Budget	Development Services, OEM	Local Plans & Regulations	Could reduce insurance for new or existing buildings	N/A	2-3 years
Expand existing drainage systems to provide additional drainage capacity, i.e., enlarging culverts, creating new culverts, retention features	Flood	Medium	\$250,000, Clean Water State Revolving Fund, Texas Water Development Fund	City of Port Aransas	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	2-3 years
Install redundant natural gas supply to support City for minimum 3 days.	Severe Winter, Hurricane	Medium	\$2,500,000, State/Federal Grants, City Budget	City of Port Aransas	Structure and infrastructure	Reduces risk to existing buildings and new buildings	N/A	1-3 Years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Upgrade windows and storefronts to TDI rated	Hurricane / Tropical storm, Windstorm	Medium	\$1,000,000 UT Austin	UTMSI	Structure and Infrastructure	Reduces risk to existing buildings	N/A	5 years
Insulate existing water systems	Severe Winter Storm	High	\$500,000 UT Austin	UTMSI	Structure and Infrastructure	Reduces risk to existing buildings	N/A	5 years

CITY OF PORT ARANSAS MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Assess shoreline conditions along City Beaches	Flood and Coastal Erosion	Moderate	City Budget, HMGP	Planning Department	N/A	N/A	N/A	1 Year
Design and implement a program to assess and restore shoreline conditions along City Beaches.	Flood and Coastal Erosion	Moderate	City Budget, HMGP	Planning Department	Natural Systems Protection	New and existing buildings will benefit from the risk reduction of an assessment and restoration program.	N/A	1 Year

City of Robstown Mitigation Actions

CITY OF ROBSTOWN MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Install and maintain a second Electrical Substation.	Hurricanes/ Tropical Storms/Flood	High	HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	New and existing buildings will benefit from uninterrupted power	Capital Improvements Plan	Short Term (1 Year)
Install and maintain a second Natural Gas Gate.	Hurricanes/ Tropical Storms/Flood	High	HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	N/A	Capital Improvements Plan	Short Term (1 Year)
Update Dune Protection Plan /Erosion response plan	Coastal Erosion, Flood	High	HMGP, CMP, Nueces County Coastal Parks Department Budget	Nueces County Coastal Parks Department	Local Plans and Regulations, Natural Systems Protection	N/A	Will provide protection to new and existing buildings	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Increase availability of safe rooms/storm shelters so as to reduce injury and loss of life during natural hazard events. This includes safe rooms in Robstown ISD schools, public safety room(s) near or around critical facilities (Fire departments, Police departments, City Hall, etc.), and private installation of storm shelters through a cash rebate program. Promote the construction and use of safe rooms in homes and commercial areas.	Hurricanes/ Tropical Storms/Flood/ Tornado	High	HMGP, City/ISD Budget	City of Robstown, Emergency Management Coordinator, Robstown Utility Systems, City of Robstown (Emergency Management Coordinator), Robstown ISD	Structure and Infrastructure, Education and Awareness	Use new or existing buildings to protect people from hazards	Emergency Operations Plan	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Utilize the City's Natural Hazard Warning System.	Hurricanes/ Tropical Storms/ Flood	High	HMGP, City Budget	City of Robstown, Emergency Management Coordinator	Education and Awareness	Reduced risk to people/buildings	Emergency Operations Plan	Short Term (1 Year)
Construct retention ponds. Increase potable and non-potable water storage to have during times of drought and emergencies.	Hurricanes/ Tropical Storms/ Flood/ Drought/ Wildfires	Medium	HMGP, FMA, City Budget	City of Robstown (Floodplain Administrator), Nueces County Drainage District No. 2	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Emergency Operations Plan	Moderate Term (2 – 4 Years)
Study the Costs and Benefits of Acquiring Flood Prone Properties and Return Land to Open Space, Review and update Floodplain Management Ordinances annually, and Elevate flood prone properties when acquisition is not feasible.	Hurricanes/ Tropical Storms/ Flood	High	HMGP, FMA, City Budget	City of Robstown (Floodplain Administrator), Nueces County Drainage District No. 3	Local Plans and Regulations, Structure and Infrastructure	Acquisition of existing properties	N/A	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Evaluate opportunities to improve Community Rating System (CRS) opportunities.	Hurricanes/ Tropical Storms/Flood/ Wind	High	HMGP, City Budget	City of Robstown (Floodplain Administrator)	Local Plans and Regulations, Education and Awareness	Possible reduced insurance on buildings	NFIP Community Rating System (CRS Program)	Short Term (1 Year)
Evaluate opportunities to the City of Robstown Storm Water Management Plan.	Hurricanes/ Tropical Storms/Flood	High	HMGP, FMA, City Budget	City of Robstown (Floodplain Administrator)	Local Plans and Regulations	Reduces risk to existing buildings and new buildings	Stormwater Management Plan / Ordinance	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Educate Robstown residents regarding the impacts of flood events, extreme heat safety and health issues, the benefits of water conservation, hail dangers and where to seek shelter during hailstorms, the effects of severe wind on property and life and potential protective measures, and the risk of tornados, location of shelters, and warning systems. Conduct Lightning Awareness programs.	Drought, Hurricane and Tropical Storms, and Flood	High	HMGP, FMA, City/RUS/ISD Budget	City of Robstown (Floodplain Administrator), City of Robstown, Robstown Utility Systems, Nueces County Water Control & Irrigation District No. 3, City of Robstown (Emergency Management Coordinator), City of Robstown (Development Services), Robstown ISD	Education and Awareness	Reduces risk to existing buildings and new buildings	Emergency Operations Plan	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Protect critical facilities, equipment, and schools through the installation of lightning rods and grounding on infrastructure.	Lightning	Medium	HMGP, City/RUS/ISD Budget	City of Robstown (Public Works), Robstown Utility Systems, Robstown ISD	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Capital Improvements Plan	Moderate Term (2 – 4 Years)
Install surge protection on critical electronic equipment, critical facilities and schools.	Lightning	Medium	HMGP, City/RUS/ISD Budget	City of Robstown (Public Works), Robstown Utility Systems, Robstown ISD	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Emergency Operations Plan	Moderate Term (2 – 4 Years)
Encourage insurance authorities to provide discounts for residents who install lightning protection systems.	Lightning	Low	HMGP, City Budget	City of Robstown	Local Plans and Regulations, Education and Awareness	Reduces risk to existing buildings and new buildings	N/A	Moderate Term (2 – 4 Years)
Develop cooling or heating centers to assist the public during extreme weather events.	Extreme Heat/Winter Storm	High	HMGP, City Budget	City of Robstown	Local Plans and Regulations	Use new or existing buildings to protect people from hazards	Emergency Operations Plan	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Encourage utilities to defer high electric bills during extreme high temperatures.	Extreme Heat	Medium	HMGP, City/RUS Budget	City of Robstown, Robstown Utility Systems	Local Plans and Regulations	N/A	N/A	Short Term (1 Year)
Coordinate with Nueces County WCID #3, City of Robstown Fire Department regarding Drought Contingency Plan compliance.	Drought	Low	HMGP, City Budget	City of Robstown (Fire Department), Robstown Utility Systems, Nueces County Water Control & Irrigation District, No. 3	Local Plans and Regulations	N/A	Wildfire Protection Plan	Short Term (1 Year)
Review and participate in Nueces County Community Wildfire Protection Plan	Drought	Medium	HMGP, City Budget	City of Robstown (Fire Department)	Local Plans and Regulations	Reduces risk to existing buildings and new buildings	Wildfire Protection Plan	Short Term (1 Year)
Review Nueces County Wildfire Risk Assessment	Drought	High	HMGP, City Budget	City of Robstown (Fire Department)	Local Plans and Regulations	Reduces risk to existing buildings and new buildings	Wildfire Protection Plan	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Study feasibility of Water Conservation Rebate or Incentive Program	Drought	Low	HMGP, City Budget	Robstown Utility Systems, Nueces County Water Control & Irrigation District, No. 3	Local Plans and Regulations	N/A	N/A	Moderate Term (2 – 4 Years)
Promote through Public Education/ Awareness the use of proven engineering solutions to residential and commercial buildings on expansive clays.	Expansive Soils	Medium	HMGP, City Budget	City of Robstown (Development Services)	Education and Awareness	Reduces risk to existing buildings and new buildings	N/A	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Review Existing Soil Survey and update Expansive Soils Map for Robstown area annually. Integrate Flood and Drainage Mitigation measures in areas where Expansive Soils are most prevalent. Discourage or prevent development in the most severe areas where expansive soils are most prevalent.	Expansive Soils	Medium	HMGP, City Budget	City of Robstown (Floodplain Administration), Nueces County Drainage District #2	Education and Awareness, Local Plans and Regulations, Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Stormwater Management Plan / Ordinance	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Promote the use of hail resistant roofing materials, structural bracing, shutters, laminated glass in windowpanes, window screens/film, and roof sheathing to better resist hail damage in both public and private structures. Promote building design standards to minimize wind damage such as wind buffers, passive ventilation in building and site design, and wind resistance roof shapes.	Hailstorm, Hurricane, Windstorms, Tropical Storms, Tornados	Medium	HMGP, City/ISD Budget	City of Robstown (Development Services), Robstown ISD	Local Plans and Regulations, Education and Awareness	Reduces risk to existing buildings and new buildings	N/A	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Develop and enforce building codes and mobile home installation codes that will minimize damage from high winds.	Windstorms	High	HMGP, City Budget	City of Robstown (Development Services)	Local Plans and Regulations	Reduces risk to existing buildings and new buildings	Building Codes	Short Term (1 Year)
Develop and implement standards for burial of electrical, telephone, cable lines and other utilities.	Windstorms	Medium	HMGP, City Budget	City of Robstown (Development Services)	Local Plans and Regulations, Structure and Infrastructure	N/A	Building Codes	Short Term (1 Year)
Promote the retrofit of residential buildings to reduce future wind damage through protective measures.	Windstorms	High	HMGP, City Budget	City of Robstown (Development Services)	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Access public buildings and critical facilities through the improvement of roof coverings, anchoring HVAC units, installation of load-path connectors to strengthen structural frames, and retrofitting emergency operations center to FEMA 361 standards.	Windstorms	High	HMGP, City Budget	City of Robstown (Development Services)	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Emergency Operations Plan	Short Term (1 Year)
Review ordinances and building codes to encourage Wind-Resistant building technologies.	Windstorms	High	HMGP, City Budget	City of Robstown (Development Services)	Local Plans and Regulations	Reduces risk to existing buildings and new buildings	Building Codes	Short Term (1 Year)
Install drainage pipe, drainage boxes, and/or valley gutters throughout the city to prevent flooding.	Flood, Hurricane & Tropical Storm	High	\$2,535,000, HMGP, FMA, City Budget	City of Robstown Public Works	Local Plans and Regulations, Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Floodplain Management Plan	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Construct or purchase of existing building for Public Safety employees.	Flood, Hurricane & Tropical Storm	High	\$700,000, HMGP, City Budget	City of Robstown (Emergency Management Coordinator)	Structure and Infrastructure	Use new or existing buildings to protect people from hazards	Emergency Operations Plan	Short Term (1 Year)
Purchase and install generators at the Fire Department	Flood, Hurricane & Tropical Storm	High	\$120,000, HMGP, City Budget	City of Robstown (Emergency Management Coordinator)	Structure and Infrastructure	New and existing buildings will benefit from uninterrupted power	Emergency Operations Plan	Short Term (3-6 Months)
Repair and/or improve manholes, citywide, infiltrated from rains which cause back up into homes and streets.	Flood, Hurricane & Tropical Storm	High	\$1,000,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Stormwater Management Plan / Ordinance	Short Term (6 months to 1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Repair and/or improve sanitary sewer lines.	Flood, Hurricane & Tropical Storm	High	\$709,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	N/A	N/A	Short Term (1 Year)
Install new plastic lines to prevent leaks during a natural disaster/hazard where ground shifting would occur.	Flood, Hurricane & Tropical Storm	High	\$817,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	Prevent ground shifting of foundations	N/A	Short Term (1 Year)
Install a grinder and conveyor at the entrance to the WWTP that would prevent clogged lines at the plant.	Flood, Hurricane & Tropical Storm	High	\$750,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	Short Term (1 Year)
Install additional aeration basin and blower at the existing plant to deal with the increased flow during heavy rains/floods.	Flood, Hurricane & Tropical Storm	High	\$750,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	N/A	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Add reconductor/multiple circuits to electrical distribution lines.	Winter Storm, Hurricane and Tropical Storm, Windstorm, Hail, Tornado	Medium	\$10,000,000, HMGP, RUS Budget	Robstown Utility Systems	Structure and Infrastructure	N/A	N/A	Moderate Term (2 – 4 Years)
Install and maintain additional rural fire hydrants. Install/Replace and maintain water lines.	Wildfire	High	HMGP, City Budget	City of Robstown (Emergency Management Coordinator)	Structure and Infrastructure	Reduces risk to existing buildings and new buildings	Wildfire Protection Plan	Moderate Term (2 – 4 Years)
Obtain equipment to help communicate and track status of storms to include new storm/hazard sirens. Purchase and install Weather Radio receivers in schools, nursing homes, and all other public facilities. Utilize drones to track and locate hazards.	Tropical Storms, Hurricanes, TORNADOS	High	HMGP, City/RUS/ISD Budget	City of Robstown, Emergency Management, Robstown Utility Systems, Robstown ISD	Local Plans & Regulations, Structure & Infrastructure, Education & Awareness	Reduces risk to existing or new critical facilities	Emergency Operations Plan	Short Term (1 Year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Promote the importance of mindful water use and involve the public and schools in finding and implementing new ways to conserve water. Prepare and/or distribute information to educate the public and schools on how to conserve water usage. Provide informational booths and/or workshops at local fairs, etc. on water conservation techniques. Map water sources.	Drought	Medium	HMGP, City/ISD Budget	City of Robstown, Emergency Management, Robstown Utility Systems, Robstown ISD	Local Plans & Regulations, Structure & Infrastructure, Natural Systems Protection, Education & Awareness	N/A	N/A	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Emergency generator for WWTP and Lift Stations	Hurricanes/ Tropical Storms	High	State/Federal Grants, City Budget	Robstown Utility Systems	N/A	N/A	N/A	Moderate Term (2 – 4 Years)
Study citywide drainage improvements.	Floods	High	State/Federal Grants, City Budget	City of Robstown (Floodplain Administrator)	N/A	N/A	N/A	Short Term (1 Year)
Work with Local Social Service and Healthcare agencies to educate Robstown’s elderly residents regarding Extreme Heat.	Extreme Heat	High	City Budget	City of Robstown, Robstown Utility Systems	N/A	N/A	N/A	Short Term (1 Year)
Reduce Heat Island Effect through increased tree planting in parking lots and along public rights-of-way, green roofs, and use of cool roofing products that reflect sunlight and heat.	Extreme Heat	Moderate	City Budget	City of Robstown, Robstown Utility Systems	N/A	N/A	N/A	Moderate Term (2 – 4 Years)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Provide sheltering for supplies and equipment at critical facilities such as the WWTP and Electrical Substation.	Hailstorm	High	City Budget	City of Robstown, Robstown Utility Systems	N/A	N/A	N/A	Moderate Term (2 – 4 Years)
Installation of drainage pipe and/or drainage boxes, to prevent flooding.in the City’s original Town site area. No drainage currently exists.	Flood	High	State/Federal Grants	City of Robstown (Emergency Management Coordinator)	N/A	N/A	N/A	Short Term (6 months)
Installation of backup regulators and automated sensors at every regulator station citywide. This would ensure alerting the Gas Department of any gas issues during a disaster and repairing or preventing gas fires and restoring gas during a	Flood	High	State/Federal Grants	Robstown Utility Systems	N/A	N/A	N/A	Short Term (6 months – 1 year)

CITY OF ROBSTOWN MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Improve the Dakota Lift Station to minimize operations during a natural disaster. The Dakota Lift Station handles 60% of the domestic sewage that flows into the WWTP.	Flood	High	State/ Federal grants	City of Robstown, Robstown Utility Systems	N/A	N/A	N/A	Short Term (6-9 months)

Nueces County Drainage District #2 Mitigation Actions

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
District GIS System Hardware & Software: Obtain & Implement A District GIS System for Facility Management	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Local Plans and Regulations	Record Keeping	Comprehensive/Master Plan	Moderate Term (2 to 4 Years)
Regional Detention Ponds: Acquire Land for Master planned Detention Ponds	Flood	High	HMGP, FMA, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Lower BFE	Capital Improvements Plan	Long Term (5+ Years)
Regional Detention Ponds: Design and Construct Master planned Detention Ponds	Flood	High	HMGP, FMA, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Lower BFE	Capital Improvements Plan	Long Term (5+ Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Areawide Drainage Channel Improvements: Acquire Land for Master planned Drainage Channels	Flood	High	HMGP, FMA, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Lower BFE	Capital Improvements Plan	Long Term (5+ Years)
Areawide Drainage Channel Improvements: Design and Construct Master planned Drainage Channels	Flood	High	HMGP, FMA, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Lower BFE	Capital Improvements Plan	Long Term (5+ Years)
Equipment Acquisition--Gradall: Secure New Gradall for Proper Maintenance of Open Channels	Flood, Hurricane, Tropical Storm, Severe Winter Storm, Levee Failure	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Maintain BFE	Comprehensive/Master Plan	Long Term (5+ Years)
Equipment Acquisition--Motor Grader: Secure Motor Grader to Maintain District Rural Infrastructure	Flood, Hurricane/ Tropical Storm, Severe Winter Storm, Levee Failure	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Maintain BFE	Comprehensive/Master Plan	Long Term (5+ Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Equipment Acquisition--Tractor with Side Boom Mower (2): Secure Tractors with Side Boom Mowers (2) For Maintenance of Open Channels	Flood, Hurricane/ Tropical Storm, Severe Winter Storm, Levee Failure	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Maintain BFE	Comprehensive/Master Plan	Long Term (5+ Years)
Equipment Acquisition--Dump Trucks (2): Secure Dump Trucks (2) For Maintenance of District Infrastructure	Flood, Hurricane/ Tropical Storm, Severe Winter Storm, Levee Failure	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Maintain BFE	Comprehensive/Master Plan	Long Term (5+ Years)
Rural Community Education: Distribute Pamphlets Related to Illegal Dumping and Fire Potential	Wildfire	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Education and Awareness	Fire Protection	Comprehensive/Master Plan	Moderate Term (2 to 4 Years)
Rural Channel Cleaning of Illegal Dump Site: Cleanup Illegal Dump Sites Created in Rural Open Channels	Wildfire	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Fire Protection	Comprehensive/Master Plan	Moderate Term (2 to 4 Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Rural Community Education: Distribute Pamphlets Related to Dam/Levee Locations & Risk Potential	Levee Failure	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Education and Awareness	Reduce Risk	Comprehensive/Master Plan	Long Term (5+ Years)
GIS & District Records Updates: Update District GIS System with Dam/Levee Risk Potential	Levee Failure	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Local Plans and Regulations	Reduce Risk	Emergency Operations Plan	Long Term (5+ Years)
Reconstruct Windstorm-Damaged Buildings: Demolish and Reconstruct Windstorm-Damaged Buildings	Windstorms	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)
Reconstruct Windstorm-Damaged Facilities: Demolish and Reconstruct Windstorm-Damaged Facilities	Windstorms	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Generator For District Main Offices: Acquire & Install New Generator for District Offices & Command Center	Severe Winter Storms	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Reduce Risk	Emergency Operations Plan	Long Term (5+ Years)
Communications Equipment & Computer(S) For District Main Office: Acquire & Install Communications Equipment & Computers for District Offices	Severe Winter Storms	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Reduce Risk	Emergency Operations Plan	Long Term (5+ Years)
Reconstruct Tornado-Damaged Buildings: Demolish and Reconstruct Tornado-Damaged Buildings	Tornado	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)
Reconstruct Tornado-Damaged Facilities: Demolish and Reconstruct Tornado-Damaged Facilities	Tornado	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Reconstruct Hailstorm-Damaged Buildings: Demolish and Reconstruct Windstorm-Damaged Buildings	Hailstorm	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)
Reconstruct Hailstorm-Damaged Facilities: Demolish and Reconstruct Windstorm-Damaged Facilities	Hailstorm	Low	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Capital Improvements Plan	Long Term (5+ Years)
Bridge Inspections and Repairs: Inspect and Repair Expansive Soil Damaged Bridges	Expansive Soils	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Comprehensive/Master Plan	Long Term (5+ Years)
Open Channel Inspections and Repairs: Inspect and Repair Expansive Soil Damaged Channels-Restore Flowlines & Slopes	Expansive Soils	Medium	HMGP, FMA, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Restoration	Floodplain Management Plan	Long Term (5+ Years)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement multi-hazard awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Education and Awareness, Protection and Safety of Staff	N/A	Comprehensive/Master Plan	Short Term (1 Year)
Install backup generators in critical facilities	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Structure & Infrastructure	Reduce Risk	Emergency Operations Plan	Short Term (1 Year)

NUECES COUNTY DRAINAGE DISTRICT #2 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Develop/Designate cooling/heating centers to assist the employees during extreme weather events.	Extreme Heat/Winter Storm	High	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Protection and Safety of Staff	Reduce Risk	Emergency Operations Plan	Short Term (1 Year)
Develop and Implement Drought Contingency Plan	Drought	Medium	HMGP, Nueces County Drainage District 2 Budget	Nueces County Drainage District 2	Protection and Safety of Staff	Reduce Risk	Emergency Operations Plan	Moderate Term (2 to 4 Years)

Nueces County Water Control and Improvement District #3 Mitigation Actions

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #3 MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Demolish existing covering/garage structure	Hailstorm	Medium	\$400,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Demolish Existing North 0.5 MG Elevated Water Storage	Extreme Winter Storm, Lightning, Tornado, Wildfire	Medium	\$5,500,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Elevate South 0.5 MG Water Storage Tank by 20-feet	Extreme Winter Storm, Tornado, Wildfire	Medium	\$5,500,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Implement Fire Hydrant Program and 6" water lines	Wildfire	High	\$7,000,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Construct New North 1.0 MG Composite Elevated Water Storage Tank	Extreme Winter Storm, Lightning, Tornado, Wildfire	Medium	\$5,500,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #3 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Plant Pond/Ditch Project	Floods	High	\$6,900,000, HMGP, FMA, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Remove & Replace Concrete around Basins at Water Treatment Plans	Drought, Floods	High	\$3,500,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Remove & replace small diameter water lines (1", 2" & 4") with new 6" to 8" water lines	Drought, Expansive Soil, Extreme Heat, Floods	High	\$3,000,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Replace demolished covering/garage structure with hazard resistant covering/garage structure	Hailstorm	Medium	\$400,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)
Implement River Pump Station Intake Structure Improvements	Hurricane/ Tropical Storms, Windstorm	High	\$5,500,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Protects both	Emergency Management Plan	Moderate Term (2-3 Years)

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #3 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement multi-hazard awareness program	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	\$25,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Education and Awareness, Protection and Safety of Staff	N/A	Emergency Management Plan	Short Term (1 Year)
Install backup generators in critical facilities	Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	High	\$100,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Structure & Infrastructure	Reduce Risk	Emergency Management Plan	Short Term (1 Year)

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #3 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Develop/Designate cooling/heating centers to assist the employees during extreme weather events.	Extreme Heat/Winter Storm	High	\$10,000, HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Protection and Safety of Staff	Reduce Risk	Emergency Management Plan	Short Term (1 Year)
Develop and Implement Drought Contingency Plan	Drought	Medium	HMGP, Nueces County WCID #3 Budget	Nueces County WCID #3	Protection and Safety of Staff	Reduce Risk	Emergency Operations Plan	Moderate Term (2 to 4 Years)

Nueces County Water Control and Improvement District #4 Mitigation Actions

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #4 MITIGATION ACTIONS								
PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Lewis Wilcox WWTP Improvements. Installation of emergency generator in a protected enclosure with full power capacity; Instrumentation and electrical control system for automatic switch between AEP power and emergency generators; Miscellaneous improvements related to emergency generators.	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms	High	HMP Grant/ NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	The new generator and upgrades will help maintain the integrity of the treatment process during extreme weather events.	Capital Improvements Plan	1-3 years

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #4 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement Mustang Pumping Station Improvements. Installation of emergency generators in a protected enclosure with full power capacity; Instrumentation and electrical control system for automatic switch between AEP power and emergency generators; Miscellaneous improvements related to emergency generators.	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms, Wildfire	High	HMP Grant/ NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	The new generator and upgrades will help maintain the integrity of the water supply in extreme weather events.	Capital Improvements Plan	1-3 years

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #4 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Retrofit 2 Pumping Stations and 21 Lift Stations with Generator quick connection. Installation of emergency generator's Instrumentation and electrical control system for switching between AEP power and emergency generators; Miscellaneous improvements related to emergency generators.	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms, Wildfire	High	HMP Grant/ NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	The new upgrades will help maintain the integrity of the system during extreme weather events.	Capital Improvements Plan	1-3 years
Install Six Portable Generators to Power 2 Pumping Stations and 21 Lift Stations; multiple Miscellaneous improvements related to emergency generators.	Extreme Heat, Extreme Winter Storm, Floods, Tornado, Hurricanes, Power Outages, and Lightning Storms, Wildfire	High	HMP Grant/ NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	The new generators and upgrades will help maintain the integrity of the system during extreme weather events.	Capital Improvements Plan	1-3 years

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #4 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Implement multi-hazard public awareness program- Creating and disseminating a pamphlet, Calander, coloring books, and other educational materials that will cover what to do before, during, and after hazard/disaster events.	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	Low-Cost Staff Time; NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Education and Awareness	Homeowners will know what types of mitigation actions they can do to protect their lives and properties from the hazard risks.	Capital Improvements Plan	Create Year 1, Review and disseminate annually
Educate homeowners and builders on how to protect pipes against Extreme cold by producing educational materials and outreach projects to help prevent pipes bursting, which may cause flooding inside a building.	Extreme Winter Storm	Medium	Low-Cost staff time; NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Education and Awareness	Citizens will learn ways to protect their pipes against extreme cold with low maintenance projects, helping minimize pipes bursting which may cause flooding.	Capital Improvements Plan	Create Year 1, Review and disseminate annually

NUECES COUNTY WATER CONTROL AND IMPROVEMENT DISTRICT #4 MITIGATION ACTIONS

PROJECT TITLE AND DESCRIPTION	HAZARD ADDRESSED	PRIORITY	COST POTENTIAL FUNDING SOURCE	RESPONSIBLE AGENCY	TYPE OF ACTION	EFFECT ON NEW AND EXISTING BUILDINGS	INCORPORATION INTO EXISTING PLANS & PROCEDURES	TIMELINE
Purchase NOAA "All Hazards" radios for early warning and post-event information and place in area schools/businesses/critical facilities utilizing public and private partnership funding	Drought, Hurricane and Tropical Storms, Flood, Windstorm, Extreme Heat, Lightning, Tornado, Hailstorms, Expansive Soils, Levee Failure, Wildfire, and Winter storms	Medium	Low-Cost Staff Time; NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	radios for early warning and post-event information	Capital Improvements Plan	1-3 years
Adopt routine fire hydrant maintenance	Wildfire	Medium	Low-Cost Staff Time; NCWCID4 Budget	Nueces County Water Control and Improvement District #4	Structure and Infrastructure	Maintenance	Capital Improvements Plan	1-3 years

Section 20: Plan Maintenance

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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:

- Ensure the mitigation strategy remains current and is implemented according to Plan procedures.
- Secure and maintain an ongoing mitigation program throughout the community.
- Integrate short and long-term mitigation objectives into community officials' daily roles and responsibilities.
- Continued Public Involvement and maintain momentum by routine engagement of the Plan's progress.

Monitoring and Evaluation

Periodic tracking of the Plan is required to ensure that the goals, objectives, and mitigation action plans are implemented over time. 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 20-1 indicates the department or title responsible for this action.

Table 20-1. Team Members Responsible for Plan Maintenance

JURISDICTION / ENTITY	TITLE
Unincorporated Nueces County	Emergency Management Coordinator
City of Agua Dulce	Mayor
Banquete ISD	Superintendent of ISD
City of Bishop	City Secretary
City of Corpus Christi	Emergency Management Coordinator
City of Driscoll	City Administrator
City of Petronila	City Secretary
City of Port Aransas	Emergency Management Coordinator
City of Robstown	Fire Chief/Emergency Management Coordinator
Nueces County Drainage District #2	Vice-Chairman
Nueces County Water Control and Improvement District #3	District Manager
Nueces County Water Control and Improvement District #4	Information Technology

Monitoring

The Multi-Jurisdictional HMAP planning team representing each participating jurisdiction will convene a meeting annually to monitor the plan and track the status of each jurisdiction’s identified mitigation actions over the 5-year cycle of the Plan. Nueces County as coordinating entity will make arrangements to bring the team together. Mitigation Actions will be assigned to team members in advance of the meetings to prepare status reports to share with the team. Mitigation action status updates will include continued feasibility for implementation and funding.

Evaluation

Each jurisdiction will evaluate changes in risk, determine whether the implementation of mitigation actions is on schedule, or if there are any implementation issues such as changes in stated purposes or goals that affect mitigation priorities in each participating jurisdictions’ respective department or organization. The Plan Maintenance group will meet on an annual basis to identify any needed changes in the Plan based upon their evaluation activities.

Updating

Annual reports submitted by the designated Team member from each community evaluating the Plan will be used to keep the Plan updated.

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. Nueces County, as coordinating entity, will make arrangements to bring the team together and begin the update process 2 years prior to plan expiration. New flood studies and new development in flood-prone areas, an increased exposure to hazards, disaster declarations, the increase or decrease in capability to address hazards, and changes to federal or state regulations are examples of factors that may affect the content of the Plan.

The Plan review provides the Planning Team 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

The County and participating entities will work to integrate the hazard mitigation strategies into other planning mechanisms. The Planning Team will ensure that future growth, 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 the participating jurisdictions, will meet annually, and more often if warranted, to ensure mitigation actions prioritized as high to moderate are tracked and monitored based on federal Disaster Declarations, HMGP and PDM funding cycles, and other non-federal funding sources that would help communities meet the local HMA match.

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 participating jurisdictions will be reviewed in light of the Plan, and Team Members will incorporate any mitigation policies and actions into these plans as appropriate. Table 20-1 indicates Planning Team member roles for incorporating actions, method of incorporation, and approving authority. Table 20-2 identifies planning mechanisms available for the participating jurisdictions and provides examples of how the Plan will be incorporated into current efforts.

The previous plan’s mitigation plans have not been incorporated by the participating jurisdictions. Additionally, Banquete ISD, Nueces County Drainage District #2, Nueces County Water Control and Improvement District #3, and Nueces County Water Control and Improvement District #4 did not participate in the previous plan and will not have incorporated mitigation plans into their planning mechanisms. Upon approval, this plan’s mitigation plans will be incorporated into the jurisdiction’s planning mechanisms.

Table 20-2. Planning Mechanisms and Method to Incorporate into the Plan

EXISTING PLANNING MECHANISM	METHOD OF USE IN HAZARD MITIGATION PLAN
Annual Budget	Funding mitigation projects and local match requirements
Emergency Planning and Emergency Operations Plan	Identifying hazards and assessing vulnerabilities
Mutual Aid Agreements	Assessing vulnerabilities/needs
Floodplain Ordinance/ Stormwater Management	Mitigation strategies; higher regulatory considerations
Land Use Maps and New Flood Studies	Assessing vulnerabilities and flood risk; development trends; long-term growth
Critical Facilities	Location and protection
Building and Zoning Codes	Development trends; future growth

EXISTING PLANNING MECHANISM	METHOD OF USE IN HAZARD MITIGATION PLAN
State Hazard Mitigation Plan	Risk analysis

Upon formal adoption of the plan, the planning team from each participating jurisdiction will review their existing, and implemented, plans and regulations to guide the implementation of hazard mitigation actions. Jurisdictions will be responsible for the coordination of periodic review of the approved plan with assistance of the advisory planning team to ensure the hazard mitigation strategies are integrated into the jurisdiction’s planning mechanisms and enforced codes. For example, City of Corpus Christi will use the assistance of the advisory planning team to integrate drought targeting hazard mitigation actions into their drought contingency plan, all jurisdictions will do the same for all mitigation actions and their planning mechanisms.

All jurisdictions will comply with local and state requirements while incorporating this Plan into existing planning mechanisms. **Table 20-3** identifies existing hazard mitigation capabilities to support mitigation actions; the existing hazard mitigation capabilities consist of existing building codes, land use ordinances, and regulatory plans. A list of planning mechanisms available to the jurisdictions can be found in Appendix A. The mitigation actions in Section 19 describe the planning mechanisms into which the mitigation actions will be integrated. In the process of integrating the mitigation actions into new and existing planning mechanisms, the participating jurisdictions will:

- Nueces County – Actions will be presented to Commissioner’s Court by the responsible department. Upon approval by Commissioner’s Court, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- City of Agua Dulce – Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- Banquete Independent School District - Actions will be presented to the School District by the responsible department. Upon approval by the School District, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- City of Bishop– Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- City of Corpus Christi – Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.

- City of Driscoll – Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- City of Petronila – Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- City of Robstown – Actions will be presented to City Council by the responsible department. Upon approval by City Council, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- Nueces County Drainage District #2 District - Actions will be presented to the Drainage District by the responsible department. Upon approval by the Drainage District, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- Nueces County Water Control and Improvement District #3 - Actions will be presented to the Water Control and Improvement District by the responsible department. Upon approval by the Water Control and Improvement District, approved actions will be acted upon and/or integrated into existing planning mechanisms.
- Nueces County Water Control and Improvement District #4 - Actions will be presented to the Water Control and Improvement District by the responsible department. Upon approval by the Water Control and Improvement District, approved actions will be acted upon and/or integrated into existing planning mechanisms.

Table 20-3. Plans and Ordinance Status per Jurisdiction

Jurisdictions with Plans/Ordinances in Place (IP), Under Development (UD), or adopted from Nueces County (NC)									
	Nueces County	City of Agua Dulce	Banquete ISD	City of Bishop	City of Corpus Christi	City of Driscoll	City of Petronila	City of Robstown	City of Port Aransas
Comprehensive / Master Plan	IP	N/A	NC	IP	IP	UD	UD	IP	UD
Stormwater Management Plan	IP	N/A	NC	IP	IP	NC	NC	IP	UD
Emergency Operations Plan	IP	N/A	NC	IP	N/A	NC	UD	IP	IP
Capital Improvements Plan	IP	N/A	NC	IP	IP	UD	UD	UD	N/A
Floodplain Management Plan	IP	N/A	NC	IP	UD	IP	NC	N/A	IP
Economic Development Plan	IP	N/A	NC	IP	N/A	IP	N/A	UD	IP
Transportation Plan	IP	N/A	NC	UD	IP	UD	N/A	IP	IP
Wildfire Protection Plan	IP	N/A	NC	UD	N/A	N/A	N/A	IP	N/A
Stormwater Ordinance	IP	N/A	NC	IP	IP	N/A	NC	IP	IP
NFIP Community Rating System	IP	N/A	NC	UD	IP	IP	N/A	IP	N/A
Floodplain Ordinance	IP	N/A	NC	IP	IP	N/A	NC	UD	IP
Continuity of Operations Plan	IP	N/A	NC	UD	N/A	UD	UD	IP	N/A
Building Code	IP	N/A	NC	UD	IP	IP	UD	IP	IP
Zoning Ordinance	IP	N/A	NC	UD	IP	N/A	N/A	IP	IP

Expansion of Capabilities

Planning Mechanism	Expansive Capabilities
All Participating Jurisdictions	
City Staff	All participating jurisdictions have city or county staff. While the number and involvement of these staff members in the planning process varies, all participating jurisdictions benefit from the presence of staff members. Staff are involved in the planning process and the implementation of mitigation actions. Staff will be able to help planning team members, serve as stakeholders, and coordinate the monitoring and maintenance process of this Plan.
Annual Budget Review	All participating jurisdictions have an annual budget review. Jurisdictions will incorporate the Plan while conducting their annual budget reviews. High priority mitigation actions will be reviewed and may potentially receive funds to
Unincorporated Nueces County	
Stormwater Management Plan	The Plan will be consulted when updating and maintaining the County’s stormwater management plan. Both documents share the goal of reducing damage and minimizing the negative impacts of development on stormwater.
Emergency Operations Plan	The Plan will be consulted when updating and maintaining the County’s Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated.
Capital Improvement Plan	Many of the mitigation actions found in this Plan will be enacted through capital improvement projects. Consequently, the County’s Capital Improvement Plan must consult the Plan for hazard mitigation projects that could be incorporated into the Capital Improvement Plan. Prioritization should be given to high priority actions.

Unincorporated Nueces County (cont.)

Wildfire Protection Plan	<p>Several of the mitigation actions defined in this Plan relate to wildfire mitigation. When updating the Community Wildfire Protection Plan, this Plan should be consulted. Likewise, when planning or executing any of the wildfire mitigation actions in this Plan, the Community Wildfire Protection Plan should be consulted. Both plans have the ultimate goal of reducing the loss of property and life from wildfire hazards.</p>
Floodplain Order	<p>The Plan will be used in updating the floodplain order and ensuring sound floodplain management. The goals of both documents are to reduce vulnerability to flooding hazards. The Plan will be consulted for NFIP compliance, flood risk, and extent. Information from this Plan will be reviewed for inclusion in other documents, including the floodplain order.</p>

City of Agua Dulce

Emergency Operations Plan	<p>The city is part of the Nueces County Emergency Operations Plan. The Plan will be consulted when updating and maintaining the County’s Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated. (Not an Agua Dulce independent capability. Capability dependent on Nueces County. Reflected in Capability Assessment.)</p>
Wildfire Protection Plan	<p>Several of the mitigation actions defined in this Plan relate to wildfire mitigation. When updating the Community Wildfire Protection Plan, this Plan should be consulted. Likewise, when planning or executing any of the wildfire mitigation actions in this Plan, the Community Wildfire Protection Plan should be consulted. Both plans have the ultimate goal of reducing the loss of property and life from wildfire hazards. (Not an Agua Dulce independent capability. Capability dependent on Nueces County. Reflected in Capability Assessment.)</p>

City of Bishop	
Stormwater Management Plan	The Plan will be consulted when updating and maintaining the City's stormwater management plan. Both documents share the goal of reducing damage and minimizing the negative impacts of development on stormwater.
Emergency Operations Plan	The city is part of the Nueces County Emergency Operations Plan. The Plan will be consulted when updating and maintaining the County's Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated.
Capital Improvements Plan	Many of the mitigation actions found in this Plan will be enacted through capital improvement projects. Consequently, the City's Capital Improvement Plan must consult the Plan for hazard mitigation projects that could be incorporated into the Capital Improvement Plan. Prioritization should be given to high priority actions.
Floodplain Management Plan	The Plan will be used in updating the floodplain management plan and ensuring sound floodplain management. The goals of both documents are to reduce vulnerability to flooding hazards. The Plan will be consulted for NFIP compliance, flood risk, and extent. Information from this Plan will be reviewed for inclusion in other documents, including the floodplain management plan.
Wildfire Protection Plan	Several of the mitigation actions defined in this Plan relate to wildfire mitigation. When updating the Community Wildfire Protection Plan, this Plan should be consulted. Likewise, when planning or executing any of the wildfire mitigation actions in this Plan, the Community Wildfire Protection Plan should be consulted. Both plans have the ultimate goal of reducing the loss of property and life from wildfire hazards.

City of Corpus Christi

<p>Comprehensive/Master Plan</p>	<p>The Plan will be consulted when updating the Comprehensive/Master Plan. It is important to ensure that development occurs in a manner that does not increase hazard risk. The Plan includes information regarding the location, extent, and probability of many natural hazards. By incorporating this information into the Comprehensive/Master Plan, development can be guided in a hazard-resilient manner.</p>
<p>Stormwater Management Plan</p>	<p>The Plan will be consulted when updating and maintaining the City’s stormwater management plan. Both documents share the goal of reducing damage and minimizing the negative impacts of development on stormwater.</p>
<p>Emergency Operations Plan</p>	<p>The city is part of the Nueces County Emergency Operations Plan. The Plan will be consulted when updating and maintaining the County’s Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated.</p>
<p>Capital Improvements Plan</p>	<p>Many of the mitigation actions found in this Plan will be enacted through capital improvement projects. Consequently, the City’s Capital Improvement Plan must consult the Plan for hazard mitigation projects that could be incorporated into the Capital Improvement Plan. Prioritization should be given to high priority actions.</p>
<p>Stormwater Ordinance</p>	<p>The Plan will be consulted when updating and maintaining the City’s stormwater ordinance. Both documents share the goal of reducing damage and minimizing the negative impacts of development on stormwater.</p>

City of Corpus Christi (cont.)

<p>NFIP Community Rating System</p>	<p>The Plan includes information regarding the location, extent, and probability of flooding hazards. This information can and should be used in the City’s Community Rating System (CRS) program. One of the major goals of the CRS program is to go above the minimum standards of the NFIP. Many of the mitigation actions identified in this Plan involve exceeding the minimum standards of the NFIP. By incorporating this Plan into the City’s CRS program, the goals of flooding hazard reduction can be met.</p>
<p>Floodplain Ordinance</p>	<p>The Plan will be used in updating the floodplain ordinance and ensuring sound floodplain management. The goals of both documents are to reduce vulnerability to flooding hazards. The Plan will be consulted for NFIP compliance, flood risk, and extent. Information from this Plan will be reviewed for inclusion in other documents, including the floodplain ordinance.</p>

City of Petronila

<p>Emergency Operations Plan</p>	<p>The city is part of the Nueces County Emergency Operations Plan. The Plan will be consulted when updating and maintaining the County’s Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated.</p>
<p>Wildfire Protection Plan</p>	<p>Several of the mitigation actions defined in this Plan relate to wildfire mitigation. When updating the Community Wildfire Protection Plan, this Plan should be consulted. Likewise, when planning or executing any of the wildfire mitigation actions in this Plan, the Community Wildfire Protection Plan should be consulted. Both plans have the ultimate goal of reducing the loss of property and life from wildfire hazards.</p>

City of Robstown

<p>Comprehensive/Master Plan</p>	<p>The Plan will be consulted when updating the Comprehensive/Master Plan. It is important to ensure that development occurs in a manner that does not increase hazard risk. The Plan includes information regarding the location, extent, and probability of many natural hazards. By incorporating this information into the Comprehensive/Master Plan, development can be guided in a hazard-resilient manner.</p>
<p>Emergency Operations Plan</p>	<p>The city is part of the Nueces County Emergency Operations Plan. The Plan will be consulted when updating and maintaining the County’s Emergency Operations Plan. Both documents share the goal of public safety. Many of the mitigation actions in this Plan relate to emergency operations and must be integrated.</p>
<p>Capital Improvements Plan</p>	<p>Many of the mitigation actions found in this Plan will be enacted through capital improvement projects. Consequently, the City’s Capital Improvement Plan must consult the Plan for hazard mitigation projects that could be incorporated into the Capital Improvement Plan. Prioritization should be given to high priority actions.</p>
<p>Wildfire Protection Plan</p>	<p>Several of the mitigation actions defined in this Plan relate to wildfire mitigation. When updating the Community Wildfire Protection Plan, this Plan should be consulted. Likewise, when planning or executing any of the wildfire mitigation actions in this Plan, the Community Wildfire Protection Plan should be consulted. Both plans have the ultimate goal of reducing the loss of property and life from wildfire hazards.</p>

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. This Plan will be posted on the Nueces County website where local officials and the public will be invited to provide ongoing feedback. The task of notifying stakeholders and community members on an annual basis will be held with the identified Nueces County 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. Public participation will be sought during the implementation, monitoring, and evaluation phases of the plan.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:	Nueces County Office of Emergency Management		
Name and Title:	Kathy Ard-Blattner Nueces County Deputy EMC		
<p>1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.</p>			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	X		Nueces County Public Works
Stormwater Management Plan / Ordinance	X		Nueces County Public Works
Emergency Operations Plan	X		Nueces County Office of Emergency Management
Capital Improvements Plan	X		Nueces County Capital Improvement Plan
Floodplain Management Plan	X		Nueces County Public Works
Economic Development Plan	X		Nueces County
Transportation Plan	X		Corpus Christi Regional Transportation Authority
Wildfire Protection Plan	X		Nueces County Office of Emergency Management
Stormwater Ordinance	X		Nueces River Authority-Nueces County Water District #2
NFIP Community Rating System (CRS Program)	X		NFIP County Rating System needs Update of Ratings
Floodplain Ordinance	X		Nueces County Public Works
Continuity of Operations Plan	X		Nueces County Office of Emergency Management

Building Code (include name/year under Comments)	X		Nueces County Public Works
Zoning Ordinance	X		Nueces County Public Works
Acquisition of Land for Open Space/Recreation Use	X		Committee review with approval through Commissioners Court Overseen by Nueces County Public Works, Nueces County Inland and Coastal Parks
2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		Nueces County Public Works
Mutual Aid Agreements (between neighboring jurisdictions)	X		Coastal Bend Council of Governments
Mitigation Planning Committee	X		Ongoing Mitigation Planning Committee through the CBCOG
Community Planner	X		Nueces County Public Works
Staff Engineer	X		Nueces County Public Works
Emergency manager	X		Nueces County Office of Emergency Management
Floodplain manager	X		Nueces County Public Works
Personnel skilled in Geographic Information Systems (GIS)	X		Nueces County Public Works
Warning Systems/outdoor siren, reverse 911, other	X		Reverse Alert
Grant Writer	X		Nueces County Grants Department
Hazard Data/historical disaster data	X		LEPC/TCEQ/NCOEM/NC Public Works
Chief Building Official	X		Nueces County Public Works
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			

Financial Resources	Yes	No	Comments
Capital Improvement Programming	X		Nueces County
Community Development Block Grants (CDBG)	X		Nueces County Grants Department
Stormwater Utility Fees	X		
Development Impact Fees	X		
Authority to levy taxes for specific purposes	X		Nueces County
Other: _____			
<p>4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.</p>			
<p>National Weather Services provides Storm Ready, outreach to schools and the local community. Local Emergency Planning Committee, LEPC, provides school outreach and education programs throughout the community. Nueces County Office of Emergency Management provides Townhall Meetings, Business Leaders Luncheon for Emergency Preparedness, and Annual Hurricane Conference to educate the schools and community.</p>			
<p>5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.</p>			
<p>Tri-County Regional Water Drainage Study, CDBG-Community Development Block Grant, and FEMA Generator Grants for Courthouse and County Jail,</p>			

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:			
Name and Title: City of Agua Dulce		Ninfa Acuna, City Secretary	
<p>1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.</p>			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	No		
Stormwater Management Plan / Ordinance	No		
Emergency Operations Plan	No		
Capital Improvements Plan	No		
Floodplain Management Plan	No		
Economic Development Plan	No		
Transportation Plan	No		
Wildfire Protection Plan	No		
Stormwater Ordinance	No		
NFIP Community Rating System (CRS Program)	No		
Floodplain Ordinance	No		
Continuity of Operations Plan	No		
Building Code (include name/year under Comments)	No		
Zoning Ordinance	No		
Acquisition of Land for Open Space/Recreation Use	No		

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		
Mutual Aid Agreements (between neighboring jurisdictions)		No	
Mitigation Planning Committee		No	
Community Planner		No	
Staff Engineer		No	
Emergency manager		No	
Floodplain manager		No	
Personnel skilled in Geographic Information Systems (GIS)		No	
Warning Systems/outdoor siren, reverse 911, other		No	
Grant Writer		No	
Hazard Data/historical disaster data		No	
Chief Building Official		No	
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No	Comments
Capital Improvement Programming		No	
Community Development Block Grants (CDBG)		No	
Stormwater Utility Fees		No	
Development Impact Fees		No	
Authority to levy taxes for specific purposes		No	
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection evacuation plan, emergency preparedness, public education programs.

None

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department/agency responsible.

None

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:	Banquete Community		
Name and Title:	Adrian Pena, Asst Supt Business/Operations		
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	Nueces County	Unknown	Follow Nueces County
Stormwater Management Plan / Ordinance	Nueces County	Unknown	Follow Nueces County
Emergency Operations Plan	Nueces County	Unknown	Follow Nueces County
Capital Improvements Plan	Nueces County	Unknown	Follow Nueces County
Floodplain Management Plan	Nueces County	Unknown	Follow Nueces County
Economic Development Plan	Nueces County	Unknown	Follow Nueces County
Transportation Plan	Nueces County	Unknown	Follow Nueces County
Wildfire Protection Plan	Nueces County	Unknown	Follow Nueces County
Stormwater Ordinance	Nueces County	Unknown	Follow Nueces County
NFIP Community Rating System (CRS Program)	Nueces County	Unknown	Follow Nueces County
Floodplain Ordinance	Nueces County	Unknown	Follow Nueces County

Continuity of Operations Plan	Nueces County	Unknown	Follow Nueces County
Building Code (include name/year under Comments)	Nueces County	Unknown	Follow Nueces County
Zoning Ordinance	Nueces County	Unknown	Follow Nueces County
Acquisition of Land for Open Space/Recreation Use	Nueces County	Unknown	Follow Nueces County

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources

Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		Nueces County Public Works
Mutual Aid Agreements (between neighboring jurisdictions)	X		ESB's
Mitigation Planning Committee	X		In Progress Nueces County
Community Planner		X	
Staff Engineer		X	
Emergency manager	X		Nueces County
Floodplain manager		X	Nueces County
Personnel skilled in Geographic Information Systems (GIS)		X	
Warning Systems/outdoor siren, reverse 911, other		X	
Grant Writer		X	Nueces County
Hazard Data/historical disaster data	X		Nueces County
Chief Building Official		X	

3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes*

Financial Resources	Yes	No	Comments
Capital Improvement Programming		X	
Community Development Block Grants (CDBG)		X	Nueces County
Stormwater Utility Fees		X	
Development Impact Fees		X	
Authority to levy taxes for specific purposes	X		School District Only
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Small Community – Banquete Independent School District is using text alerts, phone calls and also use the school districts website and Facebook page to alert parents of any public announcements.
 NCWCD #5 uses their Facebook page to alert the community members of any water issues.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Awarded \$1M grant to renew water piping system in the community.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: City of Bishop			
Name and Title: Salvador Ochoa, Jr., City Secretary			
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	X		
Stormwater Management Plan / Ordinance	X		
Emergency Operations Plan	X		
Capital Improvements Plan	X		
Floodplain Management Plan	X		
Economic Development Plan	X		
Transportation Plan		X	
Wildfire Protection Plan		X	
Stormwater Ordinance	X		
NFIP Community Rating System (CRS Program)		X	
Floodplain Ordinance	X		
Continuity of Operations Plan		X	
Building Code (include name/year under Comments)	X		
Zoning Ordinance	X		
Acquisition of Land for Open Space/Recreation Use	X		

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		
Mutual Aid Agreements (between neighboring jurisdictions)	X		
Mitigation Planning Committee		X	
Community Planner		X	
Staff Engineer		X	
Emergency manager		X	
Floodplain manager		X	
Personnel skilled in Geographic Information Systems (GIS)		X	
Warning Systems/outdoor siren, reverse 911, other		X	
Grant Writer		X	
Hazard Data/historical disaster data		X	
Chief Building Official		X	
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No	Comments
Capital Improvement Programming	X		
Community Development Block Grants (CDBG)	X		
Stormwater Utility Fees		X	
Development Impact Fees		X	
Authority to levy taxes for specific purposes	X		
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Emergency Plan: City of Bishop and Bishop Police Department working in coordination with Nueces County.

Evacuation Plan: City of Bishop and Bishop Police Department working in coordination with Nueces County.

Public Education Programs: Social media informational notices by City of Bishop and Bishop Police Department. Community Presentations by the Bishop Police Department.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: Administration	City of Corpus Christi	Floodplain Management Division	
Name and Title:	Kathleen Chapa	Floodplain & Coastal Protection Manager	
<p>1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.</p>			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	X		Water, Wastewater,
Stormwater Management Plan / Ordinance	X		
Emergency Operations Plan			
Capital Improvements Plan	X		
Floodplain Management Plan		X	
Economic Development Plan			
Transportation Plan	X		
Wildfire Protection Plan			
Stormwater Ordinance	X		
NFIP Community Rating System (CRS Program)	X		
Floodplain Ordinance	X		
Continuity of Operations Plan			
Building Code (include name/year under Comments)	X		Currently adopting 2021 ICC Codes
Zoning Ordinance	X		
Acquisition of Land for Open Space/Recreation Use	X		

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		
Mutual Aid Agreements (between neighboring jurisdictions)	X		
Mitigation Planning Committee			
Community Planner	X		
Staff Engineer	X		
Emergency manager	X		
Floodplain manager	X		
Personnel skilled in Geographic Information Systems (GIS)	X		
Warning Systems/outdoor siren, reverse 911, other	X		
Grant Writer			
Hazard Data/historical disaster data	X		
Chief Building Official	X		
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No	Comments
Capital Improvement Programming	X		
Community Development Block Grants (CDBG)	X		
Stormwater Utility Fees	X		
Development Impact Fees		X	Working on implementing these
Authority to levy taxes for specific purposes			
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Emergency preparedness- coloring books for elementary schools

Calendars for senior citizens

Annual newsletter to all SFHA property owners with information on- evacuation routes, hazard preparedness, insurance, construction etc.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

La Volla Creek & Oso Creek Projects- used the Hazard Mitigation Grant Program & TWDB-

La Volla is in design approximately 2yrs till completion.

Oso Creek going for RFQ for a consultant approximately 3yrs till completion.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: Administration	CITY OF DRISCOLL	NUECES	
Name and Title: PAULA WAKEFIELD	CITY ADMINISTRATOR		
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	Initial Stage	Negotiating Funding	Compliment w/ Nueces County
Stormwater Management Plan / Ordinance		Unknown	Compliment w/ Nueces County
Emergency Operations Plan	Follow Nueces County		
Capital Improvements Plan	None	In Progress	FYR 2022-2023
Floodplain Management Plan	Effective Oct 1, 2022	Ord 2022-001	
Economic Development Plan	DIDC -4B Sales Tax Corp	Affected by COVID & I-69 Interstate	Minimal Activity
Transportation Plan	None	I-69 Interstate	
Wildfire Protection Plan	None		
Stormwater Ordinance			
NFIP Community Rating System (CRS Program)	Effective Oct 1, 2022	Ord. 2022-001	
Floodplain Ordinance			
Continuity of Operations Plan		Under Assessment	

Building Code (include name/year under Comments)	Effective Oct 1, 2022	Internat'l Building Code Version/Ed 11	For Future Use. City in rural area not issuing Bldg Permits
Zoning Ordinance			
Acquisition of Land for Open Space/Recreation Use		DIDC purchased land property for future development in housing	Property platted and subdivided
2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No / Partial	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	Yes		Public Works and Solid Waste Contractor
Mutual Aid Agreements (between neighboring jurisdictions)	Yes	Emergency District Mgmt - Ambulatory	MetroCom Dispatch
Mitigation Planning Committee	Yes	In Progress w/Nueces County	Multi- Jurisdictional
Community Planner	No	Shared Responsibility	
Staff Engineer	No	Engineering by Project Contract	
Emergency manager	Yes	Nueces County	
Floodplain manager	Yes	Ord. Eff. Oct 1, 2022	City Administrator
Personnel skilled in Geographic Information Systems (GIS)	Yes	Shared Responsibility	Revamp 911 Addressing Sys
Warning Systems/outdoor siren, reverse 911, other	Yes	Fire Dept siren, Public Alert Text System	
Grant Writer	Yes	Shared	City Administrator & GrantWorks
Hazard Data/historical disaster data	Yes	Nueces County	
Chief Building Official	No		
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No / Partial	Comments

Capital Improvement Programming		Under Assessment	Assessing Financial Capacity.
Community Development Block Grants (CDBG)	Yes		
Stormwater Utility Fees	No		
Development Impact Fees	No		
Authority to levy taxes for specific purposes	Yes		No Long-term debt
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Small community less than 1,000 population with utility accounts to be able to reach the public with Public Service Announcements, changes, new programs, procedures for trash pickup. The City sends out Text Alert messages directly to residents. Nueces County provides literature and educational pamphlets/brochures/bulletins to disseminate to the citizens for Emergency Management Preparedness during Hurricane season.

The hazardous issues include flooding, wind, railroad, fire. The improvements are needed in water and waste water; street and thoroughfare infrastructures. The community is agriculture and with the construction of the I-69 Interstate, the loss of revenue is expected on the commercial tax revenue.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

FEMA Public Assistance Grant 4223, Severe Storms, Tornadoes, Straight-Line Winds and Flooding (Period of Performance 5/29/2015 – 11/29/2016) with Extension to complete in 2022.

TX CDBG Contract #7216140 (Water Sys Improvements)(9/15/2016 to completion 11/13/2018)

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: Petronila			
Name and Title: Sydonia Wright-City Secretary			
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan		x	NCOEM
Stormwater Management Plan / Ordinance			N/A NC is responsible.
Emergency Operations Plan		x	
Capital Improvements Plan		X	The City would like to build a small City Hall building, and have it serve as an evacuation point. This build depends on grant money available, and voters passing a .5 cent sales tax increase in the May 2023 general election. The City needs the increase to afford maintenance, etc. once built.
Floodplain Management Plan			N/A This is handled by NCOEM.
Economic Development Plan			N/A
Transportation Plan			N/A
Wildfire Protection Plan			None
Stormwater Ordinance			N/A NC is responsible.
NFIP Community Rating System (CRS Program)			N/A

Floodplain Ordinance			None
Continuity of Operations Plan		x	
Building Code (include name/year under Comments)		x	
Zoning Ordinance			None
Acquisition of Land for Open Space/Recreation Use			No

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources

Staff / Personnel Resources	Y es	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)		x	
Mutual Aid Agreements (between neighboring jurisdictions)		x	
Mitigation Planning Committee			Not a formal committee.
Community Planner		x	
Staff Engineer		x	
Emergency manager	x		NCOEM
Floodplain manager	x		NCOEM
Personnel skilled in Geographic Information Systems (GIS)		x	
Warning Systems/outdoor siren, reverse 911, other		x	The City is open to learning more about what would be beneficial to our community.

Grant Writer		x	We would turn to NC for help.
Hazard Data/historical disaster data		x	NCOEM
Chief Building Official		x	

3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes*

Financial Resources	Y es	No	Comments
Capital Improvement Programming		x	
Community Development Block Grants (CDBG)		x	
Stormwater Utility Fees		x	
Development Impact Fees		x	
Authority to levy taxes for specific purposes		x	
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

The City partners with Petronila Elementary school in distributing flyers/memos about meetings, for the purposes of general information, emergency preparedness, and other items that are shared from NC.

The Administrators of the Petronila Community Facebook page also post items of interest for us.

The City is happy to learn more about bringing programs to the school that they might not have in place.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

None at this time.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: <i>City of Port Aransas</i>			
Name and Title: <i>Rick Adams, Asst. City Mgr, EMC</i>			
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan		✓	
Stormwater Management Plan / Ordinance	<i>partial</i>	✓	
Emergency Operations Plan	✓		
Capital Improvements Plan			
Floodplain Management Plan	✓	✓	
Economic Development Plan	✓		<i>Handled by Chamber</i>
Transportation Plan	✓	✓	<i>Being reviewed w/ Comp plan</i>
Wildfire Protection Plan			
Stormwater Ordinance	✓	✓	<i>Comp plan</i>
NFIP Community Rating System (CRS Program)			
Floodplain Ordinance	✓		
Continuity of Operations Plan			
Building Code (include name/year under Comments)	<i>ICC 2018</i>		
Zoning Ordinance	✓	✓	<i>Comp plan</i>
Acquisition of Land for Open Space/Recreation Use		✓	

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Multiple post Harvey capital improvement projects many of which were previous HMAP identified are currently underway

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:	City of Robstown		
Name and Title:	Javier Zapata – Fire Chief/EM Coord. Patti Hobbs – Grants Admin		
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	X		
Stormwater Management Plan / Ordinance	X		
Emergency Operations Plan	X		
Capital Improvements Plan		X	
Floodplain Management Plan			Not sure
Economic Development Plan		X	
Transportation Plan	X		County Plan
Wildfire Protection Plan	X		County
Stormwater Ordinance	X		
NFIP Community Rating System (CRS Program)	X		
Floodplain Ordinance		X	
Continuity of Operations Plan	X		
Building Code (include name/year under Comments)	X		2009?
Zoning Ordinance	X		
Acquisition of Land for Open Space/Recreation Use			No

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	X		
Mutual Aid Agreements (between neighboring jurisdictions)	X		
Mitigation Planning Committee	X		Assigned as Needed
Community Planner		X	
Staff Engineer		X	
Emergency manager	X		
Floodplain manager	X		Not Certified
Personnel skilled in Geographic Information Systems (GIS)		X	
Warning Systems/outdoor siren, reverse 911, other	X		
Grant Writer	X		
Hazard Data/historical disaster data	X		
Chief Building Official	X		
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No	Comments
Capital Improvement Programming			In Progress
Community Development Block Grants (CDBG)	X		Not any open currently
Stormwater Utility Fees			
Development Impact Fees		X	
Authority to levy taxes for specific purposes	X		

Other: Sales tax, Property tax, Fines & Fees	X		
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4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Hurricane Preparedness Education Program (FD), NWS StormReady, Annual Hurricane Conference, LEPC, School and Outreach programs, evacuation plan...

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Generator – PD (GLO) In progress
Generators – Lift stations (GLO) In progress

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:	Nueces County Drainage District No. 2		
Name and Title:	Samuel Arconiga	Superintendent	
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan		✓	
Stormwater Management Plan / Ordinance			N/A
Emergency Operations Plan	✓		
Capital Improvements Plan		✓	
Floodplain Management Plan		✓	
Economic Development Plan			N/A
Transportation Plan			N/A
Wildfire Protection Plan			N/A
Stormwater Ordinance			N/A
NFIP Community Rating System (CRS Program)			N/A
Floodplain Ordinance			N/A
Continuity of Operations Plan		✓	
Building Code (include name/year under Comments)			N/A
Zoning Ordinance			N/A
Acquisition of Land for Open Space/Recreation Use			N/A

Note: Most of the N/A are tools already in place for the City of Robstown or Nueces County and used when necessary by NC DD2.

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	✓		
Mutual Aid Agreements (between neighboring jurisdictions)	✓		
Mitigation Planning Committee		✓	
Community Planner		✓	City of Robstown
Staff Engineer	✓		International Consulting Engineers
Emergency manager	✓		superintendent
Floodplain manager	✓	✓	International Consulting Engineers
Personnel skilled in Geographic Information Systems (GIS)	✓		ICE
Warning Systems/outdoor siren, reverse 911, other	✓		In progress through TWDB FIF Program
Grant Writer	✓	✓	Office Administrator
Hazard Data/historical disaster data		✓	
Chief Building Official		✓	City of Robstown
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources for hazard mitigation purposes			
Financial Resources	Yes	No	Comments
Capital Improvement Programming	✓		
Community Development Block Grants (CDBG)	✓		
Stormwater Utility Fees		✓	
Development Impact Fees		✓	
Authority to levy taxes for specific purposes	✓		Drainage District
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

1. Outreach to local schools through Robstown ISD
2. Community Awareness Events organized by NCDD2.
3. Public Meetings organized by NCDD2.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

1. Bosquez
2. Ditch A
3. Casablanca
4. County DMP-NCDD2 Master Plan
5. Flood Early Warning System (FEWS)

Appendix A: Capability Assessment

Jurisdiction and/or Dept.:	Nueces County Water Control & Improvement District #3		
Name and Title:	Marcos Alaniz, District Manager		
<p>1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.</p>			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan			
Stormwater Management Plan / Ordinance			
Emergency Operations Plan	√		
Capital Improvements Plan	√		
Floodplain Management Plan			
Economic Development Plan			
Transportation Plan			
Wildfire Protection Plan			
Stormwater Ordinance			
NFIP Community Rating System (CRS Program)			
Floodplain Ordinance			
Continuity of Operations Plan			
Building Code (include name/year under Comments)			
Zoning Ordinance			
Acquisition of Land for Open Space/Recreation Use			

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2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources

Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	√		
Mutual Aid Agreements (between neighboring jurisdictions)	√		
Mitigation Planning Committee			
Community Planner			
Staff Engineer			
Emergency manager			
Floodplain manager			
Personnel skilled in Geographic Information Systems (GIS)			
Warning Systems/outdoor siren, reverse 911, other			
Grant Writer			
Hazard Data/historical disaster data			
Chief Building Official			

3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes*

Financial Resources	Yes	No	Comments
Capital Improvement Programming	√		
Community Development Block Grants (CDBG)			
Stormwater Utility Fees			
Development Impact Fees			
Authority to levy taxes for specific purposes			
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Appendix A: Capability Assessment

Jurisdiction and/or Dept.: Nueces County Water Control & Improvement District 4			
Name and Title: Scott Mack \ District Manager NCWCID#4			
1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction. Please provide additional comments or explanations in the space provided or with attachments.			
Planning and Regulatory Resource	In Place	Under Development	Comments
Comprehensive / Master Plan	x		NCWCID 4
Stormwater Management Plan / Ordinance	x		COPA
Emergency Operations Plan		x	NCWCID 4
Capital Improvements Plan	x		NCWCID 4
Floodplain Management Plan			COPA
Economic Development Plan	x		NCWCID 4
Transportation Plan			COPA
Wildfire Protection Plan			COPA
Stormwater Ordinance			COPA
NFIP Community Rating System (CRS Program)	x		COPA
Floodplain Ordinance	x		COPA
Continuity of Operations Plan		x	NCWCID 4
Building Code (include name/year under Comments)	x		COPA

Zoning Ordinance	x		COPA
Acquisition of Land for Open Space/Recreation Use	x		COPA
2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources			
Staff / Personnel Resources	Yes	No	Comments
Maintenance program to reduce risk (tree trimming, clearing drainage systems)	x		COPA
Mutual Aid Agreements (between neighboring jurisdictions)	x		NCWCID 4
Mitigation Planning Committee	x		NCWCID 4
Community Planner		x	
Staff Engineer	X		Urban Eng.
Emergency manager	x		COPA
Floodplain manager	x		COPA
Personnel skilled in Geographic Information Systems (GIS)	x		Urban Eng.
Warning Systems/outdoor siren, reverse 911, other	x		COPA
Grant Writer	x		NCWCID 4
Hazard Data/historical disaster data		x	
Chief Building Official			COPA
3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources <i>for hazard mitigation purposes</i>			
Financial Resources	Yes	No	Comments
Capital Improvement Programming	x		NCWCID 4

Community Development Block Grants (CDBG)		x	
Stormwater Utility Fees			COPA
Development Impact Fees	x		NCWCID 4
Authority to levy taxes for specific purposes	x		
Other: _____			

4. EDUCATION AND OUTREACH - Please identify any education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information such as school programs, StormReady, FireWise programs, environmental protection, evacuation plan, emergency preparedness, public education programs.

Water conservation public education programs.

5. PREVIOUS MITIGATION ACTIVITIES - Please list any previous mitigation activities (e.g. structural and/or planning projects or grants) that have been or will be implemented for your community. Please include the title of the project or grant along with any start or completion dates and the department or agency responsible.

Generator projects are ongoing.

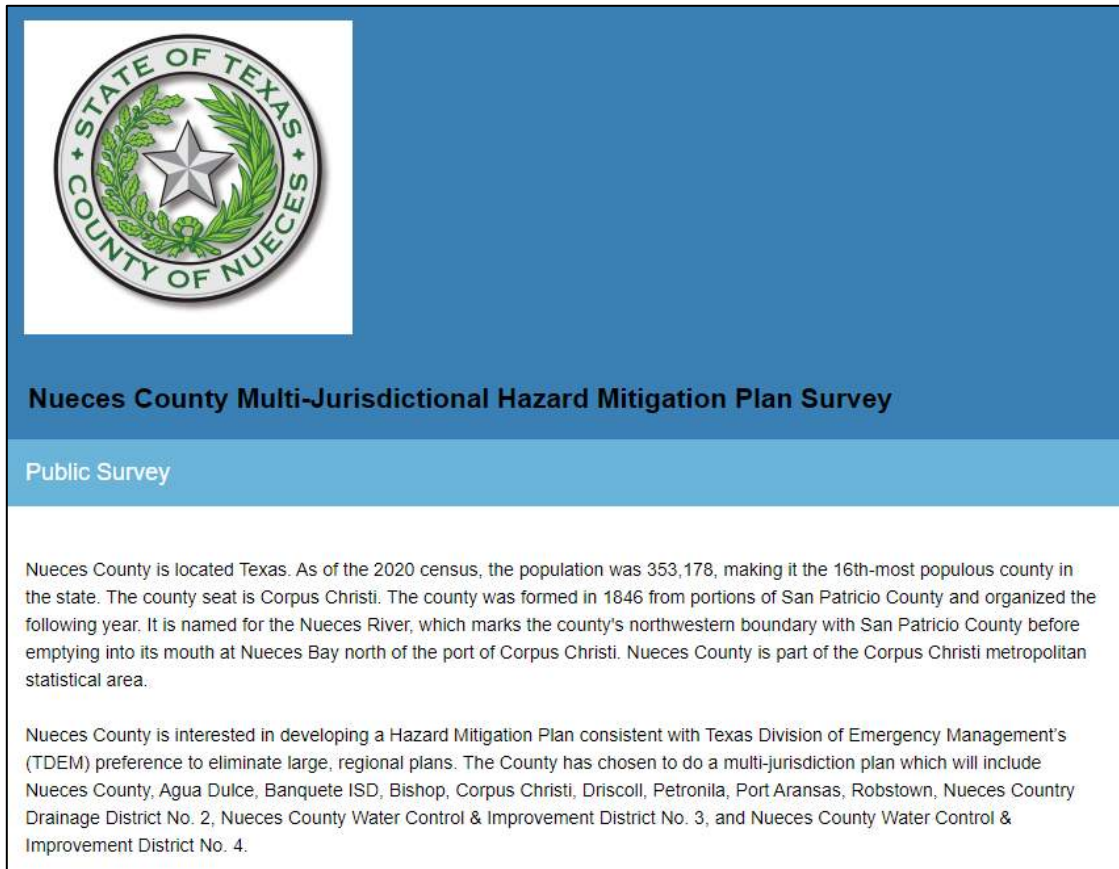
Appendix B: Public Survey

Overview 1
Public Survey Questions & Results 2

Overview

Nueces County prepared a public survey with questions for the public concerning their opinions regarding natural hazards. The survey QR Code was made available on the Nueces County website at <https://www.nuecesco.com>. 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.

Figure B-1: Screen Shot of Public Survey Linked via QC Code on Nueces County Website

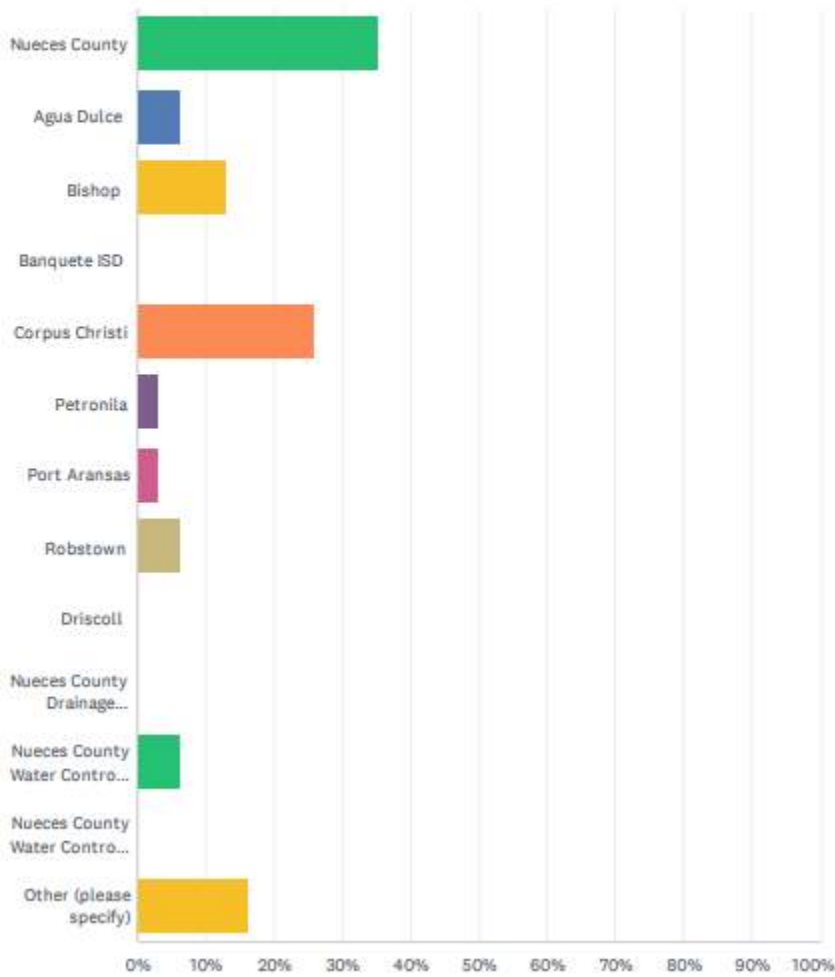


Public Survey Questions & Results

Question #1:

Q1 Please state the area, jurisdiction, or entity in which you reside or represent. Please check one.

Answered: 31 Skipped: 0



Question #1 (continued)

ANSWER CHOICES	RESPONSES	
Nueces County	35.48%	11
Agua Dulce	6.45%	2
Bishop	12.90%	4
Banquete ISD	0.00%	0
Corpus Christi	25.81%	8
Petronila	3.23%	1
Port Aransas	3.23%	1
Robstown	6.45%	2
Driscoll	0.00%	0
Nueces County Drainage District No. 2	0.00%	0
Nueces County Water Control & Improvement District No. 4	6.45%	2
Nueces County Water Control & Improvement District No. 3	0.00%	0
Other (please specify)	16.13%	5
Total Respondents: 31		

#	OTHER (PLEASE SPECIFY)	DATE
1	Bell	7/11/2023 1:02 PM
2	Padre Island	5/10/2023 6:05 PM
3	All but Port Aransas	8/30/2022 9:20 AM
4	South Texas Water Authority	8/22/2022 10:33 AM
5	Port of Corpus Christi Authority	7/19/2022 9:51 AM

Question #2

Q2 Please provide your zip code.

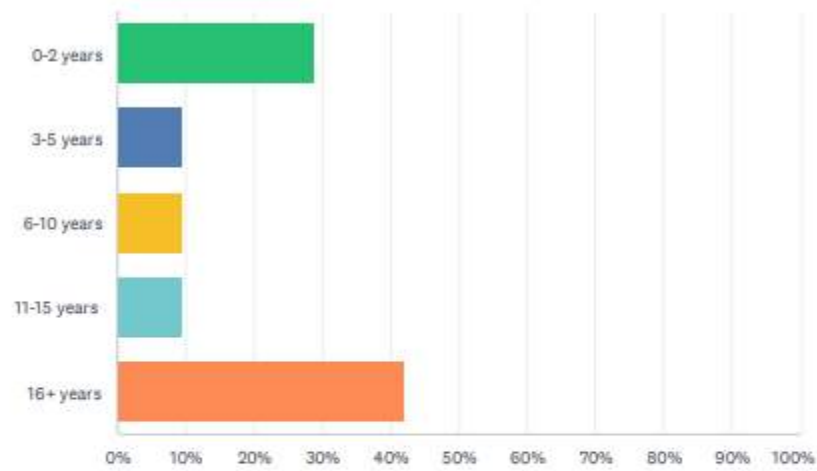
Answered: 31 Skipped: 0

#	RESPONSES	DATE
1	76559	7/11/2023 1:02 PM
2	78418	6/20/2023 9:28 AM
3	78330	5/25/2023 8:39 PM
4	78330	5/25/2023 1:21 PM
5	78343	5/20/2023 5:29 PM
6	78343	5/13/2023 10:32 AM
7	78413	5/13/2023 8:28 AM
8	78413	5/11/2023 11:10 PM
9	78414	5/11/2023 4:17 PM
10	78537	5/11/2023 3:37 PM
11	78343	5/11/2023 2:15 PM
12	78415	5/11/2023 11:26 AM
13	78418	5/11/2023 1:15 AM
14	78415	5/11/2023 12:28 AM
15	78410	5/10/2023 6:23 PM
16	78418	5/10/2023 6:05 PM
17	78413	5/10/2023 5:28 PM
18	78380	8/30/2022 12:22 PM
19	78401	8/30/2022 10:46 AM
20	78408	8/30/2022 10:45 AM
21	78380	8/30/2022 9:20 AM
22	78373	8/25/2022 5:48 PM
23	78404	8/22/2022 10:39 AM
24	78363	8/22/2022 10:33 AM
25	78413	8/3/2022 11:26 AM
26	78410	8/2/2022 11:22 AM
27	78373	7/29/2022 9:51 AM
28	78380	7/21/2022 1:12 PM
29	78401	7/19/2022 9:51 AM
30	78380	7/15/2022 4:48 PM
31	78380	7/15/2022 2:18 PM

Question #3

Q3 How long have you lived at your current residence?

Answered: 31 Skipped: 0

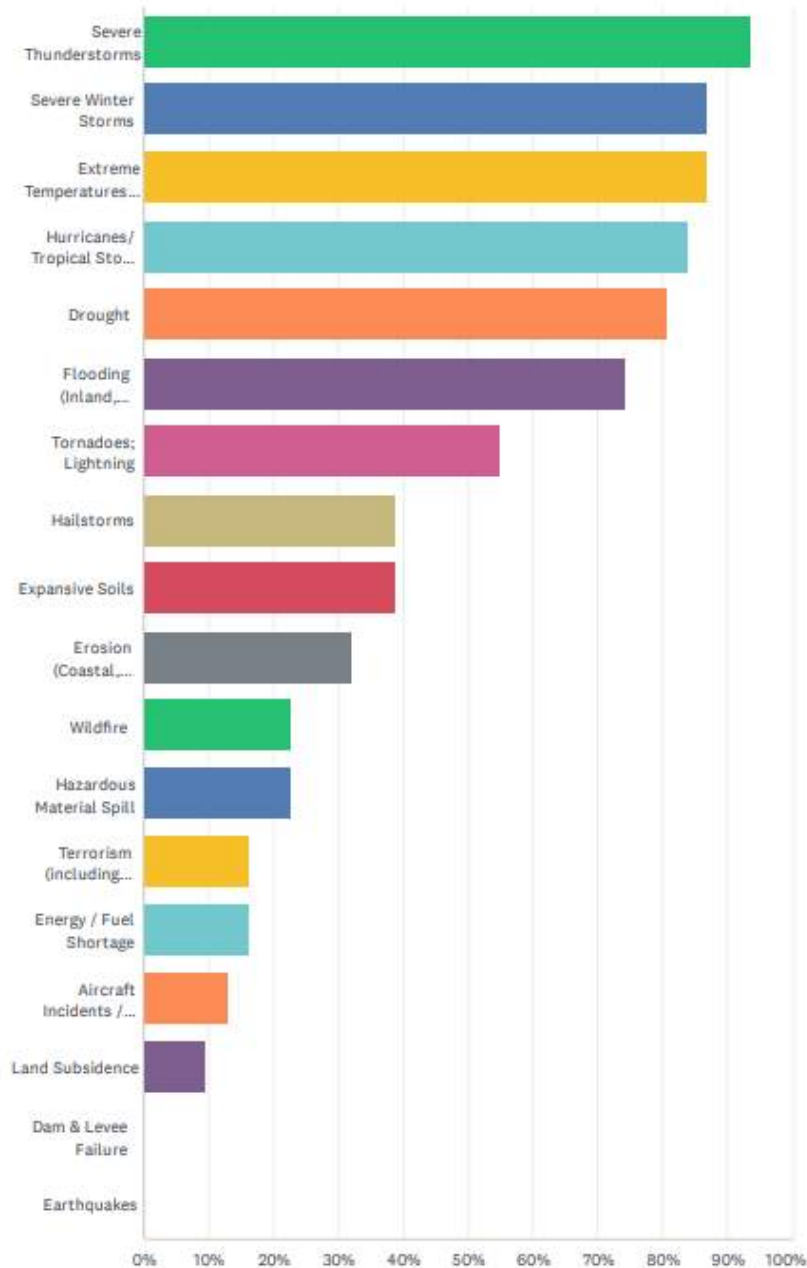


ANSWER CHOICES	RESPONSES	
0-2 years	29.03%	9
3-5 years	9.68%	3
6-10 years	9.68%	3
11-15 years	9.68%	3
16+ years	41.94%	13
TOTAL		31

Question #4

Q4 Which of the following natural hazard events have you or has anyone in your household experienced within the past 20 years. Select all that apply:

Answered: 31 Skipped: 0



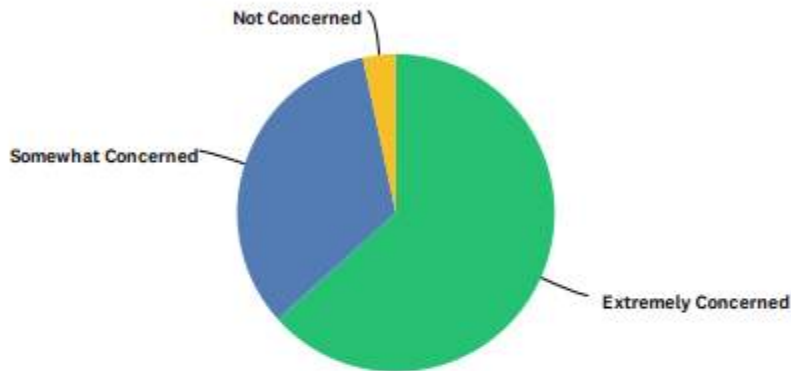
Question #4 (continued)

ANSWER CHOICES	RESPONSES	
Severe Thunderstorms	93.55%	29
Severe Winter Storms	87.10%	27
Extreme Temperatures (Cold/Heat)	87.10%	27
Hurricanes/ Tropical Storms / Depressions	83.87%	26
Drought	80.65%	25
Flooding (Inland, Riverine, and Severe Coastal Flooding)	74.19%	23
Tornadoes; Lightning	54.84%	17
Hailstorms	38.71%	12
Expansive Soils	38.71%	12
Erosion (Coastal, Inland)	32.26%	10
Wildfire	22.58%	7
Hazardous Material Spill	22.58%	7
Terrorism (including Cyber-Attack)	16.13%	5
Energy / Fuel Shortage	16.13%	5
Aircraft Incidents / Transportation Accidents	12.90%	4
Land Subsidence	9.68%	3
Dam & Levee Failure	0.00%	0
Earthquakes	0.00%	0
Total Respondents: 31		

Question #5

Q5 How concerned are you about the possibility of potable water production being impacted by a natural disaster?

Answered: 30 Skipped: 1

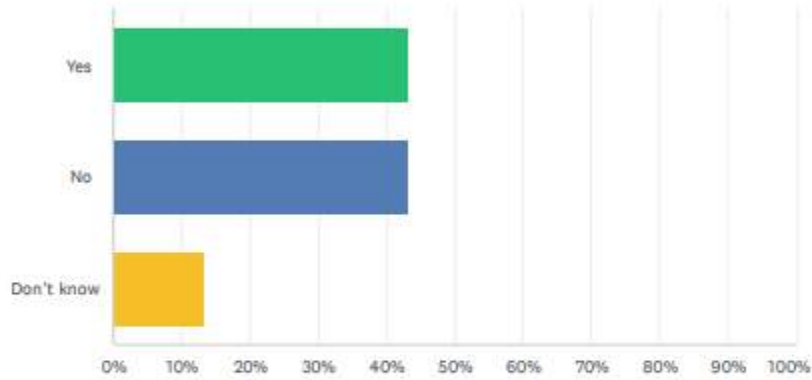


ANSWER CHOICES	RESPONSES	
Extremely Concerned	63.33%	19
Somewhat Concerned	33.33%	10
Not Concerned	3.33%	1
TOTAL		30

Question #6

Q6 Are you located in a FEMA designated floodplain? If you do not know, please go to the following link at <http://msc.fema.gov/portal/home>.

Answered: 30 Skipped: 1

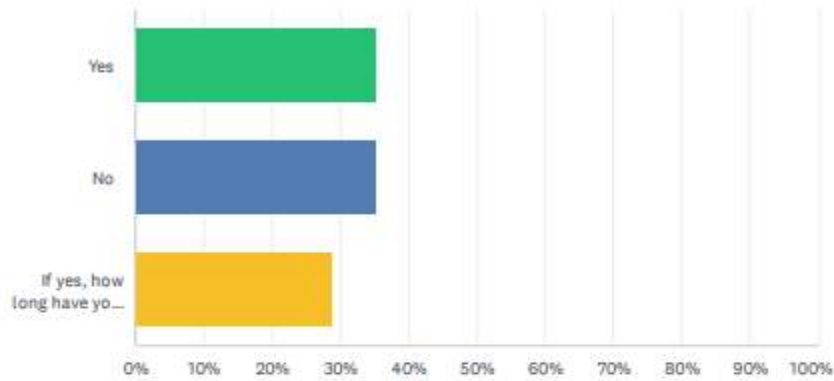


ANSWER CHOICES	RESPONSES	
Yes	43.33%	13
No	43.33%	13
Don't know	13.33%	4
TOTAL		30

Question #7

Q7 Do you have flood insurance?

Answered: 31 Skipped: 0



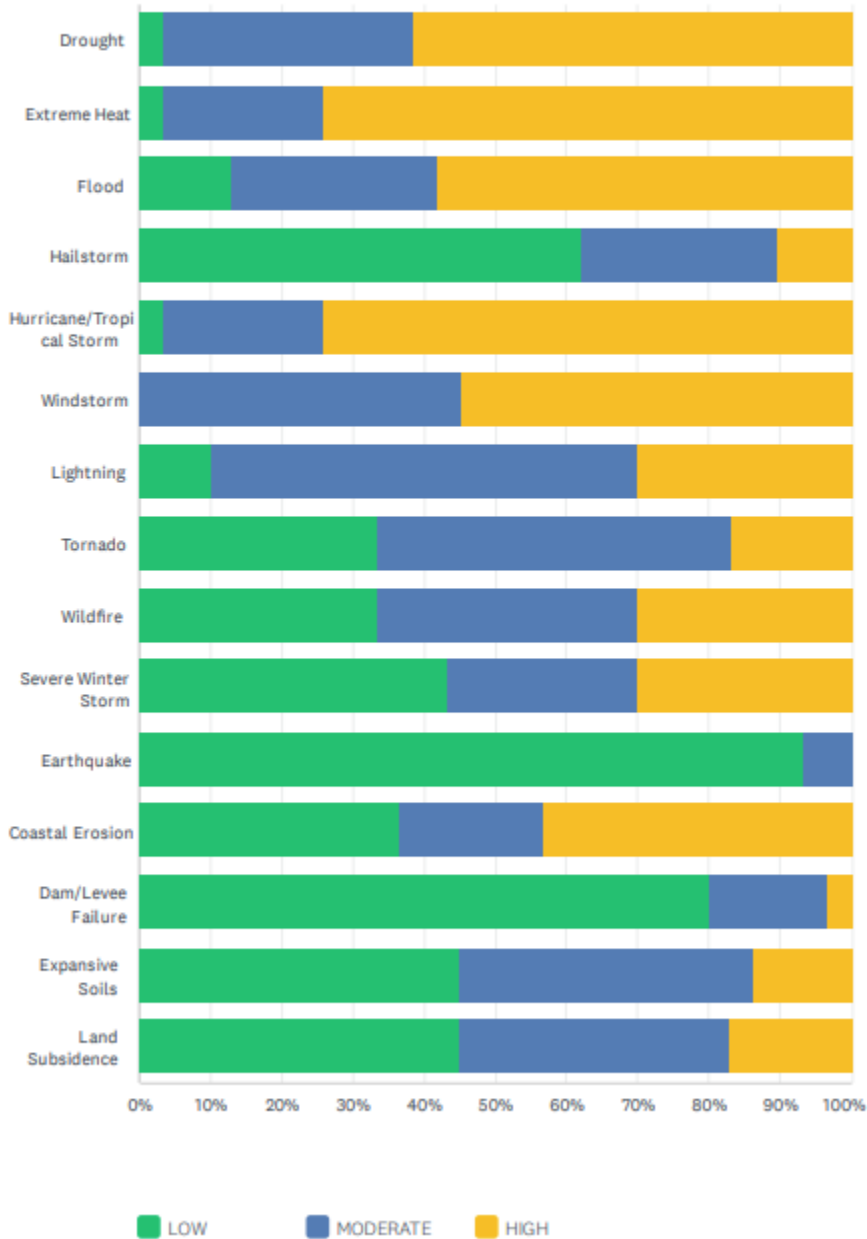
ANSWER CHOICES	RESPONSES
Yes	35.48% 11
No	35.48% 11
If yes, how long have you had a flood insurance policy?	29.03% 9
TOTAL	31

#	IF YES, HOW LONG HAVE YOU HAD A FLOOD INSURANCE POLICY?	DATE
1	10 years	5/25/2023 1:21 PM
2	Over 15 years	5/20/2023 5:29 PM
3	3 years	5/11/2023 4:17 PM
4	1 1/2 years	5/11/2023 11:26 AM
5	2 years	5/11/2023 1:15 AM
6	Several years..	5/10/2023 6:23 PM
7	Since we bought our home 11/2020	8/30/2022 12:22 PM
8	2021	7/29/2022 9:51 AM
9	2 years	7/15/2022 4:48 PM

Question #8

Q8 In general, how concerned are you about the following natural hazards in your area? (check one box for each)

Answered: 31 Skipped: 0



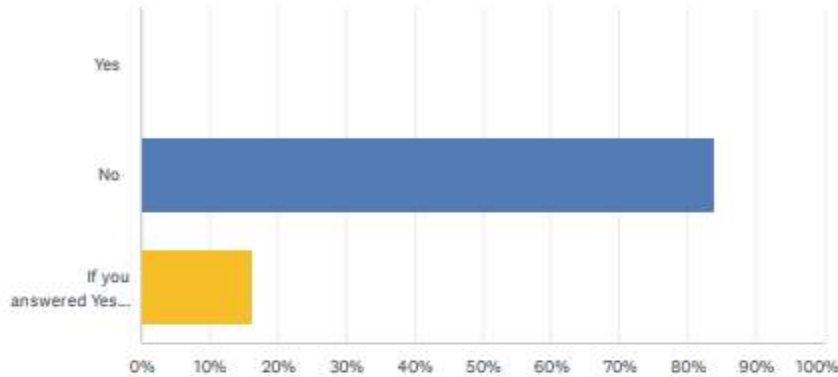
Question #8 (continued)

	LOW	MODERATE	HIGH	TOTAL	WEIGHTED AVERAGE
Drought	3.23% 1	35.48% 11	61.29% 19	31	2.58
Extreme Heat	3.23% 1	22.58% 7	74.19% 23	31	2.71
Flood	12.90% 4	29.03% 9	58.06% 18	31	2.45
Hailstorm	62.07% 18	27.59% 8	10.34% 3	29	1.48
Hurricane/Tropical Storm	3.23% 1	22.58% 7	74.19% 23	31	2.71
Windstorm	0.00% 0	45.16% 14	54.84% 17	31	2.55
Lightning	10.00% 3	60.00% 18	30.00% 9	30	2.20
Tomado	33.33% 10	50.00% 15	16.67% 5	30	1.83
Wildfire	33.33% 10	36.67% 11	30.00% 9	30	1.97
Severe Winter Storm	43.33% 13	26.67% 8	30.00% 9	30	1.87
Earthquake	93.33% 28	6.67% 2	0.00% 0	30	1.07
Coastal Erosion	36.67% 11	20.00% 6	43.33% 13	30	2.07
Dam/Levee Failure	80.00% 24	16.67% 5	3.33% 1	30	1.23
Expansive Soils	44.83% 13	41.38% 12	13.79% 4	29	1.69
Land Subsidence	44.83% 13	37.93% 11	17.24% 5	29	1.72

Question #9

Q9 Is there another natural hazard not listed above that you think represents a wide-scale threat to the Nueces County area? If yes, please explain:

Answered: 31 Skipped: 0



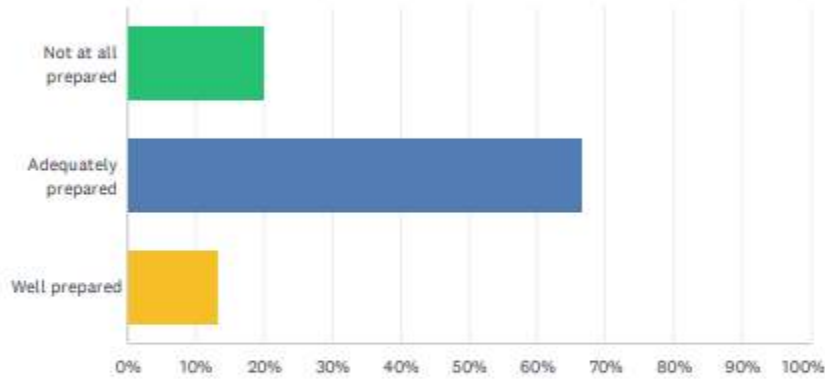
ANSWER CHOICES	RESPONSES	
Yes	0.00%	0
No	83.87%	26
If you answered Yes, please describe.	16.13%	5
TOTAL		31

#	IF YOU ANSWERED YES, PLEASE DESCRIBE.	DATE
1	Impact of increased wind and flood insurance on people who have purchased a home or commercial property or structure post-Harvey/2017	6/20/2023 9:28 AM
2	There is a large windfarm Northeast of Bishop. It is unknown how the large wind turbines will withstand hurricanes	5/20/2023 5:29 PM
3	Ropes Park in Corpus Christi had bacteria levels above this safety threshold on 70 percent of days tested in 2021. "Other Texas beaches found potentially unsafe for swimming over 50 percent of the time were Cole Park, Emerald Beach, and Corpus Christi Marina, all in Nueces County," according to the press release.	5/11/2023 1:15 AM
4	A Carrington Event. https://en.m.wikipedia.org/wiki/Carrington_Event	5/10/2023 6:05 PM
5	Sea level rise (that's probably not covered formerly as a FEMA hazard though, I think!)	8/30/2022 10:46 AM

Question #10

Q10 The FEMA Website - Ready.gov provides important information on how to prepare you and your family in the event of a disaster. How prepared is your household for a natural hazard event? (check one)

Answered: 30 Skipped: 1

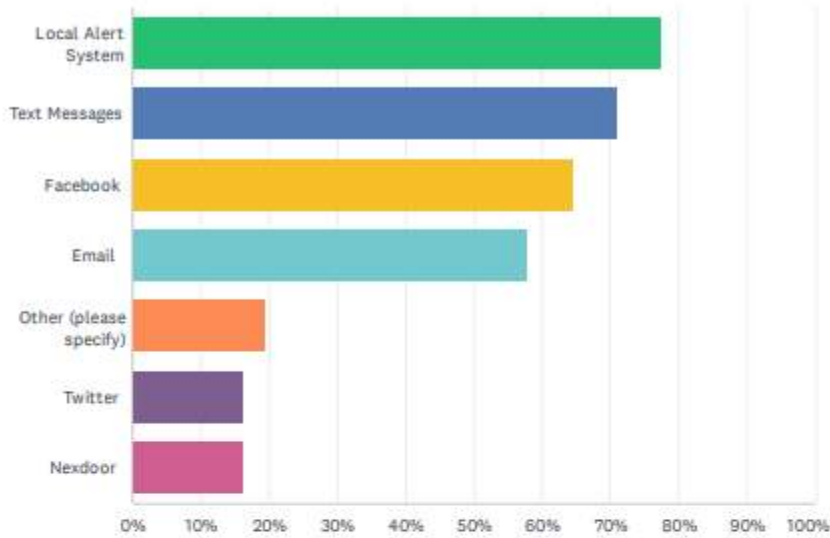


ANSWER CHOICES	RESPONSES	
Not at all prepared	20.00%	6
Adequately prepared	66.67%	20
Well prepared	13.33%	4
Total Respondents: 30		

Question #11

Q11 What media outlets do you subscribe to that you receive news and information, including natural hazard mitigation? (check all that apply)

Answered: 31 Skipped: 0



ANSWER CHOICES	RESPONSES	
Local Alert System	77.42%	24
Text Messages	70.97%	22
Facebook	64.52%	20
Email	58.06%	18
Other (please specify)	19.35%	6
Twitter	16.13%	5
Nexdoor	16.13%	5
Total Respondents: 31		

#	OTHER (PLEASE SPECIFY)	DATE
1	Active 911	7/11/2023 1:02 PM
2	Local TV and Radio, City press releases	6/20/2023 9:28 AM
3	TV, radio	5/20/2023 5:29 PM
4	Local news channels	5/11/2023 11:26 AM
5	Weather radio	5/10/2023 6:05 PM
6	TV news	8/25/2022 5:48 PM

Question #12

Q12 In your opinion, what are some steps Nueces County could take to reduce or eliminate the risk of future natural hazard damages?

Answered: 19 Skipped: 12

#	RESPONSES	DATE
1	Harden critical infrastructure, restrict development in repeat loss areas, create redundant systems	7/30/2023 3:50 PM
2	Be prepared	7/30/2023 3:46 PM
3	Insurance pool for every type of structure and physical property in the County	6/20/2023 9:28 AM
4	Communication	5/25/2023 8:39 PM
5	Fix the drainage system	5/25/2023 1:21 PM
6	Dredge the drainage channel in Bishop, enable the natural flow of rain water to the East of Bypass 77 North of FM70 and to the drainage channel, clean out culverts and ditches alongside of Hackberry in Bishop, clear brush from San Fernando Creek (a designated drainage area) West of Bishop., A desal plant so that we have a constant water supply, seek to revise requirement to release water from the lake.	5/20/2023 5:29 PM
7	installing new drainage from current ditches is important due to several reasons. The current ditches may not have sufficient capacity to handle water runoff, may lead to poor water quality, require frequent maintenance, may not be able to accommodate future growth and development, and may not comply with local regulations. Installing new drainage can help alleviate these issues and ensure a more efficient and compliant drainage system.	5/13/2023 10:32 AM
8	Build the bridges that go across waterways 3 feet higher.	5/13/2023 8:28 AM
9	Applying for grants for necessary upkeep/projects in Bishop	5/11/2023 2:15 PM
10	Organize your troops.	5/11/2023 11:26 AM
11	To build a safe underground storm shelter for individuals who are unable to leave during a hurricane or other natural disaster. Prevent electrical outages to ensure individuals can keep cool or warm as needed.	5/11/2023 1:15 AM
12	Evaluate, maintain and improve drainage systems.	5/10/2023 6:23 PM
13	Better drainage would reduce risks tremendously throughout the county and would be my number one concern with most natural hazards. There is just nowhere for the water to go! And if the runoff could be part of an irrigation system, that would help when nonraining disasters occurs, such as drought and expansive soil..	8/30/2022 12:22 PM
14	Jurisdictions could adopt resilient development codes to mitigate future damages to structures.	8/30/2022 10:46 AM
15	Plant less grass lawns.	8/25/2022 5:48 PM
16	better flood management	8/3/2022 11:26 AM
17	Continue joint planning efforts such as this.	7/19/2022 9:51 AM
18	Work on better plans (CIP, pipelines, rural water, etc.) for unincorporated and smaller jurisdictions. More flood plain mapping.	7/15/2022 4:48 PM
19	Better prepared for potable water in case of another freeze	7/15/2022 2:18 PM

Question #13

Q13 Do you have any other comments, questions, or concerns?

Answered: 12 Skipped: 19

#	RESPONSES	DATE
1	I especially worry about the sustainability of bayfront condos and townhomes and how they may price many of their current lower to moderate-income and senior renters and owners out of the market over time.	6/20/2023 9:28 AM
2	No	5/25/2023 8:39 PM
3	AGUA Dulce floods and it needs to be fixed	5/25/2023 1:21 PM
4	Nueces County is responsible for clearing San Fernando Creek bed since it is a designated drainage area. It is so overgrown with trees, brush, and tall grasses that the water can't even be seen in areas. Also, notices regarding public input are not advertised so most people don't even know about them. They should be announced in the local newspapers and sent to city councils, posted in post offices and county buildings, community centers, etc.	5/20/2023 5:29 PM
5	Ensure roads are built to provide proper Drainage so there is no water build up. Ensure ERCOT has the means to protect the electrical grid from failures during inclement weather conditions.	5/13/2023 8:28 AM
6	Bishop residents pay taxes at the same rate as Corpus Christi because we are part of Nueces County but doesn't seem to be that we get much benefit, attention, or care regarding the infrastructure. Very sad to see the way the town has declined in the last 30 years.	5/11/2023 2:15 PM
7	I'm just trying to understand more about natural hazard mitigation.	5/11/2023 11:26 AM
8	Nueces County could benefit by expanding into oyster farming. Oysters clean water and the shells have many uses.	5/11/2023 1:15 AM
9	N/A	8/30/2022 12:22 PM
10	no	8/3/2022 11:26 AM
11	No	7/29/2022 9:51 AM
12	None	7/19/2022 9:51 AM

Question #14

Q14 If you would like to receive information regarding upcoming public events and other participatory opportunities regarding hazard mitigation, please provide your email address below.

Answered: 19 Skipped: 12

#	RESPONSES	DATE
1		7/11/2023 1:02 PM
2		6/20/2023 9:28 AM
3		5/20/2023 5:29 PM
4		5/13/2023 10:32 AM
5		5/11/2023 4:17 PM
6		5/11/2023 11:26 AM
7		5/11/2023 1:15 AM
8		5/11/2023 12:28 AM
9		5/10/2023 6:23 PM
10		5/10/2023 5:28 PM
11		8/30/2022 10:46 AM
12		8/25/2022 5:48 PM
13		8/22/2022 10:39 AM
14		8/22/2022 10:33 AM
15		7/29/2022 9:51 AM
16		7/21/2022 1:12 PM
17		7/19/2022 9:51 AM
18		7/15/2022 4:48 PM
19		7/15/2022 2:18 PM

Note: Personal email addresses were omitted from these results for privacy.

Appendix C: Meeting Documentation

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Public Announcements



NUECES COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN PLANNING TEAM KICKOFF MEETING INVITE

Nueces County is holding a Kickoff meeting as part of the development of a FEMA Multi-Jurisdictional Hazard Mitigation Plan. The goal of the Plan is to minimize or eliminate the long-term risk to human life and property from known hazards. Upon FEMA approval of the Plan, Nueces County along with the other jurisdictions involved in the plan (Port of Corpus Christi Authority, Corpus Christi, Agua Dulce, Banquete, Bishop, Petronila, Port Aransas, and Robstown) will be eligible for certain FEMA Hazard Mitigation Assistance grant funds to implement cost-effective mitigation projects in their local jurisdiction. LAN Engineering, project consultant, will be facilitating the meeting.

You are being invited to participate as a member of the planning team that will lead this effort. Please make every effort to attend this important meeting. Strong leadership from planning team members throughout the planning process is critical; therefore, key department personnel from Nueces County and stakeholders are required to attend workshops, assess hazard risk, create mitigation strategies, involve the public, and adopt the local plan.

A public meeting to provide outreach and an overview of the project to the public will be held virtually on June 24, 2022.

We hope you can join us:

DATE: June 24, 2022
TIME: 10:30 am -11:30 a.m.
LOCATION: Virtual

If you have questions, please contact:

Melinda Malone by phone at (361) 888-0746 or by email at Melinda.malone@nuecesco.com



CURRENT NEWS

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Hazard Multi-Jurisdictional Mitigation Plan Public Meeting

Post Date: 07/08/2022 11:40 AM

FOR IMMEDIATE RELEASE

June 30, 2022

Hazard Multi-Jurisdictional Mitigation Plan Public Meeting
Date: July 15th, 2022
Location: Nueces County Courthouse First Floor Jury Room
Time: 2:00 p.m. - 4:00 p.m.

Nueces County, TX - Nueces County will hold a public meeting on July 15th to gather public input for a FEMA Hazard Multi-Jurisdictional Mitigation Plan. The public, area businesses and organizations located throughout Nueces County and surrounding jurisdictions are invited and encouraged to attend. You can also join a Teams meeting to participate at [Click here to join the meeting](#) or call in with the following credentials:

±1 402-541-7284, 728326660#
Phone Conference ID: 728 326 660#

Under the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires communities or agencies to develop a mitigation plan to minimize or eliminate the long-term risk to human life and property from known hazards. 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. Hazards that may pose risk and potentially result in disaster include drought, flood, hurricane, tornado, wildfire, and other high hazards.

With a FEMA-approved Plan, Nueces County including participating jurisdictions of the Corpus Christi, Agua Dulce, Banquete, Bishop, Driscoll, Petronila, Port Aransas, and Robstown will be eligible to apply for grant funding opportunities under the Hazard Mitigation Assistance Program (HMAMP) to fund critical projects such as backup generators, drainage projects, and hardening critical facilities to minimize future damage from natural disasters that affect the County's planning area.

The purpose of the public meeting is to provide a project overview from LAN, consultant to the project, and solicit information from citizens. Public input will help the Planning Team to identify and analyze potential hazards affecting residents and recommend possible actions to reduce their impact throughout the Nueces County planning area.

The planning process is as important as the plan itself. Any successful planning activity, such as developing a comprehensive plan or local land use plan, involves a cross-section of stakeholders and the public to reach consensus on desired outcomes or to resolve a community problem. The result is a common set of community values and widespread support for directing financial, technical, and human resources to an agreed upon course of action, usually identified in a plan. The same is true for mitigation planning. An effective and open planning process helps ensure that citizens understand risks and vulnerability, and they can work with the jurisdiction to support policies, actions, and tools that over the long-term, will lead to a reduction in future losses. Leadership, staffing, and in-house knowledge may fluctuate over time. Therefore, the description of the planning process serves as a permanent record that explains how decisions were reached and who was involved.

Detailed information about the planning process can be obtained by contacting Laura Cassett, Project Manager, at 512-338-2770 or LMCasett@lan-inc.com

###

[Return to full list >>](#)



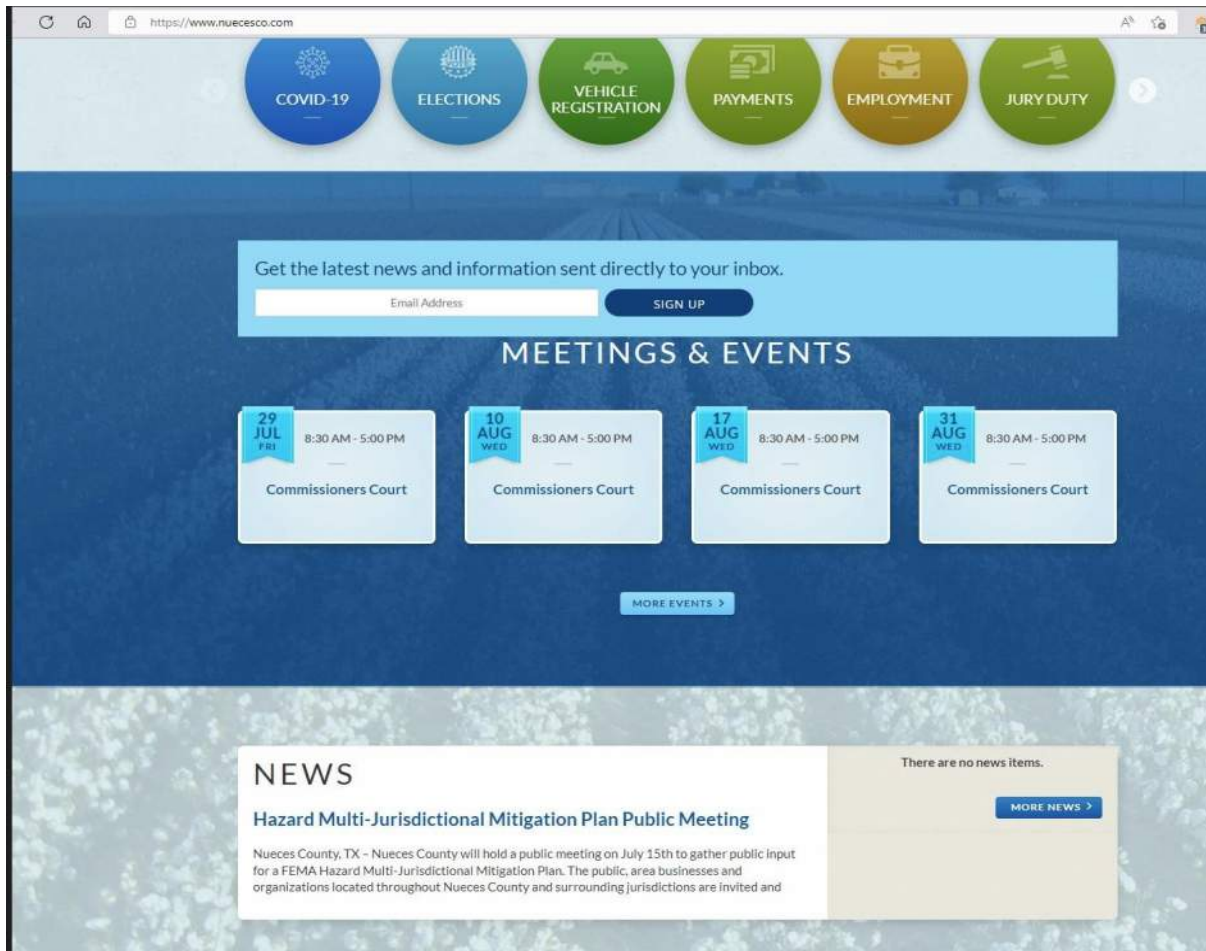
NEWS

Martin Luther King Jr. Birthday Holiday
1/11/2023 3:36:00 PM

Family Found for U.S. Marine Corps Veteran
1/11/2023 10:27:00 AM

Nueces County Game Room Regulations in Effect
1/4/2023 3:42:00 PM

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Nueces County Texas - Hazard Multi Jurisdictional Mitigation Plan Public Meeting 08 July 2022 (news)

Nueces County, state Texas (By Press Release office)

Jul 08, 2022 | 13 views

FOR IMMEDIATE RELEASE

June 30 , 2022

Hazard Multi - Jurisdictional Mitigation Plan Public Meeting

Date: July 15
th
, 2022

Location: Nueces County Courthouse First Floor Jury Room

Time: 2:00 p . m . - 4:00 p . m .

Nueces County , TX -
Nueces County
will hold a public meeting on
July 15
th

to gather public input for a FEMA Hazard Multi - Jurisdictional Mitigation Plan . The public , area businesses and organizations located throughout Nueces County and surrounding jurisdictions are invited and encouraged to attend . You can also join a Teams meeting to participate at

Click here to join the meeting
or call in with the following credentials:
+1 402 - 541 - 7284 , 728326660#

Phone Conference ID: 728 326 660#

Under the Disaster Mitigation Act of 2000 , the Federal Emergency Management Agency (FEMA) requires communities or agencies to develop a mitigation plan to minimize or eliminate the long - term risk to human life and property from known hazards . 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 . Hazards that may pose risk and potentially result in disaster include drought , flood , hurricane , tornado , wildfire , and other high hazards .

With a FEMA - approved Plan , Nueces County including participating jurisdictions of the Corpus Christi , Agua Dulce , Banquete , Bishop , Driscoll , Petronilla

MURRENT NEWS

Hazard Multi-Jurisdictional Mitigation Plan Public Meeting

Post Date: 07/08/2022 11:40 AM

FOR IMMEDIATE RELEASE

June 30, 2022

Hazard Multi-Jurisdictional Mitigation Plan Public Meeting

Date: July 15th, 2022

Location: Nueces County Courthouse First Floor Jury Room

Time: 2:00 p.m. - 4:00 p.m.

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+1402-541-7284, 728326660#

Phone Conference ID: 728 326 660#

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technical, and human resources to an agreed upon course of action, usually identified in a plan. The same is true for mitigation planning. An effective and open planning process helps ensure that citizens understand risks and vulnerability, and they can work with the jurisdiction to support policies, actions, and tools that over the long-term, will lead to a reduction in future losses. Leadership, staffing, and in-house knowledge may fluctuate over time. Therefore, the description of the planning process serves as a permanent record that explains how decisions were reached and who was involved.

Detailed information about the planning process can be obtained by contacting Laura Casset, Project Manager, at 512-338-2770 or LMCasett@lan-inc.com

###

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Hazard Mitigation Acton Plan Meeting August 30, 2022 We need your input

Post Date: 08/15/2022 3:30 AM

Hazard Mitigation Action Plan Meeting

Date: August 30th, 2022

Location: Nueces County Courthouse Fourth Floor Courtroom

Time: 10:30 a.m. - 11:00 a.m.

Nueces County will hold a public meeting August 30, 2022, to gather input for the FEMA Hazard Mitigation Plan.

The meeting will be from 10:30 am to 11:00 am and will be held virtually via Team Meeting. The public, area businesses, and organizations located throughout Nueces County and the planning area are invited and encouraged to attend.

With the FEMA-approved Plan, Nueces County, along with participating jurisdictions in the plan, Agua Dulce, Bishop, Banquete ISD, Corpus Christi, Petronila, Port Aransas, Robstown, Driscoll, Nueces County Drainage District No. 2, Nueces County Drainage District No. 3, Nueces County Water Control & Improvement District No. 4, Nueces County Water Control & Improvement District No. 5 will be eligible to apply for grant funding opportunities under the Hazard Mitigation Assistance (HMA) program. The grants could fund critical projects such as backup generators, drainage projects, and hardening of critical facilities to minimize future damage from natural disasters that affect the County's planning area.

The purpose of the public meeting it to provide an update from LAN, consultant to the project, and solicit information from citizens. Public input will help the Planning Team to identify potential projects for reducing hazard impact throughout Nueces County and the multi-jurisdictional planning area.

See [attached flyer](#) for QR Code for Survey

For virtual attendees:

[Click here to join the meeting](#)

Meeting ID: 217 615 235 118

Passcode: q7BxNQ

or

Call in (audio only): [+1 402-541-7284, 728326660#](#)

Phone Conference ID: 272 757 144#

Virtual meeting is on Microsoft Teams



**Nueces County
Hazard Mitigation Action Plan
August 30, 2022
10:30 am - 11:00 am**

**We need your input, if you suffer from
the following natural hazards:**

- **Hurricanes/Tropical Storms**
- **Extreme Heat**
- **Flooding**
- **Severe Winter Storms**
- **Droughts**
- **Coastal Erosion**
- **Wildfires**

For In Person Attendees:

Location: Nueces County Courthouse
- 4th Floor Court Room

QR Code for Survey



For Virtual Attendees:

[Click here to join the meeting](#)

Meeting ID: 217 615 235 118

Passcode: q7BxNQ

or

Or call in (audio only):

+1 402-541-7284

Phone Conference ID:

272 757 144#

*****Virtual Meeting is on Microsoft Teams*****

NEWS RELEASE

Nueces County, Texas
901 Leopard St.
Corpus Christi, Texas 78401



FOR MORE INFORMATION, CONTACT:

Tyler Thorsen
Nueces County, PIO
361-888-0382

FOR IMMEDIATE RELEASE - January 17, 2023

Nueces County Hazardous Mitigation Action Plan Virtual Meeting

January 31, 2023, 10:00 a.m. – 10:30 a.m.

Nueces County, TX – We need your input regarding the **Hazardous Mitigation Action Plan** with the addition of these new jurisdictions to the plan - NCDD2 - Nueces County Drainage District 2, NCWCID #3 – Nueces County Water Control & Improvement District #3, and NCWCID #4 – Nueces County Water Control & Improvement District #4.

If you have experienced or suffered through any of the following natural hazards:

- Hurricanes/Tropical Storms
- Extreme Heat
- Flooding
- Severe Winter Storms
- Drought
- Wildfires
- Coastal Erosion

Join us for this ** Virtual Meeting on Microsoft Teams *******

On January 31, 2023 – 10:00 a.m. – 10:30 a.m.

Sign in on your computer, room device or mobile app [Click here to join the meeting](#)

Meeting ID: 246 098 732 232

Passcode: ceLGD6

Download Teams | Join on the web

Or call in (audio only)

+1 402-541-7284,,334947896# United States, Omaha Phone Conference ID: 334 947 896#

###



Hazard Mitigation Action Plan Meeting

Date: 01/31/2023 10:00 AM - 10:30 AM

Introduction:

We need your input....

[Add to my Calendar](#)

Nueces County
Hazard Mitigation Action Plan

January 31, 2023
10:00 am - 10:30 am

Addition of three Jurisdictions: NCDD2, NCWCID #3, and NCWCID #4
(Nueces County Drainage District 2, Nueces County Water Control and Improvement District #3, and Nueces County Water Control and Improvement District #4)

We need your input if you suffer from the following natural hazards:

- Hurricanes/Tropical Storms
- Flooding
- Droughts
- Wildfires
- Extreme Heat
- Severe Winter Storms
- Coastal Erosion

*** Virtual Meeting is on Microsoft Teams ***

Join on your computer, mobile app, or room device

[Click here to join the meeting](#)

Meeting ID: 246 098 732 232
Passcode: ceLGD6

Download Teams | Join on the web
Or call in (audio only)

+1 402-541-7284,,334947896# United States, Omaha
Phone Conference ID: 334 947 896#

Other: [HMAP Public Meeting Flyer](#)

[Return to full list >>](#)



Nueces County Hazard Mitigation Action Plan January 31, 2023 10:00 am - 10:30 am

Addition of three Jurisdictions: NCDD2, NCWCID #3, & NCWCID #4

**We need your input, if you suffer from
the following natural hazards:**

- Hurricanes/Tropical Storms
- Flooding
- Droughts
- Wildfires
- Extreme Heat
- Severe Winter Storms
- Coastal Erosion

*****Virtual Meeting is on Microsoft Teams*****

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 246 098 732 232

Passcode: ceLGD6

Download Teams | Join on the web

Or call in (audio only)

+1 402-541-7284,,334947896# United States, Omaha

Phone Conference ID: 334 947 896#


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- PAYMENTS
- EMPLOYMENT
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MEETINGS & EVENTS

<p>18 JAN WED</p> <p>9:00 AM - 5:00 PM</p> <p>Commissioners Court</p>	<p>31 JAN TUE</p> <p>10:00 AM - 10:30 AM</p> <p>Hazard Mitigation Action Plan Meeting</p>	<p>08 FEB WED</p> <p>9:00 AM - 4:00 PM</p> <p>Commissioners Court</p>	<p>20 FEB MON</p> <p>All Day</p> <p>Presidents' Day</p>
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MEETINGS & EVENTS

24 MAY WED
9:00 AM - 5:00 PM
—
Commissioners Court

29 MAY MON
All Day
—
Memorial Day

07 JUN WED
9:00 AM - 5:00 PM
—
Commissioners Court

19 JUN MON
All Day
—
Juneteenth

[MORE EVENTS >](#)

NEWS

Hazard Mitigation Plan Meeting

Nueces county will hold a public meeting on Thursday, May 25th to gather public input for updating their Multijurisdictional Hazard Mitigation Action Plan (HMAP). This meeting will be held virtually via Microsoft Teams at 10:00 a.m.

There are no news items.

[MORE NEWS >](#)



FOR IMMEDIATE RELEASE

Hazard Mitigation Plan Meeting on May 25, 2023

Nueces county will hold a public meeting on Thursday, May 25th to gather public input for updating their Multijurisdictional Hazard Mitigation Action Plan (HMAP). This meeting will be held virtually via Microsoft Teams at 10:00 a.m.

The public, area businesses, and organizations located throughout Nueces County and the planning area are invited and encouraged to attend.

The purpose of the public meeting is to provide an update from LAN, consultant to the project, and solicit information from citizens. Public input will help the project team to analyze potential hazards affecting residents and recommend possible actions to reduce their impact. Hazards included are high winds, tornado, winter storm, hail, flood, drought, wildfire, dam failure, extreme heat, lightning, and expansive soils.

The goal of the Hazard Mitigation Action Plan is to minimize or eliminate the long-term risk to human life and property from known hazards by identifying and implementing cost-effective mitigation actions. Mitigation is defined by the Federal Emergency Management Agency (FEMA) as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.

With the FEMA-approved Plan, Nueces County, along with participating jurisdictions in the plan, Agua Dulce, Bishop, Banquete ISD, Corpus Christi, Petronila, Port Aransas, Robstown, Driscoll, Nueces County Drainage District No. 2, Nueces County Water Control & Improvement District No. 3, and Nueces County Water Control & Improvement District No. 4 will be eligible to apply for grant funding opportunities under the Hazard Mitigation Assistance (HMA) program. The grants could fund critical projects such as backup generators, drainage projects, and hardening of critical facilities to minimize future damage from natural disasters that affect the County's planning area.

A public participation survey is available at: <https://www.surveymonkey.com/r/NuecesCountyHMPSurvey>

Virtual Meeting Link:

Meeting ID: 263 492 247 294
Passcode: FVrzik

Call in (Audio Only):
+1 402-541-7284, 687 485 133#
Phone Conference ID: 687 485 133#

QR Code



NEWS RELEASE

Nueces County, Texas
901 Leopard St.
Corpus Christi, Texas 78401



FOR MORE INFORMATION, CONTACT:

Tyler Thorsen
Nueces County, PIO
361-888-0382

May 10, 2023

FOR IMMEDIATE RELEASE

Hazard Mitigation Plan Public Meeting on May 25, 2023

CORPUS CHRISTI, TX – Nueces County will hold a public meeting on Thursday, May 25th to gather public input for updating their Multi-jurisdictional Hazard Mitigation Action Plan (HMAP). This meeting will be held virtually via Microsoft Teams at 10:00 a.m.

The public, area businesses, and organizations located throughout Nueces County and the planning area are invited and encouraged to attend.

The purpose of the public meeting is to provide an update from LAN, consultant to the project, and solicit information from citizens. Public input will help the project team to analyze potential hazards affecting residents and recommend possible actions to reduce their impact. Hazards included are high winds, tornado, winter storm, hail, flood, drought, wildfire, dam failure, extreme heat, lightning, and expansive soils.

The goal of the Hazard Mitigation Action Plan is to minimize or eliminate the long-term risk to human life and property from known hazards by identifying and implementing cost-effective mitigation actions. Mitigation is defined by the Federal Emergency Management Agency (FEMA) as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.

With the FEMA-approved Plan, Nueces County, along with participating jurisdictions in the plan, Agua Dulce, Bishop, Banquete ISD, Corpus Christi, Petronila, Port Aransas, Robstown, Driscoll, Nueces County Drainage District No. 2, Nueces County Water Control & Improvement District No. 3, and Nueces County Water Control & Improvement District No. 4 will be eligible to apply for grant funding opportunities under the Hazard Mitigation Assistance (HMA) program. The grants could fund critical projects such as backup generators, drainage projects, and hardening of critical facilities to minimize future damage from natural disasters that affect the County's planning area.

A public participation survey is available at:
<https://www.surveymonkey.com/r/NuecesCountyHMPSurvey>

Virtual Meeting Link:

Meeting ID: 263 492 247 294 Hazard Mitigation Plan Public Meeting on May 25, 2023 Passcode:
FVrzik
call in (Audio Only):
+1 402-541-7284, 687 485 133# Phone Conference ID: 687 485 133#

QR Code:



Kickoff Public Meeting #1 Presentation, June 15, 2022

Nueces County Hazard Mitigation Plan
7/15/2022

Agenda

1. Purpose
2. Planning Process
3. Mitigation Strategy
4. Adoption/Implementation

Purpose

- Prevent or reduce loss of life and property
- Improves resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Relief
 - 75% cost share
- Building Resilient Infrastructure and Communities (BRIC)
 - Annual
 - 75% cost share
- Flood Mitigation Assistance
 - Annual
 - 75% cost share
 - Insured Structures

Planning Process

Planning Process

Planning Process

Define Planning Area

Hazard Mitigation Plan Participants

1. Nueces County
2. City of Corpus Christi
3. City of Aqua Dulce
4. Bangorville ISD
5. City of Bishop
6. City of Brown
7. City of Melissa
8. City of Port Aransas
9. City of Robstown
10. Nueces County Drainage District No.2
11. Nueces County Drainage District No.3
12. Nueces County Water Control and Improvement District No. 4
13. Nueces County Water Control and Improvement District No. 5

Public Input

- Local knowledge
- Provide information to:
 - Develop better understanding of natural hazards
 - Prioritize hazard risk
 - Develop mitigation strategy
 - Provide feedback on plan

Public Input

- Email: TMMakino@lan-inc.com
- www.surveymonkey.com/t/NuecesCountyHMPSurvey

Identify Natural Hazards

- Floods
- Hurricanes/Tropical Storms
- Wildfires
- Tornado
- Drought
- Coastal Erosion
- Dam/Levee Failure
- Earthquake
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windstorms
- Lightning

Kickoff Public Meeting #1 Presentation, June 15, 2022 (continued)



Kickoff Public Meeting #1 Attendance, June 15, 2022

Participant	Community
Kathy Ard-Blattner	Nueces County
Patti Hobbs	City of Robstown
Billy Delgado	City of Corpus Christi
Christopher Boyce	Nueces County
Cynthia Contreras	City of Bishop
Danielle Hale	Port of Corpus Christi Authority
Tak Makino	LAN
Laura Casset	LAN
Susan Roth	Nueces County
Travis Pruski	Nueces River Authority
Melinda Malone	Nueces County
Rick Adams	Port Aransas
Gabriel Hinojosa	Corpus Christi
Kathleen Chapa	Corpus Christi

Kickoff Planning Team Meeting #1 Presentation, June 24, 2022

Slide 1: Nueces County Multi-Jurisdictional Hazard Mitigation Plan
 Kickoff Meeting – June 24, 2022

Slide 2: Hazard Mitigation Plan Participants
 1. Nueces County
 2. Port of Corpus Christi Authority
 3. City of Corpus Christi
 4. City of Agua Dulce
 5. City of Edinburg
 6. City of San Antonio
 7. City of Palacios
 8. City of Port Aransas
 9. City of Robstown

Slide 3: Agenda
 1. Purpose
 2. Planning Process / Roles & Responsibilities
 3. Mitigation Strategy
 4. Adoption/Implementation

Slide 4: Purpose
 → Prevent or reduce loss of life and property
 → Improves resilience
 → Identify cost-effective mitigation measures
 → Build stakeholder/public partnerships
 → Leverage FEMA funding

Slide 5: FEMA Hazard Mitigation Assistance
 → Hazard Mitigation Grant Program (HMGP)
 → Disaster Relief
 → FEMA cost share
 → Building Resilient Infrastructure and Communities (BRIC)
 → ARRA
 → FEMA cost share
 → Private Mitigation Assistance
 → ARRA
 → FEMA cost share
 → Insured Structures

Slide 6: Planning Process
 Define Planning Area → Define Planning Team → Capability Assessment → Identify Natural Hazards → Risk Assessment → Mitigation Strategy → Adoption and Implementation

Slide 7: Planning Process
 Define Planning Area → Define Planning Team → Capability Assessment → Identify Natural Hazards → Risk Assessment → Mitigation Strategy → Adoption and Implementation

Slide 8: Define Planning Area
 Map showing the geographic boundaries of the planning area in Nueces County.

Slide 9: Define Planning Team
 → Key Nueces County and City/Authority Staff
 → Major Stakeholders
 → Agencies involved in hazard mitigation
 → Agencies with authority to regulate development
 → Neighboring communities

Slide 10: Planning Team Responsibilities
 → Participation in planning process
 → Provide historical data
 → Provide GIS data
 → Promote public engagement
 → Develop mitigation actions
 → Review draft plan and adopt final plan
 → Ongoing plan maintenance

Slide 11: Capability Assessment
 → Existing authority, plans, programs
 → Opportunities for future integration
 → Identify existing mitigation efforts
DUE: JULY 1

Slide 12: Identify Natural Hazards
 → Floods
 → Hurricanes/Tropical Storms
 → Wildfires
 → Tornadoes
 → Drought
 → Coastal Erosion
 → Ocean Level Rise
 → Earthquake
 → Explosive Boils
 → Extreme Heat
 → Hailstorms
 → Land Subsidence
 → Extreme Winter Storms
 → Windstorms
 → Lightning

Slide 13: Risk Assessment
 → Identify natural hazards
 → Previous occurrence
 → Probability of future occurrence
 → Identify vulnerable assets
 → Identify impacts to assets

Slide 14: Mitigation Strategy
 → Mitigation Actions
 → Fee per hazard
 → Types
 → Local Plans and Regulations
 → Structural and Infrastructure
 → Natural System Protection
 → Education and Awareness

Slide 15: Mitigation Strategy
 → Incorporated into other planning mechanisms
 → Department/Offices responsible for mitigation actions
 → Ongoing Maintenance
 → Review annually
 → Add actions if desired

Slide 16: Adoption and Implementation
 → Adopted by Court/Council
 → Following TDEM, FEMA review
 → Planning Team to review mitigation strategy annually
 → Update plan every five years

Slide 17: Questions

Kickoff Planning Team Meeting #1 Attendance, June 24, 2022

		Kickoff meeting Planning Team Sign-In Sheet			
Subject:	Nueces County Hazard Mitigation Planning Team	Date: Tuesday, June 24, 2022	Time: 10:30-11:30 am		
Hosted by:	Nueces County, Texas	Location: Virtual			
Agency	Name	Title	Email	Phone	
1 Bishop (P)	Tem Miller	Mayor	Tem.miller@cityofbishoptx.com	(361) 584-2567	
2 Bishop (C)	Kabrina Lawrence	Mayor Pro Tem	Bishopcitysecretary@corpus.twcbc.com	(361) 584-2567	
3 Banquete (P)	Stacey Johnson	Community-no Mayor	sjohnson@banqueteisd.net	(361)387-2551	
4 Agua Dulce (P)	John Howard	Mayor	jhoward125@yahoo.com	O: 361-701-0007 C: 361-998-2532	
5 Agua Dulce (A/CC)	Ninfa Acuna	City Secretary	City @aguadulcetexas.com	(361) 998-2532	
6 Petronilla (P)	Todd Wright	Mayor	cityofpetronilla@outlook.com	O: 361-877-1809 C: 361-688-5026	
7 Driscoll (P)	Mark Gonzalez	Mayor	mgonzalez.driscoll@gmail.com	O: 361-726-3516 C: 361-387-3011	
8 Driscoll (A/CC)	John Valls	Consultant Administrator		(361) 387-3011	
9 Robstown (P)	Javier Zapata	Fire Chief/EMC	jzapata@cityofrobstown.com	(361) 387-2522	
10 Robstown (P)	Gilbert Gomez	Mayor	ggomez@cityofrobstown.com	361-438-4104	
11 Port Aransas (P)	Rick Adams	EMC	radams@cityofportaransas.org	(361) 749-4111	
12 Port Authority (P)	Danielle Hale	Emergency Management	dhale@pocca.com	361-885-6612	
13 Port Authority (P)	Christopher Boyce	Sr. Emergency Mgmt Specialist	cboyce@pocca.com	361.885.6164	
14 Corpus Christi (CC)	Billy Delgado	EMC	BillyD@cctexas.com	(361) 826-4636	
15 Corpus Christi (P)	Yvette Dodd	Floodplain Manager	yvette@cctexas.com	361-826-3840	
16 Aranas Pass (P)	Ram Gomez	Mayor	rgomez@aptx.gov	(361) 758-5301	
17 LEPC	Joanne Salge	Administrator	joannes@cctexas.com	361-826-3960	
18 LEPC	Rosie Rodriguez	Treasurer	rosiero@cctexas.com	361-826-3938	
19 Nueces co.	Travis Pruski	Nueces County River Authority	tpruski@nueces-ra.org		

Kickoff Planning Team Meeting #1 Attendance, June 24, 2023 (continued)

20	CBCOG	Emily Martinez	Director of Regional Economic Development	emily@coastalbendcog.org	O:361-883-5743 C: 361-815-5444
21	Fire Department/Fire Chief Assoc.	Michael Clack	Fire Chief	chief@annavilefire.com	(361) 241-1372
22	STWA	Nigel Gomez	O&M Supervisor	ngomez@stwa.org	O:361-692-0337 C:361-675-0640
23	Nueces Co. Drainage Dist.#2	David "Petey" Martinez	Vice-Chairman	dmartinez@ncdd2.com	O: 361-387-4015 C: 361-215-5692
24	Nueces Co. Drainage Dist.#3	Marcus Alaniz	District Manager	malaniz@nueceswater3.com	(361) 387-4549
25	City Management/ County Administration	Aidee Hernandez	Commissioners Court Manager	aidee.hernandez@nuecesco.com	361-888-0375
26	EMC	Louie Ray	Nueces Co EMC	louie.ray@nuecesco.com	361-888-0513
27	GIS/Public Works/SWPPP	Juan Pimentel	Public Works Director	juan.pimentel@nuecesco.com	361-888-0394
28	Parks /Recreation	Scott Cross	Coastal Parks Director	scott.cross@nuecesco.com	361.949-8122
29	Parks/Recreation/Transportation	Edward Herrera	Community Services Director	edward.herrera@nuecesco.com	361.414.6565
30	City/County Attorney's Office	Jenny Dorsey	County Attorney	countyattorney@nuecesco.com	361-888-0391
31	Police/Sheriff	J.C.Hooper	Sheriff	john.hooper@nuecesco.com	361-887-2222
32	Tax Assessor	Kevin Kieschnick	Tax Assessor-Collector	kevin.kieschnick@nuecesco.com	361-888-0307
33	RTA	Gordon Robinson	Director of Planning	grobenson@ccrta.org	
34	Utility company		NEC		361-767-3865
35	Utility company		AEP		877-373-4858
36	State Emergency Mgmt Agency	Garry Barney	TDEM District Coordinator	garry.barney@tdem.texas.gov	361-438-5388
37	State Dam Safety	Zack Durham			
38	State Fire and Forestry Agency		Texas A&M Wildfire		
49	National Weather Service	Melissa Huffman	Warning Coordination Meteorologist	melissa.huffman@noaa.gov	

Kickoff Public Meeting #2 Presentation, June 24, 2022

1. Nueces County Multi-Jurisdictional Hazard Mitigation Plan
Kickoff Meeting – June 24, 2022

2. Hazard Mitigation Plan Participants

1. Nueces County
2. Port of Corpus Christi Authority
3. City of Corpus Christi
4. City of Alton
5. City of Edinburg
6. City of Floresville
7. City of Pearsburg
8. City of Port Aransas
9. City of Rockport

3. Agenda

1. Purpose
2. Planning Process / Roles & Responsibilities
3. Mitigation Strategy
4. Adoption/Implementation

4. Purpose

- Prevent or reduce loss of life and property
- Improve resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

5. FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Relief
 - TDEM assistance
 - Building Nonresidential Structures and Contents (BNSC)
 - Flood
 - TDEM cost share
- Hazard Mitigation Assistance
 - Flood
 - TDEM cost share
 - Flood Structures

6. Planning Process

```

    graph LR
      A[Define Planning Area] --> B[Define Planning Team]
      B --> C[Capability Assessment]
      C --> D[Identify Natural Hazards]
      D --> E[Identify Vulnerable Assets]
      E --> F[Risk Assessment]
      F --> G[Mitigation Strategy]
      G --> H[Adoption and Implementation]
      I[Ongoing Plan Maintenance] --> F
      J[Review and Update] --> G
      K[Capacity Assessment] --> C
      L[Identify Natural Hazards] --> D
      M[Identify Vulnerable Assets] --> E
      N[Review and Update] --> G
      O[Adoption and Implementation] --> H
    
```

7. Planning Process

```

    graph LR
      A[Define Planning Area] --> B[Define Planning Team]
      B --> C[Capability Assessment]
      C --> D[Identify Natural Hazards]
      D --> E[Identify Vulnerable Assets]
      E --> F[Risk Assessment]
      F --> G[Mitigation Strategy]
      G --> H[Adoption and Implementation]
      I[Ongoing Plan Maintenance] --> F
      J[Review and Update] --> G
      K[Capacity Assessment] --> C
      L[Identify Natural Hazards] --> D
      M[Identify Vulnerable Assets] --> E
      N[Review and Update] --> G
      O[Adoption and Implementation] --> H
    
```

8. Define Planning Area

9. Define Planning Team

- Key Nueces County and City/Authority Staff
- Major Stakeholders
- Agencies involved in hazard mitigation
- Agencies with authority to regulate development
- Neighboring communities

10. Planning Team Responsibilities

- Participation in planning process
- Provide historical data
- Provide GIS data
- Promote public engagement
- Develop mitigation actions
- Review draft plan and adopt final plan
- Ongoing plan maintenance

11. Capability Assessment

DUE: JULY 1

Category	Item	Assessment	Notes
Flood	Existing authority, plans, programs		
	Opportunities for future integration		
	Identify existing mitigation efforts		
	Other		
Tropical Storms	Existing authority, plans, programs		
	Opportunities for future integration		
	Identify existing mitigation efforts		
	Other		
Coastal Erosion	Existing authority, plans, programs		
	Opportunities for future integration		
	Identify existing mitigation efforts		
	Other		
Wildfires	Existing authority, plans, programs		
	Opportunities for future integration		
	Identify existing mitigation efforts		
	Other		
Explosive Events	Existing authority, plans, programs		
	Opportunities for future integration		
	Identify existing mitigation efforts		
	Other		

12. Identify Natural Hazards

- Floods
- Hurricanes/Tropical Storms
- Wildfires
- Tornado
- Drought
- Coastal Erosion
- Ocean Level Rise
- Earthquake
- Explosive Events
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Wildfires
- Lightning

13. Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

14. Mitigation Strategy

- Mitigation Actions
 - Fee per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

15. Mitigation Strategy

- Incorporated into other planning mechanisms
- Department/MSO responsible for mitigation actions
- Ongoing Maintenance
 - Review annually
 - Add actions if desired

16. Adoption and Implementation

- Adopted by Court/Council
 - Following TDEM, FEMA review
- Planning Teams to review mitigation strategy annually
- Update plan every five years

17. Questions

Kickoff Public Meeting #2 Attendance, June 24, 2022

Participant	Community
Kathy Ard-Blattner	Nueces County
Patti Hobbs	City of Robstown
Salvador Ochoa	City of Bishop
Billy Delgado	City of Corpus Christi
Christopher Boyce	Nueces County
Cynthia Contreras	City of Bishop
Danielle Hale	Port of Corpus Christi Authority
Tak Makino	LAN
Laura Casset	LAN
Susan Roth	Nueces County
Travis Pruski	Nueces River Authority
Melinda Malone	Nueces County

Kickoff Planning Team Meeting #2 Invitation, August 3, 2022



NUECES COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN - PLANNING TEAM MEETING INVITE

Nueces County is holding an additional kickoff meeting as part of the development of a FEMA Multi-Jurisdictional Hazard Mitigation Plan. The goal of the Plan is to minimize or eliminate the long-term risk to human life and property from known hazards. Upon FEMA approval of the Plan, Nueces County along with the other jurisdictions involved in the plan (Agua Dulce, Bishop, Banquette ISD, Corpus Christi, Petronila, Port Aransas, Robstown, City of Driscoll, Nueces County Drainage District 2, Nueces County Drainage District 3, Nueces County Water District 4, Nueces County Water District No. 5) will be eligible for certain FEMA Hazard Mitigation Assistance grant funds to implement cost-effective mitigation projects in their local jurisdiction. LAN Engineering, project consultant, will be facilitating the meeting.

You are being invited to participate as a member of the planning team that will lead this effort. Please make every effort to attend this important meeting. Strong leadership from planning team members throughout the planning process is critical; therefore, key department personnel from Nueces County and stakeholders are required to attend workshops, assess hazard risk, create mitigation strategies, involve the public, and adopt the local plan.

One planning team meeting has already been held in June. The August 3rd meeting is being held to recap information for those that were not able to attend the original planning team meeting. We encourage your participation with the following two items **before the August 3rd meeting**:

1. Take the Nueces County public survey

here: <https://www.surveymonkey.com/r/NuecesCountyHMPSurvey>

2. Fill out the Capability Assessment Form (attached) for your

jurisdiction. Completed assessment forms can be uploaded to the One Drive

folder link here. >>> [Nueces County HMP - One Drive Folder](#)

We hope you can join us for the kickoff meeting:

DATE: August 3, 2022

TIME: 3:30 pm -4:30 pm

LOCATION: Virtual Teams Meeting [Click here to join the meeting](#)

Meeting ID: 237 586 412 303

Passcode: [hNevCJ](#)

Or call in (audio only)

+1 402-541-7284, 281930707# United States, Omaha

Phone Conference ID: 281 930 707#

Kickoff Planning Team Meeting #2 Presentation, August 3, 2022



Nueces County Multi-Jurisdictional Hazard Mitigation Plan
Kickoff Meeting – August 3, 2022

Hazard Mitigation Plan Participants

- Nueces County
- Port of Corpus Christi Authority
- City of Corpus Christi
- City of Agua Dulce
- Banquete ISD
- City of Bishop
- City of Pecosita
- City of Port Aransas
- City of Robstown
- Nueces County Drainage District No.2
- Nueces County Drainage District No.3
- Nueces County Water Control & Improvement District No.4
- Nueces County Water Control & Improvement District No.5

Agenda

- Purpose
- Planning Process / Roles & Responsibilities
- Mitigation Strategy
- Adoption/Implementation

Purpose

- Prevent or reduce loss of life and property
- Improve resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Based
 - 75/25 cost share
- Building Resilient Infrastructure and Communities (BRIC)
 - Annual
 - 75/25 cost share
- Flood Mitigation Assistance
 - Annual
 - 75/25 cost share
 - Insured Structures



Planning Process



Planning Process



Define Planning Area



Define Planning Team

- Key Nueces County and City/District Staff
- Major Stakeholders
 - Agencies involved in hazard mitigation
 - Agencies with authority to regulate development
 - Neighboring communities

Planning Team Responsibilities

- Participation in planning process
- Provide historical data
- Provide GIS data
- Promote public engagement
- Develop mitigation actions
- Review draft plan and adopt final plan
- Ongoing plan maintenance

Capability Assessment

- Existing authority, plans, programs
- Opportunities for future integration
- Identify existing mitigation efforts

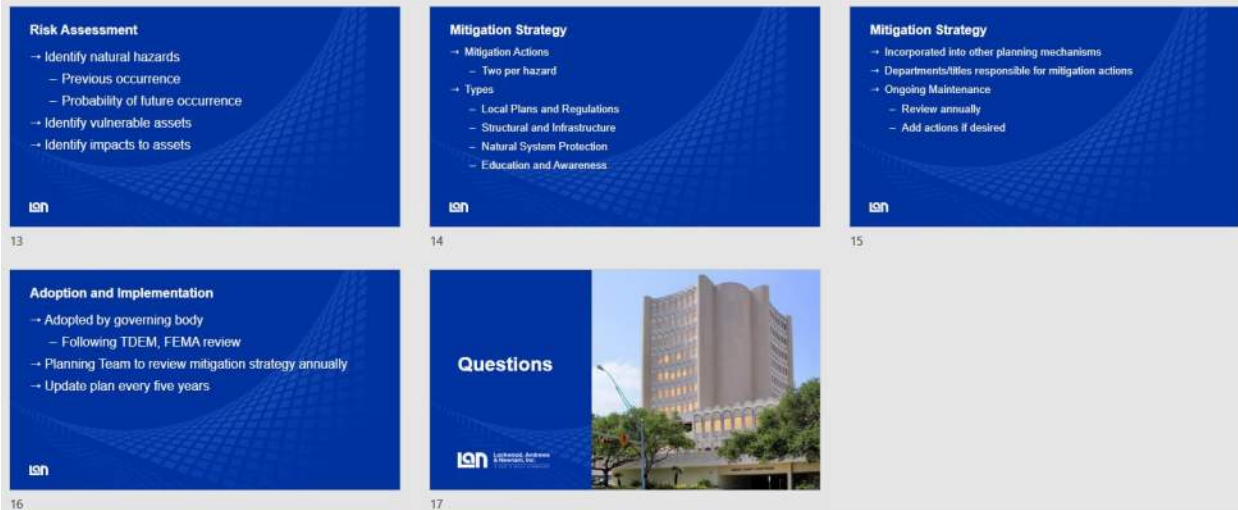
DUE: AUGUST 4



Identify Natural Hazards

- Floods
- Hurricanes/Tropical Storms
- Wildfire
- Tornado
- Drought
- Coastal Erosion
- Dam/Levee Failure
- Earthquake
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windstorms
- Lightning

Kickoff Planning Team Meeting #2 Presentation, August 3, 2022 (continued)



Kickoff Planning Team Meeting #2 Attendance, August 3, 2022

Participant	Community
Tak Makino	LAN
Javier Zapata	Robstown
Dalen Keith	LAN
Patti Hobbs	City of Robstown
Kathy Ard-Blattner	Nueces County
Laura Casset	LAN
Melinda Malone	Nueces County
Richard Chapman	Nueces County

Mitigation Strategy Public Meeting #1 Presentation, August 30, 2022

Nueces County Hazard Mitigation Plan
Public Meeting – 8/30/2022

Lockwood, Andrews & Newnam, Inc.

Laura M. Cassel, PE, CFM, CPESC
Senior Associate, Regional Stormwater Manager

Tak M. Halano, CFM
Flood Mitigation Manager

Agenda

1. Purpose
2. Public Survey
3. Planning Process
4. Mitigation Strategy
5. Adoption/Implementation

Purpose

- Prevent or reduce loss of life and property
- Improve resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Relief
 - 75% cost share
- Building Resilient Infrastructure and Communities (BRIC)
 - Annual
 - 75% cost share
- Flood Mitigation Assistance
 - Annual
 - 75% cost share
 - Insured Structures

Public Survey

<https://www.surveymonkey.com/r/NuecesCountyHMPSurvey>

Planning Process

```

    graph TD
      A[Define Planning Area] --> B[Identify Natural Hazards]
      B --> C[Conduct Risk Assessment]
      C --> D[Develop Mitigation Strategies]
      D --> E[Review and Adoption]
      E --> F[Ongoing Plan Maintenance]
      F --> A
    
```

Planning Area

Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

Identified Natural Hazards (15)

- Drought
- Floods
- Hurricanes/Tropical Storms
- Wildfire
- Tornado
- Coastal Erosion
- Dam/Levee Failure
- Earthquake
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storms
- Windstorms
- Lightning

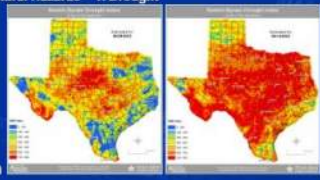
Mitigation Strategy

- Mitigation Actions
 - Two per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

Natural Hazards – 1. Drought

Mitigation Strategy Public Meeting #1 Presentation, August 30, 2022 (continued)


Natural Hazards – 1. Drought



ISN

13

Natural Hazards



— **Drought** - A period of time with below-average precipitation. Droughts can be classified as meteorological, hydrological, agricultural, or socioeconomic droughts.

Mitigation Action Examples

- Developing new or upgrading existing water delivery systems to eliminate breaks and leaks
- Developing a drought communication plan and early warning system to facilitate timely communication of relevant information to officials, decision makers, emergency managers, and the general public
- Developing agreements for secondary water sources that may be used during drought conditions
- Establishing a regular schedule to monitor and report conditions on at least a monthly basis

ISN

14


Natural Hazards – 2. Floods



ISN

15

Natural Hazards



— **Floods** - The accumulation of water within a body of water, which results in the overflow of water onto adjacent lands, usually floodplains. Flooding is the partial or complete inundation of otherwise normally dry land. Types of flooding include riverine, coastal, and shallow flooding.

Mitigation Action Examples

- Identify sites where stream and water-pipes need to be added or upgraded and coordinate installation requests
- Track and report high-water marks following a flood
- Develop projects
- Create a GIS map of National Flood Insurance Program public, private, and levees, including repetitive losses
- Promote additional means of or other to prevent residents from becoming trapped in a hurricane when staying in a flood

ISN

16

Natural Hazards – 3. Hurricanes/Tropical Storms



ISN

17

Natural Hazards



— **Hurricanes/Tropical Storms** - Intense tropical weather systems that produce damaging winds, generate storm surge, and heavy rainfall.

Mitigation Action Examples

- Developing and maintaining a database to track community vulnerability to severe wind
- Identifying entry points to assess how tropical squalllines and sea level rise
- Requiring upgrading of existing buildings that will house critical facilities
- Calculating hurricanes on the benefits of wind resistant such as schools and hurricane clips

ISN

18

Natural Hazards – 4. Wildfire



ISN

19

Natural Hazards



— **Wildfire** - uncontrolled fire almost exclusively fueled by natural vegetative fuels. Fuel may come in the form of grass, brush, or trees. Wildfire risk increases with high concentrations of connected fuels. Meteorological conditions such as high temperatures, low humidity, drought, and high wind can also increase wildfire risk.

Mitigation Action Examples

- Create a public education program on the risks and control the mitigation, with the assistance of the Texas Forest Service.
- Coordinate water and fuel conditions for response vehicles and hurricane systems to improve access
- Provide additional means of access into designated neighborhoods to prevent residents from becoming trapped in a hurricane when facing a wildfire
- Install a network of fire hydrants in stock ponds, creeks, and small lakes to increase the supply of water for fire protection

ISN

20


Natural Hazards – 5. Tornado



ISN

21

Natural Hazards



— **Tornado** - A violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes have wind speeds of 250 miles per hour or more. Damage paths can be in excess of one-mile-wide and 50 miles long.

Mitigation Action Examples

- Require "safe rooms" to be added when constructing new schools, daycares, retail homes and critical care facilities
- Build safe room shelters at mobile home parks so that all park residents can reach shelter in less than five minutes
- Develop an ordinance defining the standard for shelters of mobile homes
- Support or join shelters to existing essential facilities that offer tradeable protection

ISN

22


Natural Hazards – 6. Coastal Erosion



ISN

23

Natural Hazards



— **Coastal Erosion** - The loss or displacement of land, or the long-term removal of sediment and rocks along the coastline due to the action of waves, currents, tides, wind-driven water, waterborne ice, or other impacts of storms.

Mitigation Action Examples

- Developing and maintaining a database to track community vulnerability to erosion
- Locating critical and critical facilities outside of areas susceptible to erosion to decrease the risk of service disruption
- Designing and siting infrastructure to avoid erosion
- Preserving wetlands with proper bank stabilization, dune or grading techniques, planting vegetation on dunes, berms, salt-tolerant, or installing storm structures or protective beds

ISN

24

Natural Hazards – 7. Dam/Levee Failure

ISN

25

Natural Hazards

Dam/Levee Failure - A systematic failure of a dam structure resulting in the uncontrolled release of water, often resulting in floods that could exceed the 100-year floodplain boundaries. A levee is an embankment built to prevent overflow from a body of water. A levee failure is when a levee embankment fails, or is intentionally breached, causing the previously contained water to flood the land behind the levee.

Mitigation Action Examples

- An inspection, maintenance and enforcement program help to ensure sufficient structural integrity.
- Unnecessary or old and structurally compromised dams should be removed.
- Planning for both levees can include controlling emergency access roads as well as installing pump and float gate operations.
- Levees or levees need to be kept in good repair.

ISN

26

Natural Hazards – 8. Earthquake

ISN

27

Natural Hazards

Earthquake - The shaking of the surface of the Earth resulting from a sudden release of energy in the Earth's lithosphere that creates seismic waves. Earthquakes can range in intensity, from those that are so weak that they cannot be felt, to those violent enough to propel objects and people into the air and wreak destruction across entire cities.

Mitigation Action Examples

- Developing an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including gas utility lines and homes with illegal wall tiebacks.
- Using GIS to map hazard areas, at-risk structures, and associated hazards (e.g.,. Manufacture and distribute to assess high-risk areas.
- Requiring bonding of generators, elevators, and other vital equipment in hospitals.
- Installing shut-off valves and emergency connector boxes where water mains cross fault lines.

ISN

28

Natural Hazards – 9. Expansive Soil

ISN

29

Natural Hazards

Expansive Soil - Expansive soils have their characteristics to the presence of swelling clay minerals. As they get wet, the clay minerals absorb water molecules and expand; conversely, as they dry they shrink, leaving larger voids in the soil.

Mitigation Action Examples

- Conduct pre-development inspection for potential landslides/expansive soil threats.
- Using steel reinforcing bars to post-tension a concrete slab on grade.
- Expansive substrates can be removed and replaced with non-expansive material.
- Reinforce slabs and footings. Smaller slabs can be strengthened with wire mesh in the concrete.

ISN

30

Natural Hazards – 10. Extreme Heat

ISN

31

Natural Hazards

Extreme Heat - The condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. If extreme heat conditions persist, it may be considered a heat wave.

Mitigation Action Examples

- Increasing tree plantings around buildings to shade parking lots and along public rights-of-way.
- Encouraging citizens reporting the dangers of extreme heat and the steps they can take to protect themselves when extreme temperatures occur.
- Using heat resistant materials that reflect sunlight and heat away from a building.
- Encouraging installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air.

ISN

32

Natural Hazards – 11. Hailstorm

ISN

33

Natural Hazards

Hailstorm - A form of precipitation that occurs when updrafts in thunderstorms carry raindrops covered with extremely cold air in the atmosphere where they freeze into ice. Nearly all severe thunderstorms produce hail aloft, though it may melt before reaching the ground.

Mitigation Action Examples

- Locate tornado safe rooms inside or directly adjacent to houses to prevent hail-induced injuries that may occur when taking shelter during a severe thunderstorm.
- Consider hail guards for HVAC equipment, particularly in hail-prone areas.
- Teaching school children about the dangers of hail and how to take safety precautions.
- Consider adding your fleet vehicles in more than one location to spread risk and explore the possibility of protected coverages or indoor parking.

ISN

34

Natural Hazards – 12. Land Subsidence

ISN

35

Natural Hazards

Land Subsidence - Occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks fall in on each other.

Mitigation Action Examples

- Prohibiting development in areas that have been identified as at-risk to subsidence.
- Monitoring areas at risk to subsidence by reviewing season of changes in groundwater levels.
- Acquire and demolish or relocate buildings and infrastructure in high-risk areas.
- Offering GIS hazard mapping online for residents and design professionals.

ISN

36

Mitigation Strategy Public Meeting #1 Presentation, August 30, 2022 (continued)



37

Natural Hazards

→ **Extreme Winter Storm** - A severe winter storm event is defined as a storm with snow, ice, or freezing rain. Severe winter storms may include snowstorms, blizzards, cold waves and ice storms.

Mitigation Action Examples

- Installing temperature and humidity sensors to protect their pipes, including locating water pipes on the inside of building footprints or keeping them out of attics, crawl spaces, and vulnerable outside walls.
- Weathering public buildings to withstand severe loads and prevent roof collapse.
- Sealing residential garage doors.
- Checking for and maintaining adequate roof and debris clearing capabilities.

38



39

Natural Hazards

→ **Windstorm** - A storm with high winds or violent gusts with little or no rain.

Mitigation Action Example

- Maintain natural environmental features as windbreaks.
- Incorporating inspection and management of hazardous trees into the drainage system maintenance process.
- Proactively leading power line hikes to determine if they are riding.
- Inquiring utility poles to ensure they meet specifications and are wind resistant.

40

Natural Hazards – 15. Lightning

DATA

Date	Location	Severity	Notes
8/11/2022	Lightning nearby struck power lines at the Corpus Christi County Club.	Minor	Lightning struck a 30-year-old oak tree in the parking lot in Front Street off of Corpus Street.
8/12/2022	Lightning struck a male at work at the Trinity Episcopal Ministry between 101 and 110 AM CST. Victim estimated roughly 60,000 joules of energy and roughly 1000 volts applied into the chest.	Major	Lightning struck a construction company truck on McDevitt Ln. One person was inside the truck at the time. No one was injured.
8/14/2022	Lightning struck a work building in an open field just off of I-37 and C.A. St. causing a small explosion and fire. Roughly 100 barrels of oil were spilled from the tank before...	Major	A 61-year-old man was struck and killed by lightning on Mustang Island Beach near Port Aransas.
8/15/2022	Lightning struck a house near the Frigo Coasting schoolhouse, with significant damage reported.	Minor	Lightning struck the Tropical View Apartments on Jamaica Drive causing a fire for several hours.
8/16/2022	Lightning struck an oil well causing an explosion and fire. The well was used for oil to Market Road 888 near County Road 63 north of Mercedes.	Major	Lightning struck a house on Church Valley Drive in Corpus Christi. The house caught on fire. An elderly woman had to be rescued.
8/19/2022	Lightning struck a power line on Matilla Road in Corpus Christi. The line overloaded the transformer and lost power to 17 homes.	Minor	Lightning struck a power line on Matilla Road in Corpus Christi. The line overloaded the transformer and lost power to 17 homes.

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Natural Hazards

→ **Lightning** - lightning is a sudden electrostatic discharge during an electrical storm between electrically charged regions of a cloud, between that cloud and another cloud, or between a cloud and the ground.

Mitigation Action Examples

- Installing lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
- Installing and maintaining surge protection on critical electronic equipment.
- Implement a service to detect lightning strikes within a certain mile radius. Establish warning protocols that indicate when not to operate, utility preparation, and overall protection of public safety.
- Posting warning signage at local parks.

42

Mitigation Strategy

- Incorporated into other planning mechanisms
- Department/titles responsible for mitigation actions
- Ongoing Maintenance
 - Review annually
 - Add actions if desired

43

Capability Assessment

- Existing authority, plans, programs
- Opportunities for future integration
- Identify existing mitigation efforts

Authority/Plan/Program	Existing	Integration	Notes
Emergency Management Plan	Yes	Yes	
...

44

Capability Assessment

Authority/Plan/Program	Existing	Integration	Notes
Emergency Management Plan	Yes	Yes	
...

45

Adoption and Implementation

- Adopted by Board of Directors
 - Following TDEM, FEMA review
- Planning Team to review mitigation strategy annually
- Update plan every five years

46

Next Steps

- Collect Mitigation Actions

Priority	Funding	High	\$75,000	Emergency	Local Plans	Priority	Emergency	12
...

- Return 9/20/2022
- Public review of plan before adoption

47

Questions

48

Thank You

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Mitigation Strategy Public Meeting #1 Attendance, August 30, 2022

Participant	Community
Patti Hobbs	City of Robstown
Danielle Hale	Port of Corpus Christi Authority
Sarah Fisher	Nueces Electric
Christopher Boyce	Nueces County
Amanda Torres	City of Corpus Christi
Kathy Ard-Blattner	Nueces County
Billy Delgado	City of Corpus Christi
Kathleen Chapa	City of Corpus Christi
Melinda Malone	Nueces County
Tak Makino	LAN
Laura Casset	LAN
Dalen Keith	LAN
Scott Harris	LAN

Mitigation Strategy Planning Team Meeting #1 Presentation, August 30, 2022

1. Nueces County Hazard Mitigation Plan
Planning Team – 9/30/2022

2. Lockwood, Andrews & Newnam, Inc.
Laura M. Casset, PE, CFM, CPESC
Senior Associate, Regional Stormwater Manager
Tak M. Makino, CFM
Flood Mitigation Manager

3. Agenda
1. Purpose
2. Public Survey
3. Planning Process
4. Mitigation Strategy
5. Subplan Implementation

4. Purpose
• Prevent or reduce loss of life and property
• Improve resilience
• Identify cost-effective mitigation measures
• Build stakeholder/public partnerships
• Leverage FEMA funding

5. FEMA Hazard Mitigation Assistance
– Hazard Mitigation Grant Program (HMGP)
– Disaster Based
– 75% cost share
– Building Resilient Infrastructure and Communities (BRIC)
– Annual
– 75% cost share
– Flood Mitigation Assistance
– Annual
– 75% cost share
– Insured Structures

6. Public Survey
QR Code
<https://www.surveymonkey.com/r/nuecescountyhmpsurvey>

Mitigation Strategy Planning Team Meeting #1 Presentation, August 30, 2022 (continued)

Planning Process

7

Planning Area

8

Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

9

Identified Natural Hazards (15)

- Drought
- Floods
- Hurricane/Tropical Storms
- Wildfire
- Tornado
- Coastal Erosion
- Dam/Levee Failure
- Earthquake
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windstorms
- Lightning

10

Mitigation Strategy

- Mitigation Actions
 - Two per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

11

Natural Hazards – 1. Drought

12

Natural Hazards – 1. Drought

13

Natural Hazards

Drought - A period of time with below-average precipitation. Droughts can be classified as meteorological, hydrological, agricultural, or socioeconomic droughts.

Mitigation Action Examples

- Developing new or upgrading existing water delivery systems to eliminate breaks and leaks
- Developing a drought communication plan and early warning system to facilitate timely communication of relevant information for officials, decision makers, emergency managers, and the general public
- Developing agreements for secondary water sources that may be used during drought conditions
- Establishing a regular schedule to monitor and report conditions on at least a monthly basis

14

Natural Hazards – 2. Floods

15

Natural Hazards

Floods - The accumulation of water within a body of water, which results in the overflow of water onto adjacent lands, usually floodplains. Flooding is the partial or complete inundation of otherwise normally dry land. Types of flooding include riverine, coastal, and shallow flooding.

Mitigation Action Examples

- Verify sites where stream and water pipes need to be added or upgraded and coordinate installation requests
- Track and report high water marks following a flood
- Change projects
- Create a GIS map of historical flood locations (regional, public, private, and local), including repetitive losses
- Provide additional means of access to prevent residents from becoming trapped in a residence when facing a flood

16

Natural Hazards – 3. Hurricanes/Tropical Storms

17

Natural Hazards

Hurricanes/Tropical Storms - Intense tropical weather systems that produce damaging winds, generate storm surge, and heavy rainfall.

Mitigation Action Examples

- Developing and establishing a database to track community vulnerability to severe wind
- Inspecting utility lines to ensure they meet specifications and are well-maintained
- Requiring upgrading of insured buildings that will house critical facilities
- Encouraging homeowners on the benefits of wind resistant such as shutters and hurricane clips

18

Natural Hazards – 4. Wildfire

19

Natural Hazards

Wildfire - uncontrolled fire spread exclusively fueled by natural vegetative fuels. Fuel may come in the form of grass, brush, or trees. Wildfire risk increases with high concentrations of connected fuels. Meteorological conditions such as high temperatures, low humidity, drought, and high wind can also increase wildfire risk.

Mitigation Action Examples

- Conduct public education program on the risks and prevent the mitigation, with the assistance of the Texas Forest Service
- Evaluate access and road conditions for response vehicles and formulate options to improve access
- Provide additional means of access into designated neighborhoods to prevent residents from becoming trapped in a residence when facing a wildfire
- Install a network of fire hydrants in stock ponds, creeks, and small lakes to increase the supply of water for the protection

20

Natural Hazards – 5. Tornado

21

Natural Hazards

Tornado - A violently rotating column of air extending between, and in contact with, a cloud and the surface of the earth. Tornadoes have wind speeds of 250 miles per hour or more. Damage paths can be in excess of one-mile-wide and 50 miles long.

Mitigation Action Examples

- Require "safe rooms" to be added when constructing new schools, daycares, retail homes and critical care facilities
- Build safe room shelters at mobile home parks so that all park residents can reach shelter in less than five minutes
- Develop an ordinance defining the standards for the design of mobile homes
- Revisit or add shelters to existing essential facilities that offer inadequate protection

22

Natural Hazards – 6. Coastal Erosion

23

Natural Hazards

Coastal Erosion - The loss or displacement of land, or the long-term removal of sediment and rocks along the coastline due to the action of waves, currents, tides, wind-driven water, waterborne ice, or other impacts of storms.

Mitigation Action Examples

- Developing and establishing a database to track community vulnerability to erosion
- Livingston utility and other facilities visible of areas susceptible to erosion to decrease the risk of service disruption
- Designing and installing infrastructure to limit erosion
- Presenting erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing techniques, or installing riprap structures or geotextile fabric

24

Mitigation Strategy Planning Team Meeting #1 Presentation, August 30, 2022 (continued)

Natural Hazards – 7. Dam/Levee Failure

ISN

25

Natural Hazards

Dam/Levee Failure - A systematic failure of a dam structure resulting in the uncontrolled release of water, often resulting in floods that could exceed the 100-year floodplain boundaries. A levee is an embankment built to prevent overflow from a body of water. A levee failure is when a levee embankment fails, or is intentionally breached, causing the previously contained water to flood the land behind the levee.

Mitigation Action Examples

- Inspection, maintenance and enforcement program help to ensure continued structural integrity.
- Unnecessary or old and structurally compromised dams should be removed.
- Planning for dam breaks can include constructing emergency access roads as well as accelerating pump-out flood gate operations.
- Dams or levees need to be kept in good repair.

ISN

26

Natural Hazards – 8. Earthquake

ISN

27

Natural Hazards

Earthquake - The shaking of the surface of the Earth resulting from a sudden release of energy in the Earth's lithosphere that creates seismic waves. Earthquakes can range in intensity, from those that are so weak that they cannot be felt, to those violent enough to propel objects and people into the air and wreak destruction across entire cities.

Mitigation Action Examples

- Developing an inventory of public and commercial buildings that may be particularly vulnerable to earthquake damage, including gas-fills, bridges and towers with organic and inorganic.
- Using GIS to map hazard areas, such as structures and movement hazards (e.g., landslides and landslides) to assess high-risk areas.
- Teaching students of geoscience, volcanoes, and other related equipment in hospitals.
- Hazardous should remove and emergency connector houses when major rains occur fault lines.

ISN

28

Natural Hazards – 9. Expansive Soil

ISN

29

Natural Hazards

Expansive Soil - Expansive soils owe their characteristics to the presence of swelling clay minerals. As they get wet, the clay minerals absorb water molecules and expand; conversely, as they dry they shrink, leaving large voids in the soil.

Mitigation Action Examples

- Conduct pre-development inspection for potential landslides/expansive soil threats.
- Using steel reinforcing bars to post-tension a concrete slab on grade.
- Expansive substrates can be removed and replaced with non-expansive material.
- Reinforce slabs and footings. Greater slabs can be strengthened with wire mesh in the concrete.

ISN

30

Natural Hazards – 10. Extreme Heat

ISN

31

Natural Hazards

Extreme Heat - The condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. If extreme heat conditions persist, it may be considered a heat wave.

Mitigation Action Examples

- Encouraging tree plantings around buildings to shade parking lots and streets during daylight hours.
- Encouraging citizens regarding the dangers of extreme heat and the steps they can take to protect themselves when extreme temperatures occur.
- Using cool roofing products that reflect sunlight and heat away from a building.
- Encouraging installation of green roofs, which provide shade and reduce heat from the roof surface and surrounding air.

ISN

32

Natural Hazards – 11. Hailstorm

ISN

33

Natural Hazards

Hailstorm - A form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. Nearly all severe thunderstorms produce hail aloft, though it may melt before reaching the ground.

Mitigation Action Examples

- Locate tornado safe rooms inside or directly adjacent to houses to prevent hail-induced injuries that may occur when taking shelter during a severe thunderstorm.
- Consider hail guards for HVAC equipment, particularly in hail-prone areas.
- Teaching school children about the dangers of hail and how to take safety precautions.
- Consider storing your fleet vehicles in more than one location to spread risk and explore the possibility of protected coverings or indoor parking.

ISN

34

Natural Hazards – 12. Land Subsidence

ISN

35

Natural Hazards

Land Subsidence - Occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks fall in on itself.

Mitigation Action Examples

- Prohibiting development in areas that have been identified as at risk to subsidence.
- Monitoring areas at risk to subsidence by reviewing signs of changes in groundwater levels.
- Acquire and demolish or relocate buildings and infrastructure in high-risk areas.
- Offering GIS hazard mapping online for residents and design professionals.

ISN

36

Mitigation Strategy Planning Team Meeting #1 Presentation, August 30, 2022 (continued)

Natural Hazards – 13. Extreme Winter Storm

Wind Chill Chart

Temperature (°F) vs. Wind Speed (mph)

Wind Chill (°F)

Source: National Weather Service

37

Natural Hazards

→ **Extreme Winter Storm** - A severe winter storm event is defined as a storm with snow, ice, or freezing rain. Severe winter storms may include snowstorms, blizzards, cold waves and ice storms.

Mitigation Action Examples

- Relocating transformers and poles on lines to protect their poles, including locating water pipes on the inside of building structures or heating their end of cables, cross-arms, and insulators outside walls.
- Reinforcing public buildings to withstand snow loads and prevent roof collapse.
- Reinforcing overhead power lines.
- Refrigerating and maintaining electrical load and double-insulating transformers.

38

Natural Hazards – 14. Windstorm

Map showing windstorm hazard areas with color-coded risk levels.

39

Natural Hazards

→ **Windsurftorm** - A storm with high winds or violent gusts with little or no rain.

Mitigation Action Example

- Maintain natural environmental features as wind buffers
- Incorporating inspection and management of hazardous trees into the drainage system maintenance process
- Proactively testing power line poles to determine if they are rotting
- Inspecting utility poles to ensure they meet specifications and are wind resistant

40

Natural Hazards – 15. Lightning

Lightning - Lightning is a sudden electrostatic discharge during an electrical storm between electrically charged regions of a cloud, between that cloud and another cloud, or between a cloud and the ground.

Mitigation Action Examples

- Installing lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
- Installing and maintaining surge protection on critical electronic equipment.
- Implement a service to detect lightning strikes within a certain mile radius. Establish warning thresholds that indicate when not to operate, utility preparation, and removal protection of public safety.
- Posting warning signage at local parks.

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Natural Hazards

→ **Lightning** - Lightning is a sudden electrostatic discharge during an electrical storm between electrically charged regions of a cloud, between that cloud and another cloud, or between a cloud and the ground.

Mitigation Action Examples

- Installing lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
- Installing and maintaining surge protection on critical electronic equipment.
- Implement a service to detect lightning strikes within a certain mile radius. Establish warning thresholds that indicate when not to operate, utility preparation, and removal protection of public safety.
- Posting warning signage at local parks.

42

Mitigation Strategy

- Incorporated into other planning mechanisms
- Departmentalities responsible for mitigation actions
- Ongoing Maintenance
 - Review annually
 - Add actions if desired

43

Capability Assessment

- Existing authority, plans, programs
- Opportunities for future integration
- Identify existing mitigation efforts

Authority/Program	Authority/Program	Authority/Program	Authority/Program
...

44

Capability Assessment

Authority/Program	Authority/Program	Authority/Program	Authority/Program
...

45

Adoption and Implementation

- Adopted by Board of Directors
 - Following TDEM, FEMA review
- Planning Team to review mitigation strategy annually
- Update plan every five years

46

Next Steps

- Collect Mitigation Actions

Program	Funding	High	\$/1,000	Owner	Lead	Phase	Priority	Completion
...

- Return 9/20/2022
- Public review of plan before adoption

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Questions

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Thank You

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Mitigation Strategy Planning Team #1 Attendance, August 30, 2022

Participant	Community
Tak Makino	LAN
Laura Casset	LAN
Dalen Keith	LAN
Scott Harris	LAN
Patti Hobbs	City of Robstown
Danielle Hale	Port of Corpus Christi Authority
Sarah Fisher	Nueces Electric
Christopher Boyce	Nueces County
Amanda Torres	City of Corpus Christi
Kathy Ard-Blattner	Nueces County
Billy Delgado	City of Corpus Christi
Kathleen Chapa	City of Corpus Christi
Melinda Malone	Nueces County

Kickoff Meeting #3 Public Meeting Presentation January 31, 2023

Kickoff Meeting #3 Public Meeting Presentation, January 31, 2023 (continued)

7 Planning Process

- Define Planning Area
- Identify Natural Hazards
- Conduct Risk Assessment
- Develop Mitigation Strategies
- Review and Adoption
- Ongoing Plan Maintenance

8 Define Planning Area

9 Identify Natural Hazards

- Floods
- Hurricanes/Tropical Storms
- Wildfire
- Tornado
- Drought
- Coastal Erosion
- Dam/Levee Failure
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windspeeds
- Lightning

10 Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

11 Mitigation Strategy

- Mitigation Actions
 - Two per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

12 Mitigation Strategy

- Incorporated into other planning mechanisms
- Departments/titles responsible for mitigation actions
- Ongoing Maintenance
 - Review annually
 - Add actions if desired

13 Adoption and Implementation

- Adopted by Court/Council/Board of Directors
 - Following TDEM, FEMA review
- Planning Team to review mitigation strategy annually
- Update plan every five years

14 Questions

Kickoff Meeting #3 Public Meeting Attendance, January 31, 2023

Participant	Community
Marcus Alaniz	NCDD#3
Eric Gonzalez	Flour Bluff
Kathy Ard-Blattner	Nueces County
John Miller	Celanese
Christopher Boyce	POCCA
Scott Mack	NCWCID#4
Billy Delgado	Corpus Christi
Benjamin Ricks	POCCA
Valdemar Aristeo	Nueces County
Louie Ray	Nueces County
Juan Sanchez	DSHS
Paula Wakefield	City of Driscoll
Aaron Diaz	Nueces County

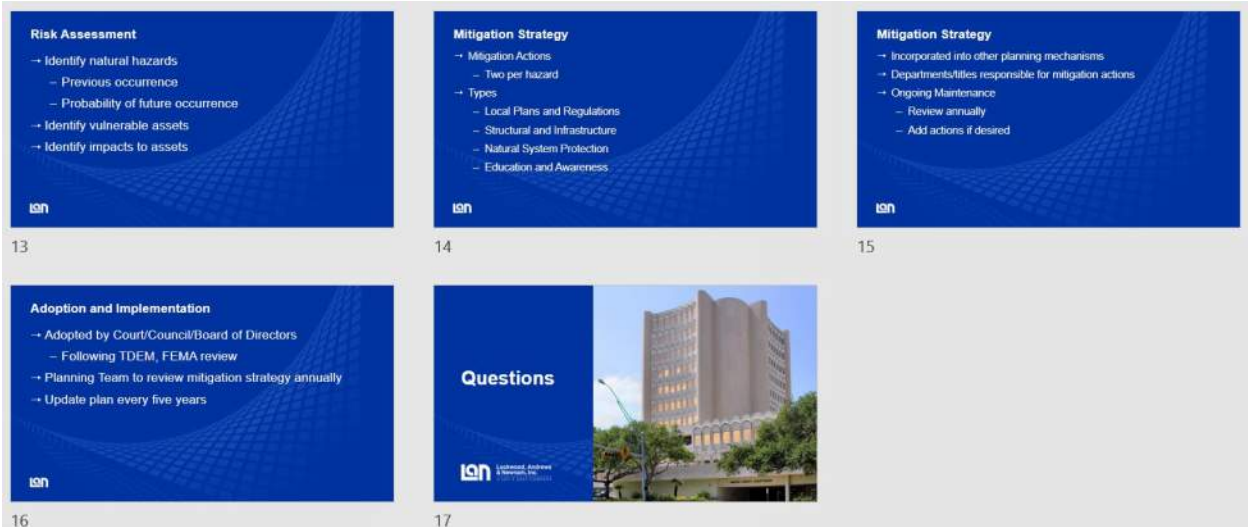
Participant (continued)	Community (continued)
Rick Adams	Port Aransas
Katya Wowk	TAMUCC
Kathleen Chapa	Corpus Christi
Samuel Arcigiega	NCDD#2
Dalen Keith	LAN
Tak Makino	LAN

Kickoff Meeting #3 Planning Team Meeting Presentation, January 31, 2023

The presentation consists of 12 slides, numbered 1 through 12, detailing the planning process for the Nueces County Multi-Jurisdictional Hazard Mitigation Plan. The slides are as follows:

- Slide 1:** Title slide for the Nueces County Multi-Jurisdictional Hazard Mitigation Plan, Kickoff Meeting January 31, 2023. Includes the LAN logo and the State of Texas seal.
- Slide 2:** Hazard Mitigation Plan Participants. Lists 12 participating entities, including Nueces County, various cities (Agua Dulce, Barossa ISD, Bishop, Corpus Christi, Driestall, Petronila, Port Aransas, Robstown), and drainage/water control districts.
- Slide 3:** Agenda. Lists: 1. Purpose, 2. Planning Process / Roles & Responsibilities, 3. Mitigation Strategy, 4. Adoption/Implementation.
- Slide 4:** Purpose. Lists: Prevent or reduce loss of life and property, Improves resilience, Identify cost-effective mitigation measures, Build stakeholder/public partnerships, Leverage FEMA funding.
- Slide 5:** FEMA Hazard Mitigation Assistance. Lists: Hazard Mitigation Grant Program (HMGP), Disaster Based (75/25 cost share), Building Resilient Infrastructure and Communities (BRIC) Annual (75/25 cost share), Flood Mitigation Assistance Annual (75/25 cost share), Insured Structures.
- Slide 6:** Planning Process. A flowchart showing: Define Planning Area → Define Planning Team → Capability Assessment → Identify Natural Hazards → Conduct Risk Assessment → Develop Mitigation Strategies → Review and Adopt Plan → Ongoing Plan Maintenance.
- Slide 7:** Planning Process. A duplicate of Slide 6.
- Slide 8:** Define Planning Area. Shows a map of the Nueces County area with various planning areas highlighted in different colors.
- Slide 9:** Define Planning Team. Lists: Key Nueces County and City/District Staff, Major Stakeholders, Agencies involved in hazard mitigation, Agencies with authority to regulate development, Neighboring communities.
- Slide 10:** Planning Team Responsibilities. Lists: Participation in planning process, Provide historical data, Provide GIS data, Promote public engagement, Develop mitigation actions, Review draft plan and adopt final plan, Ongoing plan maintenance.
- Slide 11:** Capability Assessment. Lists: Existing authority, plans, programs; Opportunities for future integration; Identify existing mitigation efforts. Includes a table for 'Appendix B: Capability Assessment' and a 'DUE: FEB 7' deadline.
- Slide 12:** Identify Natural Hazards. Lists: Floods, Hurricanes/Tropical Storms, Wildfire, Tornado, Drought, Coastal Erosion, Dam/Levee Failure, Expansive Soils, Extreme Heat, Heatstorms, Land Subsidence, Extreme Winter Storm, Windstorms, Lightning.

Kickoff Meeting #3 Planning Team Meeting Presentation, January 31, 2023 (continued)



Kickoff Meeting #3 Planning Committee Attendance, January 31, 2023

Participant	Community
Aaron Diaz	Nueces County
Aristeo Valdemar	Nueces County
Benjamin Ricks	Port of Corpus Christi Authority
Billy Delgado	City of Corpus Christi
Christopher Boyce	Port of Corpus Christi Authority
Dalen Keith	LAN
Eric Gonzalez	Flour Buff ISD
John Howard	City of Agua Dulce
John Miller	Celanese Corp.
Juan Sanchez	Texas Department of State Health Services
Kathleen Chapa	City of Corpus Christi
Kathy Ard-Blattner	Nueces County
Katya Wowk	Texas A&M University-Corpus Christi
Louie Ray	Nueces County
Marcus Alaniz	NCWCID#3
Paula Wakefield	City of Driscoll
Rick Adams	City of Port Aransas
Sam Arciniega	NCDD #2
Scott Mack	NCWCID#4
Tak Makino	LAN

Mitigation Action Workshop Public Meeting Presentation May 25, 2023

Nueces County Hazard Mitigation Plan
Public Meeting - 5/25/2023

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Agenda

1. Purpose
2. Public Survey
3. Planning Process
4. Hazard Analysis
5. Mitigation Strategy
6. Adoption/Implementation

2

Purpose

- Prevent or reduce loss of life and property
- Improve resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

3

FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Based
 - 75% cost share
- Building Resilient Infrastructure and Communities (BRIC)
 - Annual
 - 75% cost share
- Flood Mitigation Assistance
 - Annual
 - 75% cost share
 - Inured Structures

4

Public Survey

QR Code

<https://www.surveymonkey.com/r/NuecesCountyHMPSurvey>

5

Planning Process

6

Planning Area of Additional Districts

7

Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

8

Identified Natural Hazards (15)

- Drought
- Floods
- Hurricanes/Tropical Storms
- Wildfire
- Tornado
- Coastal Erosion
- Dam/Levee Failure
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windstorms
- Lightning

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Mitigation Strategy

- Mitigation Actions
 - Two per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

10

Examples of Multi-Hazard Mitigation Actions

Mitigation Action Examples

- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Acquire and distribute NOAA radios.
- Acquire and install generators with hard wired quick connect/disconnect at all critical facilities.
- Obtain certification in the National Weather Service StormReady Program.
- Hardens/shield critical facilities to hazard-resistant levels.
- Adopt and implement a routine tree trimming program that clears tree limbs near power lines and/or hanging in the right-of-way. Removes dead trees from right-of-way and drainage systems on a scheduled basis.

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Natural Hazards - 1. Drought

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Mitigation Action Workshop Public Meeting Presentation, May 25, 2023 (continued)

Natural Hazards - Drought

County Wide						
Mitigation Action	2022		2023		2024	
	Count	Percentage	Count	Percentage	Count	Percentage
Adopt a drought communication plan and early warning system to facilitate timely communication of relevant information to officials, decision makers, emergency managers, and the general public.	17	100%	17	100%	17	100%
Developing agreements for secondary water sources that may be used during drought conditions.	12	70%	12	70%	12	70%
Establishing a regular schedule to monitor and report conditions on at least a monthly basis.	12	70%	12	70%	12	70%
Adopt a drought-resistant landscape ordinance for public facilities.	12	70%	12	70%	12	70%
Establish, adopt, and implement a "green infrastructure" program for parks, nature preserves, greenways, etc.	12	70%	12	70%	12	70%
Total	63	100%	63	100%	63	100%

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Natural Hazards - Drought

Mitigation Action Examples

- Developing new or upgrading existing water delivery systems to eliminate leaks and waste.
- Require water fixtures in public buildings with low-flow fixtures.
- Developing a drought communication plan and early warning system to facilitate timely communication of relevant information to officials, decision makers, emergency managers, and the general public.
- Developing agreements for secondary water sources that may be used during drought conditions.
- Establishing a regular schedule to monitor and report conditions on at least a monthly basis.
- Adopt a drought-resistant landscape ordinance for public facilities.
- Establish, adopt, and implement a "green infrastructure" program for parks, nature preserves, greenways, etc.

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Natural Hazards - Floods

County Wide						
Mitigation Action	2022		2023		2024	
	Count	Percentage	Count	Percentage	Count	Percentage
Adopt and implement a program for clearing debris from bridges, drains, culverts, channels, etc.	10	100%	10	100%	10	100%
Identify their prone and expansion loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties.	10	100%	10	100%	10	100%
Join the Community Rating System program or increase the community rating under the CDS program.	10	100%	10	100%	10	100%
Implement a Comprehensive Watershed Ordinance for new development. Adopt setbacks development regulations.	10	100%	10	100%	10	100%
Increase floodproof requirements for permitting structures in the SFHA. Adopt a "no new" or "no SFHA" Update local flood ordinance to provide priority of retention in the SFHA. Include "catastrophic damage" provisions in local floodproofing management ordinances.	10	100%	10	100%	10	100%
Implement a flood assessment program for providing FIRM/NFP materials to emergency services, real estate agents, and insurance agents and place them in local libraries.	10	100%	10	100%	10	100%
Increase storage capacity. Add stormwater detention and/or retention basins as necessary to reduce flood risk.	10	100%	10	100%	10	100%
Implement stream restoration/conservation program to ensure adequate drainage/dispersal of stormwater.	10	100%	10	100%	10	100%
Adopt regulations to limit amount of impervious cover in context with new development.	10	100%	10	100%	10	100%
Total	10	100%	10	100%	10	100%

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Natural Hazards - Floods

Mitigation Action Examples

- Adopt and implement a program for clearing debris from bridges, drains, culverts, channels, etc.
- Identify their prone and expansion loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties.
- Join the Community Rating System program or increase the community rating under the CDS program.
- Implement a Comprehensive Watershed Ordinance for new development. Adopt setbacks development regulations.
- Increase floodproof requirements for permitting structures in the SFHA. Adopt a "no new" or "no SFHA" Update local flood ordinance to provide priority of retention in the SFHA. Include "catastrophic damage" provisions in local floodproofing management ordinances.
- Implement a flood assessment program for providing FIRM/NFP materials to emergency services, real estate agents, and insurance agents and place them in local libraries.
- Increase storage capacity. Add stormwater detention and/or retention basins as necessary to reduce flood risk.
- Implement stream restoration/conservation program to ensure adequate drainage/dispersal of stormwater.
- Adopt regulations to limit amount of impervious cover in context with new development.

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Natural Hazards – Hurricanes/Tropical Storms

County Wide						
Mitigation Action	2022		2023		2024	
	Count	Percentage	Count	Percentage	Count	Percentage
Build early warning systems throughout the jurisdiction to include emergency centers and/or manufactured home parks so that all park residents can reach shelter in less than five minutes.	10	100%	10	100%	10	100%
Require standards for built of utility lines in new developments. Stay existing utility lines.	10	100%	10	100%	10	100%
Adopt ordinance requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require standard tie-downs of propane tanks.	10	100%	10	100%	10	100%
Require "safe rooms" to be added when constructing new schools, libraries, retail stores, and critical facilities.	10	100%	10	100%	10	100%
Develop alternative evacuation routes and investigate emergency throughways, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.	10	100%	10	100%	10	100%
Implement and enhance an area-wide telephone Emergency Notification System.	10	100%	10	100%	10	100%
Incorporate higher standards for hazard resistance in local application of the building code.	10	100%	10	100%	10	100%
Harden critical facilities for hazard resistance levels. Acquire and install generators in critical facilities.	10	100%	10	100%	10	100%
Obtain contribution to the National Weather Service StormReady Program.	10	100%	10	100%	10	100%
Acquire and distribute NOAA weather radios.	10	100%	10	100%	10	100%
Total	10	100%	10	100%	10	100%

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Natural Hazards – Hurricanes/Tropical Storms

Mitigation Action Examples

- Build early warning systems throughout the jurisdiction to include emergency centers and/or manufactured home parks so that all park residents can reach shelter in less than five minutes.
- Require standards for built of utility lines in new developments. Stay existing utility lines.
- Adopt ordinance requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require standard tie-downs of propane tanks.
- Require "safe rooms" to be added when constructing new schools, libraries, retail stores, and critical facilities.
- Develop alternative evacuation routes and investigate emergency throughways, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.
- Implement and enhance an area-wide telephone Emergency Notification System.
- Incorporate higher standards for hazard resistance in local application of the building code.
- Harden critical facilities for hazard resistance levels. Acquire and install generators in critical facilities.
- Obtain contribution to the National Weather Service StormReady Program.
- Acquire and distribute NOAA weather radios.

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Natural Hazards - Wildfire

County Wide						
Mitigation Action	2022		2023		2024	
	Count	Percentage	Count	Percentage	Count	Percentage
Install the danger rattleback lawn signs.	10	100%	10	100%	10	100%
Install a network of dry hydrants in stock ponds, creeks, and small lakes to increase the supply of water for fire protection.	10	100%	10	100%	10	100%
Adopt and implement a wildfire fire hydrant maintenance program.	10	100%	10	100%	10	100%
Conduct public education programs on fire risks and wildfire mitigation with the assistance of the Texas Forest Service.	10	100%	10	100%	10	100%
Develop alternative evacuation routes and investigate emergency throughways, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.	10	100%	10	100%	10	100%
Implement a community education program regarding the dangers for identified risk areas. Conduct campaigns through neighborhood associations or town fairs to make residents aware of wildfire hazard areas and the protection measures for homes and public.	10	100%	10	100%	10	100%
Adopt construction regulations for the resistant roofing materials, smoke alarm systems, sprinkler systems, chimney, escape plans, fire management requirements, and timing of aces, overhang, and decks. Require the retrofits for all homes and businesses.	10	100%	10	100%	10	100%
Convert firebreaks into public wooded areas according to risk factors.	10	100%	10	100%	10	100%
Total	10	100%	10	100%	10	100%

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Natural Hazards - Wildfire

Mitigation Action Examples

- Install the danger rattleback lawn signs.
- Install a network of dry hydrants in stock ponds, creeks, and small lakes to increase the supply of water for fire protection.
- Adopt and implement a wildfire fire hydrant maintenance program.
- Conduct public education programs on fire risks and wildfire mitigation with the assistance of the Texas Forest Service.
- Develop alternative evacuation routes and investigate emergency throughways, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.
- Implement a community education program regarding the dangers for identified risk areas. Conduct campaigns through neighborhood associations or town fairs to make residents aware of wildfire hazard areas and the protection measures for homes and public.
- Adopt construction regulations for the resistant roofing materials, smoke alarm systems, sprinkler systems, chimney, escape plans, fire management requirements, and timing of aces, overhang, and decks. Require the retrofits for all homes and businesses.
- Convert firebreaks into public wooded areas according to risk factors.

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Mitigation Action Workshop Public Meeting Presentation, May 25, 2023 (continued)

Natural Hazards – Tornado

County Data		City of Nueces		City of San Antonio	
Year	Population	Year	Population	Year	Population
2010	12	2010	1	2010	23,000
2015	12	2015	1	2015	23,000
2020	12	2020	1	2020	23,000
2025	12	2025	1	2025	23,000
2030	12	2030	1	2030	23,000
2035	12	2035	1	2035	23,000
2040	12	2040	1	2040	23,000
2045	12	2045	1	2045	23,000
2050	12	2050	1	2050	23,000

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Natural Hazards – Tornado

Mitigation Action Examples

- Build safe room shelters throughout the jurisdiction to include community centers and/or manufactured home parks so that all people can reach shelter in less than five minutes.
- Require standards for facility safety in new developments. Rely existing safety laws.
- Adopt ordinances requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require standards for doors of propane tanks.
- Require "safe rooms" to be added when constructing new schools, daycares, rest homes, and critical facilities.
- Adopt architectural design standards for optimal wind conveyance.
- Implement and enhance an area wide telephone Emergency Notification System.
- Incorporate higher standards for hazard resistance in local application of the building code.
- Hardenschool critical facilities to hazard resistant levels. Acquire and install generators in critical facilities.
- Obtain participation in the National Weather Service StormReady Program.
- Analyze and distribute NOAA weather radios.

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Natural Hazards – Coastal Erosion

County Data		City of Nueces		City of San Antonio	
Year	Population	Year	Population	Year	Population
2010	12	2010	1	2010	23,000
2015	12	2015	1	2015	23,000
2020	12	2020	1	2020	23,000
2025	12	2025	1	2025	23,000
2030	12	2030	1	2030	23,000
2035	12	2035	1	2035	23,000
2040	12	2040	1	2040	23,000
2045	12	2045	1	2045	23,000
2050	12	2050	1	2050	23,000

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Natural Hazards – Coastal Erosion

Mitigation Action Examples

- Require erosion/sedimentation controls to be utilized during construction. Include on-site sedimentation retention as a development requirement.
- Map and assess vulnerability to erosion.
- Manage development in erosion hazard areas.
- Planure or require safe and building design standards to minimize erosion risk.
- Disturb erosion hazard areas.
- Increase Assessment of erosion hazard areas.
- Locating utilities and critical facilities in areas susceptible to erosion to decrease the risk of service disruption.
- Planting strategic with proper bank stabilization, shading or grading techniques, planting vegetation or riprap, terracing, or installing riprap structures or gabion structures.

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Natural Hazards – Dam/Levee Failure

County Data		City of Nueces		City of San Antonio	
Year	Population	Year	Population	Year	Population
2010	12	2010	1	2010	23,000
2015	12	2015	1	2015	23,000
2020	12	2020	1	2020	23,000
2025	12	2025	1	2025	23,000
2030	12	2030	1	2030	23,000
2035	12	2035	1	2035	23,000
2040	12	2040	1	2040	23,000
2045	12	2045	1	2045	23,000
2050	12	2050	1	2050	23,000

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Natural Hazards – Dam/Levee Failure

Mitigation Action Examples

- Inspection, maintenance and enforcement program help to ensure continued structural integrity.
- Unnecessary or old and structurally unsound dams should be removed or significantly improved upon.
- Develop an automatic pump and flood gate operation.
- Develop alternative evacuation routes and designate emergency shelters, particularly in areas with limited capacity. Evaluate alternate evacuation routes and procedures.
- Implement and enhance an area wide telephone Emergency Notification System.
- Hardenschool critical facilities to hazard resistant levels. Acquire and install generators in critical facilities.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.

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Natural Hazards – Expansive Soil

County Data		City of Nueces		City of San Antonio	
Year	Population	Year	Population	Year	Population
2010	12	2010	1	2010	23,000
2015	12	2015	1	2015	23,000
2020	12	2020	1	2020	23,000
2025	12	2025	1	2025	23,000
2030	12	2030	1	2030	23,000
2035	12	2035	1	2035	23,000
2040	12	2040	1	2040	23,000
2045	12	2045	1	2045	23,000
2050	12	2050	1	2050	23,000

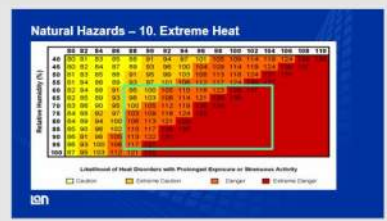
34

Natural Hazards – Expansive Soil

Mitigation Action Examples

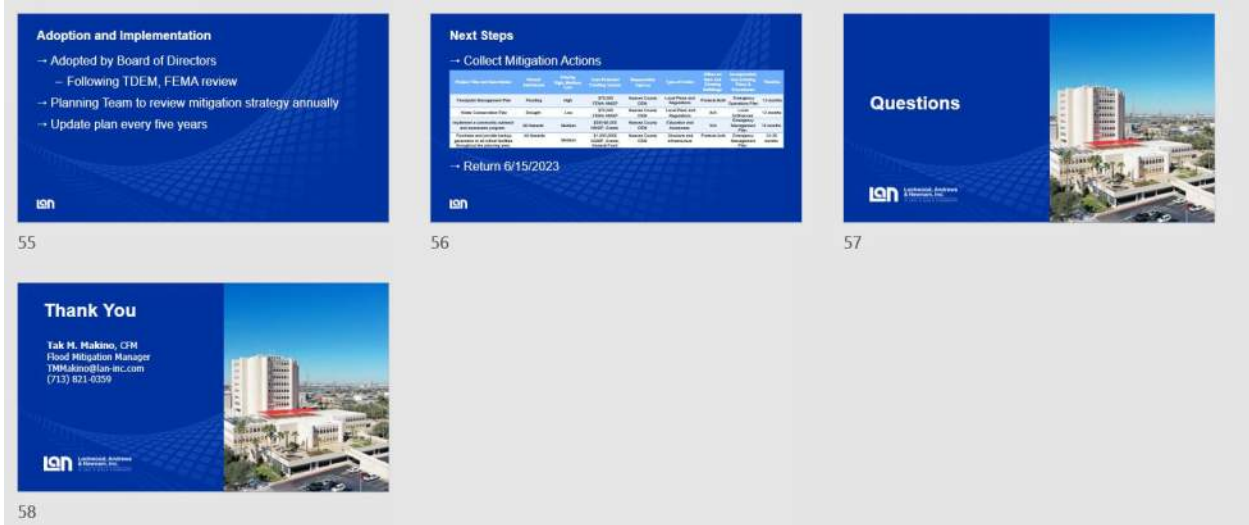
- Require data collection requirements of expansive soil sections. This may include using the City's 3-1-1 system to maintain a database of reports called in regarding cracked slabs and other evidence of foundation faults. A database would be developed with the information and then the most vulnerable facilities could be identified.
- Develop and implement a program to regularly water the foundation of public buildings.
- Develop and implement an ordinance to require engineering techniques for infrastructure to mitigate the effects of expansive soils.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Conduct pre development inspection for potential problematic expansive soil threats.
- Utilize rebaring techniques when constructing new buildings.
- Remove expansive substrates and replace them with non-expansive material.

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Mitigation Action Workshop Public Meeting Presentation, May 25, 2023 (continued)



Mitigation Action Workshop Public Meeting Attendance, May 25, 2023

Participant	Community
Adrian Pena	Banquete ISD
Amanda Torres	City of Corpus Christi
Christopher Boyce	Port of Corpus Christi Authority
Chris Hale	Binkley & Barfield, Inc.
Danielle Hale	Port of Corpus Christi Authority
Javier Zapata	City of Robstown
John Howard	City of Agua Dulce
Kathy Ard-Blattner	Nueces County
Dalen Keith	LAN
Leane Heldenfels	City of Corpus Christi
Tak Makino	LAN
Marcos Alaniz	NCWCID#3
Patti Hobbs	City of Robstown
Paula Wakefield	City of Driscoll
Beatriz Perez	Texas A&M-Corpus Christi
Richard Chapman	NCWCID#4
Sal Ochoa	City of Bishop

Mitigation Action Workshop Planning Team Meeting Presentation May 25, 2023

lan

Nueces County Hazard Mitigation Plan

Planning Team Meeting – 5/25/2023

1

lan

Agenda

1. Purpose
2. Public Survey
3. Planning Process / Roles & Responsibilities
4. Hazard Analysis
5. Mitigation Strategy
6. Adoption/Implementation

2

lan

Purpose

- Prevent or reduce loss of life and property
- Improve resilience
- Identify cost-effective mitigation measures
- Build stakeholder/public partnerships
- Leverage FEMA funding

3

lan

FEMA Hazard Mitigation Assistance

- Hazard Mitigation Grant Program (HMGP)
 - Disaster Based
 - 75% cost share
- Building Resilient Infrastructure and Communities (BRIC)
 - Annual
 - 75% cost share
- Flood Mitigation Assistance
 - Annual
 - 75% cost share
 - Inland Structures

4

lan

Public Survey

<https://www.surveymonkey.com/r/NuecesCounty/IMPSurvey>

5

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Planning Team

- Key Participating Jurisdiction Staff
- Major Stakeholders
 - Agencies involved in hazard mitigation
 - Agencies with authority to regulate development
 - Neighboring communities

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Planning Team Responsibilities

- Participation in planning process
- Provide historical data
- Provide GIS data
- Promote public engagement
- Develop mitigation actions
- Review draft plan and adopt final plan
- Ongoing plan maintenance

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Planning Process

```

    graph TD
      A[Define Planning Area] --> B[Identify Natural Hazards]
      B --> C[Conduct Risk Assessment]
      C --> D[Develop Mitigation Strategies]
      D --> E[Review and Adoption]
      E --> F[Ongoing Plan Maintenance]
      F --> A
    
```

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Planning Area of Additional Districts

9

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Risk Assessment

- Identify natural hazards
 - Previous occurrence
 - Probability of future occurrence
- Identify vulnerable assets
- Identify impacts to assets

10

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Identified Natural Hazards (15)

- Drought
- Floods
- Hurricanes/Tropical Storms
- Wildfire
- Tornado
- Coastal Erosion
- Dam/levee Failure
- Expansive Soils
- Extreme Heat
- Hailstorms
- Land Subsidence
- Extreme Winter Storm
- Windstorms
- Lightning

11

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Mitigation Strategy

- Mitigation Actions
 - Two per hazard
- Types
 - Local Plans and Regulations
 - Structural and Infrastructure
 - Natural System Protection
 - Education and Awareness

12

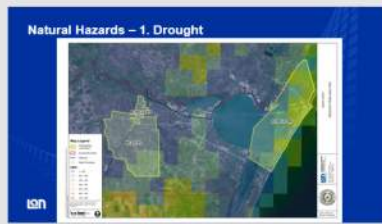
Mitigation Action Workshop Planning Team Meeting Presentation, May 25, 2023 (continued)

Examples of Multi-Hazard Mitigation Actions

Mitigation Action Examples

- Implement education awareness programs to reduce citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Acquire and distribute NOAA radios.
- Acquire and install generators with hard-wired surge connections at all critical facilities.
- Obtain certification in the National Weather Service StormReady Program.
- Hardenshift critical facilities to hazard-resistant levels.
- Adopt and implement a routine tree trimming program that clears tree limbs near power lines and hanging in the right-of-way. Remove dead trees from right-of-way and drainage systems on a scheduled basis.

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Natural Hazards - Drought

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	37	107	133	34	66	437
Area (sq. miles)	4,275	18,473	14,675	10,875	5,975	66,273
Population Density	0.0087	0.0058	0.0091	0.0031	0.0110	0.0070
Area (sq. miles)	10,460	975	366	\$2,294,741	160	160
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	1.401	\$1,035,000	103.825	\$51,000,000	\$425,000	\$133,000

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Natural Hazards - Drought

Mitigation Action Examples

- Developing new or upgrading existing water delivery systems to eliminate breaks and leaks.
- Replace water fixtures in public buildings with low-flow fixtures.
- Developing a drought communication plan and early warning system to facilitate timely communication of relevant information to officials, decision makers, emergency managers, and the general public.
- Developing agreements for secondary water sources that may be used during drought conditions.
- Establishing a regular schedule to monitor and report conditions on at least a monthly basis.
- Adopt a drought-resistant landscape ordinance for public facilities.
- Establish, adopt, and implement a "green infrastructure" program for parks, nature preserves, greenbelts, etc.

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Natural Hazards - Floods

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	71	861	1,417	1,417	1,417	6,003
Area (sq. miles)	13	13	13	13	13	65
Population Density	5.46	66.23	108.23	108.23	108.23	92.38
Area (sq. miles)	20,000	\$11,100	\$28,200	\$11,100	\$10,000	\$1,178,710
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	0.735	\$92,000,000	103.825	\$1,000,000	\$6,800,000	\$41,000

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Natural Hazards - Floods

Mitigation Action Examples

- Adopt and implement a program for clearing debris from bridges, drains, culverts, channels, etc.
- Identify flood-prone and repetitive loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties.
- Join the Community Rating System program to increase the community's rating under the CRS program.
- Implement a Comprehensive Watershed Ordinance for new development. Adopt wetlands development regulations.
- Increase flood-resistant requirements for permitting structures in the SFHA. Adopt a "no-rise" in SFHA. Update flood floor ordinance to prohibit granting of variances in the SFHA. Include "cumulative damage" provisions to local floodplain management ordinances.
- Implement a flood awareness program for providing FEMA/IFPP materials to mortgage lenders, real estate agents, and insurance agents and place them in flood libraries.
- Increase drainage capacity. Add stormwater detention and/or retention basins as necessary to reduce flood risk.
- Implement stream restoration/drainage program to ensure adequate management of stormwater.
- Adopt regulations to limit amount of impervious cover in conjunction with new development.

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Natural Hazards - Hurricanes/Tropical Storms

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	61	11	1,417	1,417	1,417	6,003
Area (sq. miles)	13	13	13	13	13	65
Population Density	4.69	0.85	108.23	108.23	108.23	92.38
Area (sq. miles)	20,000	\$11,100	\$28,200	\$11,100	\$10,000	\$1,178,710
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	0.735	\$92,000,000	103.825	\$1,000,000	\$6,800,000	\$41,000

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Natural Hazards - Hurricanes/Tropical Storms

Mitigation Action Examples

- Build safe room shelters throughout the jurisdiction to include community centers and/or manufactured home parks so that all park residents can reach shelter in less than five minutes.
- Require standards for burial of utility lines in new developments. Buy existing utility lines.
- Adopt ordinance requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require standard tie-downs of program trailers.
- Require "safe rooms" to be added when constructing new schools, daycares, rest homes, and critical facilities.
- Develop alternative evacuation routes and designate emergency throughways, particularly in areas with limited capacity. Evaluate citizens on evacuation routes and procedures.
- Implement and enhance an area-wide telephone Emergency Notification System.
- Improve higher standards for hazard resistance in local application of the building code.
- Hardenshift critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Obtain certification in the National Weather Service StormReady Program.
- Acquire and distribute NOAA weather radios.

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Natural Hazards - Wildfire

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	61	11	1,417	1,417	1,417	6,003
Area (sq. miles)	13	13	13	13	13	65
Population Density	4.69	0.85	108.23	108.23	108.23	92.38
Area (sq. miles)	20,000	\$11,100	\$28,200	\$11,100	\$10,000	\$1,178,710
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	0.735	\$92,000,000	103.825	\$1,000,000	\$6,800,000	\$41,000

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Natural Hazards - Wildfire

Mitigation Action Example

- Install the danger rattling horn signs.
- Install a network of dry hydrants in stock ponds, creeks, and small lakes to increase the supply of water for fire protection.
- Adopt and implement a routine fire hydrant maintenance program.
- Conduct public education programs on fire risk and wildfire mitigation with the assistance of the Texas Forest Service.
- Develop alternative evacuation routes and designate emergency throughways, particularly in areas with limited capacity. Evaluate citizens on evacuation routes and procedures.
- Implement a community education program regarding fire dangers for identified risk areas. Distribute pamphlets through neighborhood associations or street fairs in water bills to make residents aware of wildfire hazard areas and the protection products for homes and yards.
- Adopt construction regulations for fire-resistant roofing materials, window alarm systems, sprinkler systems, egress routes, fire escape requirements, and housing of steep, overhanging, and decks. Require the egress routes for all homes and businesses.
- Cut firebreaks into public needed areas according to risk factors.

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Natural Hazards - Tornado

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	61	11	1,417	1,417	1,417	6,003
Area (sq. miles)	13	13	13	13	13	65
Population Density	4.69	0.85	108.23	108.23	108.23	92.38
Area (sq. miles)	20,000	\$11,100	\$28,200	\$11,100	\$10,000	\$1,178,710
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	0.735	\$92,000,000	103.825	\$1,000,000	\$6,800,000	\$41,000

27

Natural Hazards – Tornado

Mitigation Action Examples

- Build safe room shelters throughout the jurisdiction to include community centers and/or manufactured home parks so that all park residents can reach shelter in less than five minutes.
- Require standards for burial of utility lines in new developments. Buy existing utility lines.
- Adopt ordinance requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require standard tie-downs of program trailers.
- Require "safe rooms" to be added when constructing new schools, daycares, rest homes, and critical facilities.
- Adopt architectural design standards for optimal wind connectivity.
- Implement and enhance an area-wide telephone Emergency Notification System.
- Improve higher standards for hazard resistance in local application of the building code.
- Hardenshift critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Obtain certification in the National Weather Service StormReady Program.
- Acquire and distribute NOAA weather radios.

28



29

Natural Hazards - Coastal Erosion

Hazard	County Risk					
	Very Low	Low	Medium	High	Very High	Total
Population	61	11	1,417	1,417	1,417	6,003
Area (sq. miles)	13	13	13	13	13	65
Population Density	4.69	0.85	108.23	108.23	108.23	92.38
Area (sq. miles)	20,000	\$11,100	\$28,200	\$11,100	\$10,000	\$1,178,710
Population	14,700	\$1,012,000	\$38,000	\$1,200,000	\$68,000	\$2,628,000
Population Density	0.735	\$92,000,000	103.825	\$1,000,000	\$6,800,000	\$41,000

30

Mitigation Action Workshop Public Meeting Presentation, May 25, 2023 (continued)

Natural Hazards – Coastal Erosion


Mitigation Action Examples

- Require erosion/sedimentation controls to be utilized during construction. Include on-site sedimentation retention as a development requirement.
- Map and assess vulnerability to erosion.
- Manage development in erosion-hazard areas.
- Promote or require safe and building design standards to minimize erosion risk.
- Stabilize erosion hazard areas.
- Increase Awareness of erosion hazard areas.
- Locating offices and critical facilities in areas susceptible to erosion to decrease the risk of service disruption.
- Promoting erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing techniques, or installing riprap boulders or geotextile fabric.

ISN

31

Natural Hazards – 7. Dam/Levee Failure



ISN

32

Natural Hazards – Dam/Levee Failure

New Hazard		Total Hazard	
Area (sq. miles)	Population	Area (sq. miles)	Population
1.0	10,000	1.0	10,000
2.0	20,000	2.0	20,000
3.0	30,000	3.0	30,000
4.0	40,000	4.0	40,000
5.0	50,000	5.0	50,000
6.0	60,000	6.0	60,000
7.0	70,000	7.0	70,000
8.0	80,000	8.0	80,000
9.0	90,000	9.0	90,000
10.0	1,000,000	10.0	1,000,000

ISN

33

Natural Hazards – Dam/Levee Failure


Mitigation Action Examples

- An inspection, maintenance and enforcement program help to ensure continued structural integrity.
- Unserviceable or old and structurally impaired dams should be removed or significantly repaired upon.
- Develop an automatic pump and flood gate operation.
- Develop alternative evacuation routes/plans and designate emergency thoroughfares, particularly in areas with limited capacity. Evaluate options on evacuation routes and procedures.
- Implement and enhance an area-wide telephone Emergency Notification System.
- Harden/critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.

ISN

34

Natural Hazards – Expansive Soil



ISN

35

Natural Hazards – Expansive Soil

New Hazard		Total Hazard	
Area (sq. miles)	Population	Area (sq. miles)	Population
1.0	10,000	1.0	10,000
2.0	20,000	2.0	20,000
3.0	30,000	3.0	30,000
4.0	40,000	4.0	40,000
5.0	50,000	5.0	50,000
6.0	60,000	6.0	60,000
7.0	70,000	7.0	70,000
8.0	80,000	8.0	80,000
9.0	90,000	9.0	90,000
10.0	1,000,000	10.0	1,000,000

ISN

36

Natural Hazards – Expansive Soil

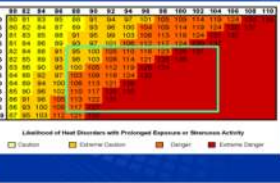
Mitigation Action Examples

- Improve data collection capabilities of expansive soil incidents. This may include using the City's 3-1-1 helpline to receive a database of reports called in regarding cracked roads and other evidence of expansive soils. A database would be compiled with the information and then the most vulnerable facilities could be identified.
- Develop and implement a program to regularly water the foundation of public buildings.
- Develop and implement an ordinance to require engineering techniques for infrastructures to mitigate the effects of expansive soils.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Conduct pre-development inspection for potential non/semi-responsive soil threats.
- Utilize soil-strengthening techniques when constructing new buildings.
- Remove expansive substrates and replace them with non-expansive material.

ISN

37

Natural Hazards – 10. Extreme Heat



ISN

38

Natural Hazards – Extreme Heat

New Hazard		Total Hazard	
Area (sq. miles)	Population	Area (sq. miles)	Population
1.0	10,000	1.0	10,000
2.0	20,000	2.0	20,000
3.0	30,000	3.0	30,000
4.0	40,000	4.0	40,000
5.0	50,000	5.0	50,000
6.0	60,000	6.0	60,000
7.0	70,000	7.0	70,000
8.0	80,000	8.0	80,000
9.0	90,000	9.0	90,000
10.0	1,000,000	10.0	1,000,000

ISN

39

Natural Hazards – Extreme Heat


Mitigation Action Examples

- Establish, adopt, and implement a "green infrastructure" program for parks, nature preserves, greenbelts, etc.
- Adopt smart growth initiatives. Incorporate a formal hazard mitigation plan in long-term community development planning activity.
- Incorporate higher standards for hazard resistance in local application of the building code.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Encouraging installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air. Encourage the use of cool roofing products that reflect sunlight and heat away from buildings.
- Increase tree plantings around buildings to shade parking lots and public rights-of-way.
- Establish dedicated heat-resisting facilities for citizens to utilize during extreme weather events.

ISN

40

Natural Hazards – 11. Hailstorm



ISN

41

Natural Hazards – Hailstorm

New Hazard		Total Hazard	
Area (sq. miles)	Population	Area (sq. miles)	Population
1.0	10,000	1.0	10,000
2.0	20,000	2.0	20,000
3.0	30,000	3.0	30,000
4.0	40,000	4.0	40,000
5.0	50,000	5.0	50,000
6.0	60,000	6.0	60,000
7.0	70,000	7.0	70,000
8.0	80,000	8.0	80,000
9.0	90,000	9.0	90,000
10.0	1,000,000	10.0	1,000,000

ISN

42

Mitigation Action Workshop Public Meeting Presentation, May 25, 2023 (continued)

Natural Hazards – Hailstorm

Mitigation Action Examples

- Require standards for burial of utility lines in new developments. Bury existing utility lines.
- Adopt and implement a routine tree trimming program that clears trees from power lines and/or hanging in the right-of-way. Remove dead trees from right-of-way and drainage systems on a scheduled basis.
- Acquire and distribute NOAA radars.
- Harden/critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Consider full guards for HVAC equipment, particularly in high-rise areas.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Consider steering fleet vehicles in more than one location to spread risk. Explore the possibility of protected coverage or indoor parking.
- Designate "safe areas" inside or directly adjacent to facilities to prevent hail-induced injuries that may occur during a severe hailstorm.

43

Natural Hazards – 12. Land Subsidence

44

Natural Hazards – Land Subsidence

Category	Value
...	...

45

Natural Hazards – Land Subsidence

Mitigation Action Examples

- Manage development in areas that have been identified as at-risk to subsidence.
- Monitoring areas at risk to subsidence to remaining aware of changes in groundwater levels, places where natural resources are removed from underground, or other subsurface open spaces.
- Acquire and demolish or relocate buildings and infrastructure in high-risk areas.
- Offer OIG hazard mitigation advice for residents and design professionals.
- Consider land subsidence during building/infrastructure design.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.

46

Natural Hazards – 13. Extreme Winter Storm

47

Natural Hazards – Extreme Winter Storm

Category	Value
...	...

48

Natural Hazards – Extreme Winter Storm

Mitigation Action Examples

- Add building insulation to walls and attic and upgrade floor plans of public facilities.
- Adopt and implement programs to insulate outdoor pipes at public buildings.
- Educate citizens on how to prevent frozen pipes. Educate citizens on carbon monoxide warnings/signs.
- Install warning signs at hazardous bridges and roadways subject to ice.
- Require standards for burial of utility lines in new developments. Bury existing utility lines.
- Adopt and implement a routine tree trimming program that clears trees from power lines and/or hanging in the right-of-way. Remove dead trees from right-of-way and drainage systems on a scheduled basis.
- Include higher standards for hazard resistance in local applications of the building code.
- Harden/critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Establish reduced-occupancy facilities to citizens to utilize during extreme weather events.

49

Natural Hazards – 14. Windstorm

50

Natural Hazards – Windstorm

Category	Value
...	...

51

Natural Hazards – Windstorm

Mitigation Action Example

- Require standards for burial of utility lines in new developments. Bury existing utility poles to ensure they meet specifications and are wind resistant.
- Adopt ordinance requiring tie-downs for mobile homes. Require manufactured housing be securely anchored to permanent foundations. Require secured locations of propane tanks.
- Require "safe rooms" to be added when constructing new schools, daycare, retail centers, and critical facilities.
- Incorporate higher standards for hazard resistance in local applications of the building code. Adopt architectural design standards for optimal wind-resistance.
- Implement and enhance an area-wide telephone Emergency Notification System.
- Harden/critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Obtain certification in the National Weather Service StormReady Program.
- Acquire and distribute NOAA weather radios.
- Adopt and implement a routine tree trimming program that clears trees from power lines and/or hanging in the right-of-way. Remove dead trees from right-of-way and drainage systems on a scheduled basis.
- Monitor natural environmental features as wind sheds.

52

Natural Hazards – 15. Lightning

Event Description

- Lightning nearly struck three golfers at the Corpus Christi Country Club.
- Lightning struck a 14-year-old girl carrying an umbrella in the Wal-Mart parking lot in Flour Bluff off of Chisholm Trail.
- Lightning struck a semi-trailer at the Valero 500 Greenway Highway between 500 and 100 AM CDT. Valero estimated roughly \$1,000 gallons of oil spilled into the adjacent channel. Lightning struck a Houston company truck on Midland Ct. One person was inside the truck at the time but was not injured.
- Lightning struck a bank teller in an open field just off FM 10 and C.R. 88, causing a small explosion and the roughly 100 barrels of oil were pulled from the bank teller.
- A 30-year-old man was struck and killed by lightning on Mustang Island Beach near Port Aransas.
- Lightning struck a house near the Kings Country subdivision, with significant damage reported.
- Lightning struck the Tropical Inn Apartments on Jamaica Drive causing a fire.
- Lightning struck an oil tank causing an explosion and fire. The tank was near Farm to Market Road 900 and County Road 55 north of San Angelo.
- Lightning struck a house on Cause Valley Drive in Corpus Christi. The house caught on fire. An elderly person had to be rescued.
- Lightning struck a beer house on Middle Road in Corpus Christi. The fire destroyed the beerhouse and led to additional businesses closing on the site.

53

Natural Hazards – Lightning

Category	Value
...	...

54

Natural Hazards – Lightning

Mitigation Action Examples

- Require standards for burial of utility lines in new developments. Bury existing utility lines.
- Adopt and implement a routine tree trimming program that clears trees from power lines and/or hanging in the right-of-way. Remove dead trees from right-of-way and drainage systems on a scheduled basis.
- Install lightning lightning protection devices/methods, such as surge protectors, lightning rods, and other grounding methods, on critical facilities, communication infrastructure, electronic equipment, etc.
- Harden/critical facilities to hazard-resistant levels. Acquire and install generators in critical facilities.
- Implement education awareness programs to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and damages.
- Implement a plan to detect lightning strikes within a certain risk radius. Establish warning sirens that indicate when not to operate, utility preparation, and overall protection of public safety.
- Posting warning signage at local parks.

55

Mitigation Strategy

- Incorporated into other planning mechanisms
- Departments/offices responsible for mitigation actions
- Ongoing Maintenance
- Review annually
- Add actions if desired

56

Adoption and Implementation

- Adopted by Board of Directors
- Following TDEM, FEMA review
- Planning Team to review mitigation strategy annually
- Update plan every five years

57

Next Steps

→ Collect Mitigation Actions

Category	Value
...	...

→ Return 6/15/2023

58

Questions

59

Thank You

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 Flood Mitigation Manager
 TMMakino@lan-inc.com
 (713) 821-9359

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Mitigation Action Workshop Planning Meeting Attendance May 25, 2023

Participant	Community
Adrian Pena	Banquete ISD
Javier Zapata	City of Robstown
John Howard	City of Agua Dulce
Dalen Keith	LAN
Tak Makino	LAN
Patti Hobbs	City of Robstown
Richard Chapman	NCWCID#4
Sal Ochoa	City of Bishop

Appendix D: Critical Facilities

Asset Name	Asset Class	Jurisdiction
Agua Dulce ISD Agua Dulce Elementary School	School	Agua Dulce
Agua Dulce ISD Agua Dulce H S	School	Agua Dulce
Banquete ISD Banquete El	School	Banquete ISD
Banquete ISD Banquete H S	School	Banquete ISD
Banquete ISD Banquete J H	School	Banquete ISD
Bishop CISD Bishop El	School	Bishop
Bishop CISD Bishop H S	School	Bishop
Bishop CISD Bishop Pri	School	Bishop
Bishop CISD Lillion E Luehrs J H	School	Bishop
Annville Fire Department 11551 Leopard St Corpus Christi, Texas 78410	Fire station	Corpus Christi
Bayview Behavioral Hospital, A Campus of Corpus Christi Medical	Hospital	Corpus Christi
Calallen ISD Calallen Charter H S	School	Corpus Christi
Calallen ISD Calallen East El	School	Corpus Christi
Calallen ISD Calallen H S	School	Corpus Christi
Calallen ISD Calallen Middle	School	Corpus Christi
Calallen ISD Calallen Wood River El	School	Corpus Christi
Calallen ISD Magee El	School	Corpus Christi
Christus Spohn Hospital Corpus Christi	Hospital	Corpus Christi
Christus Spohn Hospital Corpus Christi Shoreline	Hospital	Corpus Christi
Christus Spohn Hospital Corpus Christi South	Hospital	Corpus Christi
Corpus Christi ISD Adkins Middle	School	Corpus Christi
Corpus Christi ISD Allen El	School	Corpus Christi
Corpus Christi ISD Baker Middle	School	Corpus Christi
Corpus Christi ISD Barnes El	School	Corpus Christi
Corpus Christi ISD Browne Middle	School	Corpus Christi
Corpus Christi ISD Calk El	School	Corpus Christi
Corpus Christi ISD Carroll H S	School	Corpus Christi
Corpus Christi ISD Club Estates	School	Corpus Christi
Corpus Christi ISD Coles H S And Educational Center	School	Corpus Christi
Corpus Christi ISD Collegiate H S	School	Corpus Christi
Corpus Christi ISD Crockett El	School	Corpus Christi
Corpus Christi ISD Cullen Middle	School	Corpus Christi
Corpus Christi ISD Cunningham @ South Park Middle	School	Corpus Christi

Asset Name	Asset Class	Jurisdiction
Corpus Christi ISD Dawson El	School	Corpus Christi
Corpus Christi ISD Driscoll Middle	School	Corpus Christi
Corpus Christi ISD Early Childhood Development Ctr	School	Corpus Christi
Corpus Christi ISD Evans Ses	School	Corpus Christi
Corpus Christi ISD Fannin El	School	Corpus Christi
Corpus Christi ISD Faye Webb El	School	Corpus Christi
Corpus Christi ISD Galvan El	School	Corpus Christi
Corpus Christi ISD Garcia El	School	Corpus Christi
Corpus Christi ISD Gibson El	School	Corpus Christi
Corpus Christi ISD Grant Middle	School	Corpus Christi
Corpus Christi ISD Haas Middle	School	Corpus Christi
Corpus Christi ISD Hamlin Middle	School	Corpus Christi
Corpus Christi ISD Harold T Branch Academy for Career & Tech.	School	Corpus Christi
Corpus Christi ISD Hicks El	School	Corpus Christi
Corpus Christi ISD Houston El	School	Corpus Christi
Corpus Christi ISD Jones El	School	Corpus Christi
Corpus Christi ISD Kaffie Middle	School	Corpus Christi
Corpus Christi ISD King H S	School	Corpus Christi
Corpus Christi ISD Kolda El	School	Corpus Christi
Corpus Christi ISD Kostoryz El	School	Corpus Christi
Corpus Christi ISD Los Encinos Ses	School	Corpus Christi
Corpus Christi ISD Martin Middle	School	Corpus Christi
Corpus Christi ISD Mary Grett School	School	Corpus Christi
Corpus Christi ISD Mary Helen Berlanga El	School	Corpus Christi
Corpus Christi ISD Meadowbrook El	School	Corpus Christi
Corpus Christi ISD Menger El	School	Corpus Christi
Corpus Christi ISD Mireles El	School	Corpus Christi
Corpus Christi ISD Montclair El	School	Corpus Christi
Corpus Christi ISD Moody H S	School	Corpus Christi
Corpus Christi ISD Moore El	School	Corpus Christi
Corpus Christi ISD Oak Park Special Emphasis School	School	Corpus Christi
Corpus Christi ISD Ray H S	School	Corpus Christi
Corpus Christi ISD Roy Miller H S And Metro School of Design	School	Corpus Christi
Corpus Christi ISD Sanders El	School	Corpus Christi
Corpus Christi ISD Schanen Estates El	School	Corpus Christi
Corpus Christi ISD Shaw Ses	School	Corpus Christi
Corpus Christi ISD Smith El	School	Corpus Christi

Asset Name	Asset Class	Jurisdiction
Corpus Christi ISD South Park Middle	School	Corpus Christi
Corpus Christi ISD Travis El	School	Corpus Christi
Corpus Christi ISD Veterans Memorial H S	School	Corpus Christi
Corpus Christi ISD Wilson El	School	Corpus Christi
Corpus Christi ISD Windsor Park G/T	School	Corpus Christi
Corpus Christi ISD Woodlawn El	School	Corpus Christi
Corpus Christi ISD Wynn Seale Metropolitan School of Design	School	Corpus Christi
Corpus Christi ISD Yeager El	School	Corpus Christi
Corpus Christi ISD Zavala El	School	Corpus Christi
Corpus Christi Montessori School Corpus Christi Montessori School	School	Corpus Christi
Corpus Christi Rehabilitation Hospital	Hospital	Corpus Christi
Dr M L Garza-Gonzalez Charter School Accelerated Learning Center	School	Corpus Christi
Dr M L Garza-Gonzalez Charter School Dr M L Garza-Gonzalez Charter School	School	Corpus Christi
Dr M L Garza-Gonzalez Charter School Gcclr Institute of Tech.	School	Corpus Christi
Driscoll Children S Hospital	Hospital	Corpus Christi
Driscoll ISD Elementary and Jr High	School	Driscoll
Dubuis Hospital of Corpus Christi	Hospital	Corpus Christi
Fire Station 1 - 514 Belden St Corpus Christi, Tx 78401	Fire station	Corpus Christi
Fire Station 10 - 1550 Horne Rd. Corpus Christi, Tx 78416	Fire station	Corpus Christi
Fire Station 11 - 910 Airline Rd. Corpus Christi, Tx 78412	Fire station	Corpus Christi
Fire Station 12 - 2120 Rand Morgan Rd. Corpus Christi, Tx 78410	Fire station	Corpus Christi
Fire Station 13 - 1801 Waldron Rd. Corpus Christi, Tx 78418	Fire station	Corpus Christi
Fire Station 14 - 5901 S Staples St. Corpus Christi, Tx 78413	Fire station	Corpus Christi
Fire Station 15 - 14202 Commodore St. Corpus Christi, Tx 78418	Fire station	Corpus Christi
Fire Station 16 - 8185 Texas 361 Corpus Christi, Tx 78373	Fire station	Corpus Christi
Fire Station 17 - 6869 Yorktown Blvd Corpus Christi, Tx 78414	Fire station	Corpus Christi
Fire Station 18 - 6226 Ayers St. Corpus Christi, Tx 78415	Fire station	Corpus Christi
Fire Station 2 - 13421 Leopard St. Corpus Christi, Tx 78410	Fire station	Corpus Christi
Fire Station 3 - 1401 Morgan Avenue Corpus Christi, Tx 78404	Fire station	Corpus Christi
Fire Station 4 - 2338 Rodd Field Rd Corpus Christi, Tx 78414	Fire station	Corpus Christi
Fire Station 5 - 3105 Leopard St. Corpus Christi, Tx 78408	Fire station	Corpus Christi
Fire Station 6 - 6713 Weber Rd Corpus Christi, Tx 78413	Fire station	Corpus Christi
Fire Station 7 - 3750 S Staples St. Corpus Christi, Tx 78411	Fire station	Corpus Christi
Fire Station 8 - 4645 Kostoryz Rd. Corpus Christi, Tx 78415	Fire station	Corpus Christi
Fire Station 9 - 501 Navigation Blvd. Corpus Christi, Tx 78408	Fire station	Corpus Christi
Flour Bluff ISD Early Childhood Center	School	Corpus Christi

Asset Name	Asset Class	Jurisdiction
Flour Bluff ISD Flour Bluff El	School	Corpus Christi
Flour Bluff ISD Flour Bluff H S	School	Corpus Christi
Flour Bluff ISD Flour Bluff Int	School	Corpus Christi
Flour Bluff ISD Flour Bluff J H	School	Corpus Christi
Flour Bluff ISD Flour Bluff Pri	School	Corpus Christi
Laguna Madre Wastewater	WWTP	Corpus Christi
Nueces County Emergency Operations Center	EOC	Corpus Christi
Nueces County Emergency Services District 2 337 Yorktown Blvd Corpus Christi, Texas 78418	Fire station	Corpus Christi
O. N. Stevens Water Filtration Plant	WTP	Corpus Christi
Por Vida Academy Cesar E Chavez Academy	School	Corpus Christi
Por Vida Academy Corpus Christi College Prep H S	School	Corpus Christi
Post Acute Medical Specialty Hospital of Corpus Christi	Hospital	Corpus Christi
Richard Milburn Alter High School (Killeen Richard Milburn Academy Corpus Christi	School	Corpus Christi
School Of Science and Technology Discovery School of Science and Technology Corpus Ch	School	Corpus Christi
Seashore Charter Schools Seashore Learning Center	School	Corpus Christi
Seashore Charter Schools Seashore Middle Acad	School	Corpus Christi
South Texas Surgical Hospital	Hospital	Corpus Christi
The Corpus Christi Medical Center - Bay Area	Hospital	Corpus Christi
The Corpus Christi Medical Center - Doctors Regional	Hospital	Corpus Christi
The Corpus Christi Medical Center - Northwest	Hospital	Corpus Christi
The Corpus Christi Medical Center - The Heart Hospital	Hospital	Corpus Christi
Trinity Charter School Bokenkamp	School	Corpus Christi
Tuloso-Midway ISD Tuloso-Midway Academic Career Center	School	Corpus Christi
Tuloso-Midway ISD Tuloso-Midway H S	School	Corpus Christi
Tuloso-Midway ISD Tuloso-Midway Int	School	Corpus Christi
Tuloso-Midway ISD Tuloso-Midway Middle	School	Corpus Christi
Tuloso-Midway ISD Tuloso-Midway Pri	School	Corpus Christi
West Oso ISD Kennedy El	School	Corpus Christi
West Oso ISD West Oso El	School	Corpus Christi
West Oso ISD West Oso H S	School	Corpus Christi
West Oso ISD West Oso J H	School	Corpus Christi
Driscoll ISD Driscoll El & Middle	School	Driscoll
London ISD London El	School	Nueces County
London ISD London H S	School	Nueces County
Nueces County Emergency Services District 1 5241 Co Rd 73 Robstown, Texas 78380	Fire station	Nueces County

Asset Name	Asset Class	Jurisdiction
Bishop CISD Petronila El	School	Petronila
City Of Port Aransas Wastewater Treatment Plant	WWTP	Port Aransas
Port Aransas Fire Department 202 E Avenue C Port Aransas, Texas 78373	Fire station	Port Aransas
Port Aransas ISD Brundrett Middle	School	Port Aransas
Port Aransas ISD Olsen El	School	Port Aransas
Port Aransas ISD Port Aransas H S	School	Port Aransas
TXDOT Ferry Terminal	Other	Port Aransas
University Of Texas Marine Science Institute	School	Port Aransas
Robstown Emergency Operations Center	EOC	Robstown
Robstown ISD Hattie Martin Early Childhood Center	School	Robstown
Robstown ISD Lotspeich El	School	Robstown
Robstown ISD Robert Driscoll Jr El	School	Robstown
Robstown ISD Robstown H S	School	Robstown
Robstown ISD Salazar Crossroads Academy	School	Robstown
Robstown ISD San Pedro El	School	Robstown
Robstown ISD Seale J H	School	Robstown
Robstown ISD Solomon P Ortiz Int	School	Robstown

Appendix E: Wildfire Occurrences

Start Date	Area Burned (Acres)	Cause	Sub-Cause
1/13/2005	5	Debris burning	Unsafe burning of household trash
1/17/2005	3	Debris burning	Unsafe burning of household trash
1/23/2005	5	Debris burning	Brush pile burning
12/31/2005	0.06	Miscellaneous	Other
1/1/2006	10	Equipment use	Farm equipment (hay balers, tractors, etc.)
1/2/2006	0.06	Miscellaneous	Other
1/3/2006	0.06	Miscellaneous	Other
1/5/2006	1	Incendiary	Other
1/6/2006	1	Debris burning	Right-of-ways; utility co.'s and highways
1/6/2006	1.5	Incendiary	Other
1/16/2006	72	Miscellaneous	Other
1/17/2006	5	Incendiary	Other
1/20/2006	10	Power lines	Power Lines
1/24/2006	2	Miscellaneous	Other
1/27/2006	0.5	Incendiary	Spite
2/5/2006	70	Equipment use	Oil field equipment (pump jacks, faulty electric lines, etc.)
2/7/2006	0.1	Incendiary	Other
2/8/2006	0.1	Miscellaneous	Other
2/10/2006	0.06	Miscellaneous	Other
2/10/2006	0.06	Miscellaneous	Other
2/13/2006	0.06	Miscellaneous	Other
2/15/2006	1	Incendiary	Other
2/16/2006	1	Railroads	Origin traceable to trains
2/17/2006	1	Miscellaneous	Other
2/20/2006	1	Incendiary	Other
3/6/2006	3	Incendiary	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
3/8/2006	0.06	Miscellaneous	Other
3/9/2006	0.25	Miscellaneous	Other
3/9/2006	0.06	Miscellaneous	Other
3/10/2006	0.06	Miscellaneous	Other
3/12/2006	5	Miscellaneous	Other
3/13/2006	2	Miscellaneous	Other
3/18/2006	200	Miscellaneous	Other
3/19/2006	0.06	Miscellaneous	Other
3/21/2006	1	Debris burning	Brush pile burning
3/21/2006	0	Campfire	Warming or cooking
3/28/2006	1	Debris burning	Unsafe burning of household trash
3/31/2006	1	Miscellaneous	Other
4/4/2006	2	Miscellaneous	Other
4/8/2006	1	Children	Playing with matches
4/10/2006	3	Power lines	Power Lines
4/13/2006	2	Smoking	Origin traceable to smoking
4/16/2006	1	Miscellaneous	Other
4/19/2006	1	Power lines	Power Lines
4/21/2006	0.5	Miscellaneous	Other
4/26/2006	0.5	Debris burning	Construction debris (boards, panels, cardboard, etc.)
4/28/2006	1	Miscellaneous	Other
5/1/2006	0.5	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
5/3/2006	1	Debris burning	Burning leaves and garden spots
5/16/2006	0.1	Miscellaneous	Other
5/19/2006	3	Miscellaneous	Other
5/21/2006	0.5	Miscellaneous	Other
5/21/2006	0.5	Incendiary	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
5/22/2006	1	Miscellaneous	Other
5/25/2006	1	Incendiary	Amusement
6/8/2006	0.5	Power lines	Power Lines
6/13/2006	1	Children	Playing with matches
6/16/2006	60	Incendiary	Other
6/16/2006	0.05	Miscellaneous	Other
6/28/2006	0.5	Children	Other
7/6/2006	1	Power lines	Power Lines
7/14/2006	0.5	Miscellaneous	Other
7/16/2006	40	Equipment use	Bush hogs, lawn mowers, weed eaters, etc.
7/22/2006	0.5	Miscellaneous	Other
7/31/2006	0.1	Power lines	Power Lines
8/6/2006	0.5	Miscellaneous	Other
8/16/2006	0.5	Equipment use	Farm equipment (hay balers, tractors, etc.)
8/21/2006	0	Power lines	Power Lines
8/31/2006	0	Miscellaneous	Other
9/5/2006	15	Miscellaneous	Other
10/8/2006	0.5	Miscellaneous	Other
12/30/2006	50	Miscellaneous	Other
1/1/2007	1	Incendiary	Other
1/25/2007	1	Miscellaneous	Other
3/24/2007	2	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
4/13/2007	3	Power lines	Power Lines
5/3/2007	1	Power lines	Power Lines
5/4/2007	1	Children	Playing with matches
5/7/2007	2	Miscellaneous	Other
6/10/2007	50	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
12/26/2007	100	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
12/29/2007	800	Miscellaneous	Fireworks
12/31/2007	200	Miscellaneous	Fireworks
1/1/2008	10	Miscellaneous	Fireworks
1/1/2008	5	Miscellaneous	Fireworks
1/1/2008	40	Miscellaneous	Fireworks
1/2/2008	30	Miscellaneous	Fireworks
1/3/2008	400	Equipment use	Farm equipment (hay balers, tractors, etc.)
1/3/2008	6	Miscellaneous	Fireworks
1/9/2008	1	Power lines	Power Lines
1/10/2008	2	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
1/11/2008	1	Miscellaneous	Other
1/13/2008	2	Debris burning	Unsafe burning of household trash
1/15/2008	1	Campfire	Warming or cooking
1/30/2008	5	Incendiary	Other
2/1/2008	2	Miscellaneous	Other
2/6/2008	3000	Debris burning	Prescribed burning (forest brush control/hazard reduction, grassland brush control)
2/6/2008	5	Miscellaneous	Other
2/6/2008	2	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
2/7/2008	2	Miscellaneous	Other
2/7/2008	2	Debris burning	Unsafe burning of household trash
2/10/2008	1	Miscellaneous	Other
2/14/2008	2	Miscellaneous	Other
2/22/2008	1	Miscellaneous	Other
2/23/2008	1	Miscellaneous	Other
2/23/2008	0.5	Incendiary	Other
2/26/2008	100	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
2/26/2008	20	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
2/26/2008	5	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
2/27/2008	100	Equipment use	Bush hogs, lawn mowers, weed eaters, etc.
2/28/2008	5	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
2/29/2008	2	Miscellaneous	Other
3/1/2008	1	Power lines	Power Lines
3/5/2008	1	Miscellaneous	Other
3/16/2008	2	Power lines	Power Lines
3/19/2008	5	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
3/21/2008	100	Miscellaneous	Other
3/26/2008	1	Power lines	Power Lines
4/15/2008	3	Debris burning	Brush pile burning
5/8/2008	1	Power lines	Power Lines
5/27/2008	4	Miscellaneous	Other
5/30/2008	5	Incendiary	Other
6/6/2008	20	Power lines	Power Lines
6/9/2008	2	Power lines	Power Lines
6/10/2008	1	Miscellaneous	Other
6/27/2008	30	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
7/21/2008	50	Power lines	Power Lines
8/15/2008	2	Miscellaneous	Other
9/2/2008	0.25	Miscellaneous	Other
9/19/2008	0.5	Miscellaneous	Other
9/24/2008	2	Equipment use	Farm equipment (hay balers, tractors, etc.)
10/5/2008	1	Lightning	Origin traceable to lightning
11/5/2008	2	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
11/5/2008	2	Children	Playing with matches

Start Date	Area Burned (Acres)	Cause	Sub-Cause
11/24/2008	0.5	Miscellaneous	Other
11/24/2008	1	Smoking	Origin traceable to smoking
11/28/2008	10	Smoking	Origin traceable to smoking
12/4/2008	25	Campfire	Warming or cooking
12/6/2008	0.5	Miscellaneous	Other
12/13/2008	1000	Miscellaneous	Other
12/28/2008	1	Miscellaneous	Fireworks
12/28/2008	1	Miscellaneous	Fireworks
12/29/2008	1	Miscellaneous	Fireworks
12/30/2008	3	Miscellaneous	Other
1/1/2009	0.5	Miscellaneous	Fireworks
1/1/2009	0	Miscellaneous	Other
1/2/2009	0	Miscellaneous	Other
1/3/2009	0.5	Smoking	Origin traceable to smoking
1/7/2009	2	Miscellaneous	Other
1/10/2009	1	Miscellaneous	Other
1/10/2009	1	Smoking	Origin traceable to smoking
1/10/2009	0	Miscellaneous	Other
1/12/2009	0	Miscellaneous	Other
1/15/2009	1	Children	Playing with matches
1/15/2009	1	Miscellaneous	Other
1/18/2009	0.25	Miscellaneous	Other
1/19/2009	2	Smoking	Origin traceable to smoking
1/20/2009	3	Debris burning	Unsafe burning of household trash
1/21/2009	0.25	Debris burning	Construction debris (boards, panels, cardboard, etc.)
1/24/2009	1000	Miscellaneous	Other
1/25/2009	1	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
1/25/2009	0.5	Miscellaneous	Other
1/27/2009	1	Miscellaneous	Other
1/29/2009	0.5	Smoking	Origin traceable to smoking
1/29/2009	1	Equipment use	Bush hogs, lawn mowers, weed eaters, etc.
2/3/2009	0.5	Miscellaneous	Other
2/3/2009	0.1	Miscellaneous	Other
2/3/2009	100	Equipment use	Farm equipment (hay balers, tractors, etc.)
2/5/2009	5	Smoking	Origin traceable to smoking
2/6/2009	0.5	Smoking	Origin traceable to smoking
2/9/2009	70	Miscellaneous	Other
2/9/2009	50	Miscellaneous	Other
2/11/2009	1	Power lines	Power Lines
2/11/2009	1	Smoking	Origin traceable to smoking
2/11/2009	1	Power lines	Power Lines
2/20/2009	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
2/20/2009	0.5	Campfire	Warming or cooking
3/1/2009	2	Debris burning	Unsafe burning of household trash
3/1/2009	0.25	Miscellaneous	Other
3/1/2009	0.25	Equipment use	Bush hogs, lawn mowers, weed eaters, etc.
3/1/2009	60	Debris burning	Brush pile burning
3/2/2009	0.25	Smoking	Origin traceable to smoking
3/3/2009	3	Equipment use	Farm equipment (hay balers, tractors, etc.)
3/7/2009	0.3	Smoking	Origin traceable to smoking
3/9/2009	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
3/18/2009	1	Children	Playing with matches
3/21/2009	1	Children	Playing with matches
3/21/2009	5	Children	Playing with matches

Start Date	Area Burned (Acres)	Cause	Sub-Cause
3/26/2009	20	Power lines	Power Lines
3/29/2009	1	Miscellaneous	Other
4/1/2009	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
4/2/2009	40	Miscellaneous	Other
4/2/2009	40	Power lines	Power Lines
4/3/2009	1	Miscellaneous	Other
4/3/2009	20	Miscellaneous	Other
4/18/2009	3	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
4/20/2009	3	Miscellaneous	Other
4/22/2009	15	Miscellaneous	Other
4/26/2009	7	Miscellaneous	Other
4/28/2009	5	Miscellaneous	Other
4/29/2009	0.5	Power lines	Power Lines
5/3/2009	26	Children	Playing with matches
5/15/2009	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
5/15/2009	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
5/15/2009	7	Miscellaneous	Other
5/15/2009	5	Miscellaneous	Other
5/25/2009	0.5	Children	Playing with matches
5/29/2009	0.5	Power lines	Power Lines
6/28/2009	1	Miscellaneous	Other
6/30/2009	0.5	Miscellaneous	Other
7/4/2009	2	Miscellaneous	Other
7/16/2009	0.5	Debris burning	Burning leaves and garden spots
7/21/2009	100	Children	Playing with matches
8/4/2009	0.5	Miscellaneous	Other
8/8/2009	2	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
8/18/2009	1	Children	Playing with matches
8/24/2009	1	Miscellaneous	Other
8/30/2009	1	Lightning	Origin traceable to lightning
9/18/2009	0.5	Children	Playing with matches
9/18/2009	0.5	Children	Playing with matches
10/16/2009	1	Power lines	Power Lines
10/17/2009	0.5	Children	Playing with matches
10/18/2009	0.5	Power lines	Power Lines
10/31/2009	1	Miscellaneous	Other
11/5/2009	1	Miscellaneous	Other
11/13/2009	1	Miscellaneous	Other
11/14/2009	5	Miscellaneous	Other
12/23/2009	3	Children	Playing with matches
1/1/2010	0	Miscellaneous	Other
1/8/2010	1	Incendiary	Other
1/9/2010	1	Miscellaneous	Other
1/17/2010	0	Miscellaneous	Other
1/19/2010	0	Miscellaneous	Other
1/19/2010	0	Miscellaneous	Other
1/20/2010	0	Miscellaneous	Other
2/12/2010	0	Miscellaneous	Other
2/15/2010	1	Children	Playing with matches
3/7/2010	1	Children	Playing with matches
3/9/2010	0	Miscellaneous	Other
3/14/2010	0	Miscellaneous	Other
3/17/2010	1	Children	Playing with matches
3/23/2010	2	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
3/28/2010	0.5	Children	Playing with matches
3/30/2010	0.2	Miscellaneous	Other
4/7/2010	0.1	Campfire	Warming or cooking
4/22/2010	1	Miscellaneous	Other
4/26/2010	0	Miscellaneous	Other
4/26/2010	0	Miscellaneous	Other
5/5/2010	0.5	Smoking	Origin traceable to smoking
5/9/2010	0.5	Incendiary	Other
5/10/2010	0	Miscellaneous	Other
5/10/2010	0	Miscellaneous	Other
5/10/2010	0	Miscellaneous	Other
5/10/2010	0	Miscellaneous	Other
5/12/2010	0	Miscellaneous	Other
5/12/2010	0	Equipment use	Farm equipment (hay balers, tractors, etc.)
6/5/2010	0.5	Miscellaneous	Other
6/16/2010	0.5	Miscellaneous	Other
6/16/2010	0.5	Power lines	Power Lines
7/4/2010	0.1	Miscellaneous	Fireworks
7/12/2010	0.1	Debris burning	Brush pile burning
7/17/2010	0.1	Power lines	Power Lines
7/18/2010	1	Power lines	Power Lines
7/18/2010	1	Children	Playing with matches
8/8/2010	0.5	Miscellaneous	Other
8/21/2010	0.5	Miscellaneous	Other
10/16/2010	1	Power lines	Power Lines
10/22/2010	2	Power lines	Power Lines
10/29/2010	0.5	Power lines	Power Lines

Start Date	Area Burned (Acres)	Cause	Sub-Cause
10/29/2010	0.5	Debris burning	Trash dumps
12/11/2010	75	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
12/31/2010	1	Miscellaneous	Fireworks
1/1/2011	1	Miscellaneous	Fireworks
1/1/2011	1	Miscellaneous	Fireworks
1/1/2011	1	Miscellaneous	Fireworks
1/1/2011	1	Miscellaneous	Fireworks
1/1/2011	1	Miscellaneous	Fireworks
1/1/2011	0	Miscellaneous	Other
1/1/2011	0	Miscellaneous	Other
2/8/2011	1	Power lines	Not specified
2/12/2011	15	Power lines	Not specified
2/12/2011	0	Miscellaneous	Other
2/13/2011	3	Miscellaneous	Other
2/13/2011	2	Children	Playing with matches
2/13/2011	0	Miscellaneous	Other
2/16/2011	1	Children	Playing with matches
2/17/2011	0	Miscellaneous	Other
2/19/2011	0	Miscellaneous	Other
3/10/2011	0	Miscellaneous	Other
3/10/2011	0	Miscellaneous	Other
3/12/2011	3	Power lines	Not specified
3/19/2011	1	Miscellaneous	Other
3/19/2011	0	Incendiary	Other
4/5/2011	2	Incendiary	Other
4/5/2011	0	Miscellaneous	Other
4/11/2011	0	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
4/28/2011	0.5	Miscellaneous	Other
4/29/2011	0.5	Miscellaneous	Other
4/29/2011	0.5	Miscellaneous	Other
4/30/2011	2	Power lines	Not specified
5/3/2011	1	Power lines	Not specified
5/3/2011	0.5	Power lines	Not specified
5/3/2011	25	Power lines	Not specified
5/4/2011	0	Miscellaneous	Other
5/5/2011	2	Power lines	Not specified
5/19/2011	1	Power lines	Not specified
6/3/2011	0	Miscellaneous	Other
6/4/2011	3	Children	Playing with matches
6/6/2011	0	Miscellaneous	Other
6/14/2011	4	Debris burning	Trash dumps
6/15/2011	1	Debris burning	Trash dumps
6/26/2011	0	Miscellaneous	Other
6/27/2011	8	Debris burning	Unsafe burning of household trash
6/29/2011	500	Smoking	Origin traceable to smoking
6/29/2011	1	Miscellaneous	Other
6/29/2011	500	Miscellaneous	Other
6/29/2011	0	Miscellaneous	Other
6/29/2011	0	Miscellaneous	Other
7/3/2011	0.5	Power lines	Not specified
7/7/2011	50	Miscellaneous	Other
7/7/2011	0.25	Miscellaneous	Other
7/9/2011	0	Miscellaneous	Other
7/9/2011	0	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
7/11/2011	3	Equipment use	Welding equipment use (fence-building, equipment modification, etc.)
7/11/2011	0.25	Miscellaneous	Other
7/12/2011	0	Miscellaneous	Other
7/16/2011	0.25	Miscellaneous	Other
7/24/2011	100	Miscellaneous	Other
7/29/2011	4	Miscellaneous	Other
8/2/2011	2	Miscellaneous	Other
8/5/2011	1	Miscellaneous	Other
8/8/2011	2	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
8/11/2011	12	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
8/12/2011	2	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
8/15/2011	5	Debris burning	Pasture and field burning (including grass, crop residues)
8/16/2011	40	Debris burning	Unsafe burning of household trash
8/17/2011	6	Debris burning	Unsafe burning of household trash
8/19/2011	2	Power lines	Not specified
8/19/2011	0	Miscellaneous	Other
8/20/2011	0	Debris burning	Unsafe burning of household trash
8/21/2011	0.5	Miscellaneous	Other
8/21/2011	7	Equipment use	Farm equipment (hay balers, tractors, etc.)
8/21/2011	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
8/22/2011	0.5	Equipment use	Farm equipment (hay balers, tractors, etc.)
8/23/2011	5	Debris burning	Unsafe burning of household trash
8/29/2011	0.25	Power lines	Not specified
9/3/2011	0	Miscellaneous	Other
9/3/2011	4	Debris burning	Trash dumps
9/4/2011	2	Debris burning	Trash dumps
9/4/2011	2	Debris burning	Trash dumps

Start Date	Area Burned (Acres)	Cause	Sub-Cause
9/5/2011	0	Debris burning	Construction debris (boards, panels, cardboard, etc.)
9/8/2011	2	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
9/8/2011	1	Debris burning	Unsafe burning of household trash
9/9/2011	0.5	Power lines	Not specified
9/13/2011	2	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
9/26/2011	2	Smoking	Origin traceable to smoking
10/5/2011	1000	Smoking	Origin traceable to smoking
10/15/2011	5	Incendiary	Other
10/16/2011	5	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
1/1/2012	0	Miscellaneous	Other
1/3/2012	0	Miscellaneous	Other
1/16/2012	0	Miscellaneous	Other
1/16/2012	0.25	Miscellaneous	Other
1/16/2012	0.25	Miscellaneous	Other
2/2/2012	0	Miscellaneous	Other
3/28/2012	1000	Smoking	Origin traceable to smoking
7/18/2012	5	Miscellaneous	Other
7/31/2012	15	Miscellaneous	Other
8/26/2012	0.25	Miscellaneous	Other
9/3/2012	10	Miscellaneous	Other
9/3/2012	10	Debris burning	Brush pile burning
9/10/2012	2	Power lines	Power Lines
9/12/2012	2	Children	Playing with matches
9/13/2012	10	Incendiary	Other
10/12/2012	5	Miscellaneous	Other
10/26/2012	2	Power lines	Power Lines
11/20/2012	1	Power lines	Power Lines

Start Date	Area Burned (Acres)	Cause	Sub-Cause
11/24/2012	1	Children	Playing with matches
12/20/2012	40	Miscellaneous	Other
12/22/2012	1	Miscellaneous	Other
2/13/2013	0.25	Miscellaneous	Other
2/25/2013	1	Miscellaneous	Other
2/25/2013	0.1	Miscellaneous	Other
2/27/2013	0.5	Debris burning	Unsafe burning of household trash
3/4/2013	0.1	Miscellaneous	Other
3/11/2013	0.1	Miscellaneous	Other
3/12/2013	0.1	Miscellaneous	Other
3/24/2013	0.1	Miscellaneous	Other
8/5/2013	1	Miscellaneous	Other
8/17/2013	0.25	Miscellaneous	Other
8/23/2013	0.25	Incendiary	Other
12/14/2013	800	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
1/15/2014	7	Incendiary	Other
1/28/2014	0.25	Miscellaneous	Other
2/14/2014	1	Miscellaneous	Other
2/14/2014	1	Miscellaneous	Other
1/15/2015	1	Miscellaneous	Other
1/21/2015	0.2	Campfire	Warming or cooking
2/19/2015	1	Children	Playing with matches
2/21/2015	0.1	Campfire	Warming or cooking
6/15/2015	0.15	Miscellaneous	Other
7/4/2015	1	Miscellaneous	Fireworks
7/12/2015	1	Miscellaneous	Other
8/3/2015	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)

Start Date	Area Burned (Acres)	Cause	Sub-Cause
8/9/2015	1	Miscellaneous	Other
8/15/2015	1	Children	Other
8/30/2015	0.2	Debris burning	Brush pile burning
8/30/2015	0.5	Miscellaneous	Other
9/12/2015	0.2	Power lines	Power Lines
10/1/2015	1	Debris burning	Brush pile burning
11/9/2015	0.1	Miscellaneous	Other
11/21/2015	2	Campfire	Warming or cooking
1/12/2016	1	Debris burning	Brush pile burning
1/19/2016	100	Miscellaneous	Other
1/24/2016	8	Incendiary	Other
1/25/2016	0.2	Miscellaneous	Other
1/26/2016	0.2	Miscellaneous	Other
1/26/2016	0.01	Debris burning	Construction debris (boards, panels, cardboard, etc.)
2/2/2016	0.05	Debris burning	Brush pile burning
2/6/2016	15	Campfire	Warming or cooking
2/13/2016	15	Miscellaneous	Other
2/24/2016	1	Miscellaneous	Other
3/1/2016	1	Equipment use	Vehicles (catalytic converters, faulty mufflers, dragging metal)
3/8/2016	1	Lightning	Origin traceable to lightning
3/19/2016	0.01	Campfire	Warming or cooking
3/21/2016	0.5	Campfire	Warming or cooking
3/24/2016	1	Miscellaneous	Other
4/11/2016	1	Incendiary	Other
5/6/2016	0.2	Debris burning	Unsafe burning of household trash
5/7/2016	15	Campfire	Warming or cooking
6/14/2016	1	Debris burning	Pasture and field burning (including grass, crop residues)

Start Date	Area Burned (Acres)	Cause	Sub-Cause
6/30/2016	5	Debris burning	Pasture and field burning (including grass, crop residues)
7/5/2016	4	Debris burning	Brush pile burning
7/12/2016	10	Miscellaneous	Other
7/31/2016	2	Power lines	Power Lines
7/31/2016	0.2	Equipment use	Farm equipment (hay balers, tractors, etc.)
8/1/2016	1	Campfire	Warming or cooking
10/20/2016	1	Debris burning	Pasture and field burning (including grass, crop residues)
10/28/2016	1	Debris burning	Burning leaves and garden spots
11/21/2016	5	Debris burning	Pasture and field burning (including grass, crop residues)
1/4/2017	100	Power lines	NULL
1/22/2017	0.2	Miscellaneous	Other
2/12/2017	2	Debris burning	Unsafe burning of household trash
3/30/2017	0.5	Debris burning	Unsafe burning of household trash
5/21/2017	1	Campfire	Warming or cooking
5/28/2017	1	Debris burning	Burning leaves and garden spots
6/15/2017	1	Miscellaneous	Other
6/22/2017	0.5	Debris burning	Unsafe burning of household trash
7/4/2017	2	Miscellaneous	Fireworks
8/29/2017	0.2	Power lines	NULL
8/30/2017	0.1	Power lines	NULL
8/30/2017	0.5	Miscellaneous	Other
8/30/2017	0.1	Power lines	NULL
9/25/2017	0.5	Miscellaneous	Other
9/25/2017	0.25	Miscellaneous	Other
10/18/2017	1	Debris burning	Pasture and field burning (including grass, crop residues)
10/25/2017	0.1	Campfire	Warming or cooking
10/26/2017	10	Miscellaneous	Other

Start Date	Area Burned (Acres)	Cause	Sub-Cause
11/18/2017	0.01	Power lines	NULL
11/30/2017	50	Miscellaneous	Other
12/1/2017	0.01	Miscellaneous	Other
12/8/2017	0.01	Miscellaneous	Other
12/31/2017	0.01	Miscellaneous	Fireworks
12/31/2017	0.01	Miscellaneous	Fireworks
1/12/2018	24	Miscellaneous	Other
1/12/2018	0.1	Miscellaneous	Other
1/21/2018	0.1	Debris burning	Brush pile burning
1/23/2018	5	Debris burning	Unsafe burning of household trash
2/17/2018	5	Miscellaneous	Other
3/2/2018	0.01	Miscellaneous	Other
3/19/2018	0.25	Miscellaneous	NULL
4/18/2018	0.5	Miscellaneous	NULL
5/9/2018	900	Unknown	Cause and Origin Not Identified
5/18/2018	4	Miscellaneous	NULL
5/20/2018	10	Debris burning	Subdivision development, clearing
5/27/2018	1	Miscellaneous	NULL
8/16/2018	5	Unknown	Cause and Origin Not Identified
8/22/2018	5	Unknown	Cause and Origin Not Identified
8/29/2018	10	Unknown	Cause and Origin Not Identified
9/1/2018	0.5	Campfire	Warming or cooking
2/6/2020	5	Unknown	Investigated but Undetermined
2/7/2020	5	Debris burning	Pasture and field burning (including grass, crop residues)
2/8/2020	20	Debris burning	Pasture and field burning (including grass, crop residues)

Appendix F: Adoption Resolution

Appendix G: Floodplain Management Ordinances

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ARTICLE V. - FLOOD HAZARD PREVENTION CODE

Footnotes:

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State Law reference— *Local governments must adopt ordinances necessary for jurisdiction to qualify for National Flood Insurance Program, V.T.C.A., Water Code § 16.3145; political subdivision to comply with federal requirements, V.T.C.A., Water Code § 16.315.*

DIVISION 1. - FINDINGS OF FACT AND PURPOSES

Sec. 14-501. - Findings of fact.

- (a) The flood hazard areas of the city are subject to periodic inundation, which results 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 the public health, safety and general welfare.
- (b) 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 hazards areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood-proofed, or otherwise protected from flood damage.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-502. - Statement of purpose.

It is the purpose of this flood hazard prevention code (the code) to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- (1) Protect human life and health;
- (2) Minimize expenditure of public money for costly flood control projects;
- (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- (4) Minimize prolonged business interruptions;
- (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;
- (6) 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
- (7) Insure that potential buyers are notified that property is in a flood area.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-503. - Methods of reducing flood losses.

In order to accomplish its purposes, this article uses the following methods:

- (1) 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;
- (2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
- (4) Control filling, grading, dredging and other development which may increase flood damage;
- (5) Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.

(Ord. No. 25467, § 1, 9-9-2003)

Secs. 14-504—14-520. - Reserved.

DIVISION 2. - DEFINITIONS

Sec. 14-521. - Definitions.

Unless specifically defined below, words or phrases used in this article shall be interpreted to give them the meaning they have in common usage and to give this article its most reasonable application:

Alluvial fan flooding means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.

Apex means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

Appeal means a request for a review of the floodplain administrator's interpretation of any provision of this article or a request for a variance.

Appurtenant structure means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

Area of future conditions flood hazard means the land area that would be inundated by the one-percent annual chance (100-year) flood based on future conditions hydrology.

Areas of shallow flooding means a designated AO, AH, or VO zone on a city's flood insurance rate map (FIRM) with a one (1) per cent chance or greater annual chance of flooding to an average depth of one (1) to three (3) feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of special flood hazard is the land in the floodplain within a community subject to a one (1) per cent or greater chance of flooding in any given year. The area may be designated as zone A on the flood hazard boundary map (FHBM). After detailed ratemaking has been completed in preparation for publication of the FIRM, zone A usually is refined into zones A, AE, AH, AO, A1-99, VO, V1-30, VE or V.

Base flood means the flood having a one (1) per cent chance of being equaled or exceeded in any given year.

Basement means any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway wall means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

Coastal high hazard area means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high-velocity wave action from storms or seismic sources.

Critical feature means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be comprised.

Development means any manmade change in improved and unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

Development permit means any permit, plan approval or other authorization required from any department of the city prior to commencing any development work regulated by the city building code, electrical code, energy conservation code, fuel gas code, mechanical code, plumbing code, platting ordinance, zoning ordinance, excavation ordinance, or any other applicable ordinance of the city.

Elevated buildings means a non-basement building:

- (1) In the case of a building in zones A1-30, AE, A, A1-99, AH, B, C, X, and D, built to have the top of the elevated floor, or in the case of a building in zones V1-30, VE, or V, to have the bottom of the lowest horizontal structure member of the elevated floor elevated above the ground level by means of pilings, columns (posts and piers), or shear walls parallel to the floor of the water; and
- (2)

Adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood.

- (3) In the case of zones A1-30, AE, A, A1-99, AO, AH, B, C, X, and D, elevated building includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of floodwaters.
- (4) In the case of zones V1-30, VE, or V, elevated building includes a building otherwise meeting the definition of elevated building, even though the lower area is enclosed by means of breakaway walls if the breakaway walls met the standards of section 60.3(e)(5) of the National Flood Insurance Program regulations.

Existing construction means for the purposes of determining rates, structures for which the start of construction commenced before the effective date of the FIRM or before January 1, 1975, for FIRM's effective before that date. Existing construction may also be referred to as existing structures.

Existing manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Expansions to an existing manufactured home park or subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FEMA means the Federal Emergency Management Agency.

Flood or flooding means a general and temporary condition of partial or complete inundation of normally dry land areas from:

- (1) The overflow of inland or tidal waters.
- (2) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood elevation study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood hazard boundary map (FHBM) means an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards.

Flood insurance rate map (FIRM) means an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood insurance study is the official report provided by the Federal Emergency Management Agency. The report contains flood profiles, water surface elevation of the base flood, as well as the flood boundary floodway map.

Floodplain or flood-prone area means any land area susceptible to being inundated by water from any source (see definition of flooding).

Floodplain management means the operation of an overall program of corrective and preventive measures for reducing flood damage, including, but not limited to, emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood protection system means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the areas within a community subject to a special flood hazard and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood-proofing means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway (regulatory floodway) means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Functionally dependent use means a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Habitable floor means any floor usable for the following purposes: which includes working, sleeping, eating, cooking or recreation, or a combination thereof. A floor used for storage purposes only is not a habitable floor.

Hazardous materials means those chemicals or substances that are physical hazards or health hazards as classified in the adopted Building and Fire codes, whether the materials are in usable or waste condition.

Highest adjacent grade means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic structure means any structure that is:

- (1) Listed individually in the National Register of Historic Places (a listing maintained by the department of interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
- (2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
- (3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or
- (4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
 - a. By an approved state program as determined by the Secretary of the Interior or;
 - b. Directly by the Secretary of the Interior in states without approved programs.

Levee means a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee system means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking or vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirement of section 60.3 of the National Flood Insurance Program regulations.

Manufactured home means a structure transportable in one (1) or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term manufactured home does not include a recreational vehicle.

Manufactured home park or subdivision means a parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

Mean sea level means, for purposes of the National Flood Insurance Program, the North American Vertical Datum (NAVD) of 1988 or other datum, to which base flood elevations shown on a city's flood insurance rate map are referenced.

New construction means for the purpose of determining insurance rates, structures for which the start of construction commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, new construction means structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

New manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.

Non-residential structure includes, but is not limited to: small business concerns, churches, schools, farm buildings (including grain bins and silos), pool houses, club houses, recreational buildings, mercantile structures, agricultural and industrial structures, warehouses, hotels and motels with normal room rentals for less than six (6) months' duration, and nursing homes.

Permanent foundation means construction of grillages of steel, of masonry, of reinforced concrete or timber and designed in accordance with accepted engineering practice to provide adequate support and anchorage. For floodplain management purposes guidelines and methods for manufactured homes are contained in FEMA 85/September 1985 publication entitled Manufactured Home Installation in Flood Hazard Areas.

Primary frontal dune means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Recreational vehicle means a vehicle which is:

- (1) Built on a single chassis;
- (2) Four hundred (400) square feet or less when measured at the largest horizontal projections;
- (3) Designed to be self-propelled or permanently towable by a light duty truck;
- (4) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Residential structure means any one-family or two-family dwelling or portion thereof including townhouses, that is used, or designated or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, and shall include accessory structures thereto.

Riverine means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Sand dunes means naturally occurring accumulations of sand in ridges or mounds landward of the beach.

Start of construction (for other than new construction of substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)) includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within one hundred eighty (180) days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure means a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty (50) per cent of the market value of the structure before the damage occurred.

Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) per cent of the market value of the structure before start of construction of the improvement. This includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

- (1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary conditions; or
- (2) Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

Variance is a grant of relief to a person from the requirement of this ordinance when specific enforcement would result in unnecessary hardship. A variance, therefore, permits construction or development in a manner otherwise prohibited by this article. (For full requirements see section 60.6 of the National Flood Insurance Program regulations.)

Violation means the failure of a structure or other development to be fully compliant with the city's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in sections 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), or (e)(5) [of the National Flood Insurance Program regulations] is presumed to be in violation until such time as that documentation is provided.

Water surface elevation means the height, in relation to the North American Vertical Datum (NAVD) of 1988 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032888, § 1, 10-11-2022)

Secs. 14-522—14-530. - Reserved.

DIVISION 3. - GENERAL PROVISIONS

Sec. 14-531. - Lands to which this article applies.

This article applies to all areas of special flood hazard within the jurisdiction of the city.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-532. - Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering reports entitled, The Flood Insurance Study (FIS) for Nueces County, Texas, and Incorporated Areas, dated October 13, 2022, with accompanying flood insurance rate maps (FIRM) dated October 13, 2022 and any revisions thereto, are hereby adopted by reference and declared to be a part of this Code.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 031541, § 1, 9-18-2018; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-533. - Establishment of development permit.

A development permit in the floodplain is required to ensure conformance with the provisions of this article.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-534. - Compliance.

No structure or land may be located, altered, or have its use changed without full compliance with the terms of this article and other applicable regulations.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-535. - Abrogation and greater restrictions.

This article is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this article and another ordinance, easement, covenant, or deed restrictions conflict or overlap, whichever imposes the more stringent restrictions prevails.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-536. - Interpretation.

In the interpretation and application of this article, all provisions shall be:

- (1) Considered as a minimum requirements;
- (2) Liberally construed in favor of the governing body; and
- (3) Deemed neither to limit nor repeal any other powers granted under state statutes.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-537. - Warning and disclaimer of liability.

The degree of flood protection required by this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. This article does not imply that land outside the areas of special flood hazards or uses permitted within special flood hazard areas will be free from flooding or flood damages. This article does not create liability on the part of the community or any official or employee of the city for any flood damages that result from reliance on this article or any administrative decision lawfully made under this article.

(Ord. No. 25467, § 1, 9-9-2003)

Secs. 14-538—14-540. - Reserved.

DIVISION 4. - ADMINISTRATION

Sec. 14-541. - Designation of the floodplain administrator.

(a) The city manager, or the city manager's designee, is appointed the floodplain administrator to administer and implement the provisions of this article and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.

(b) The floodplain administrator is to be assisted by the floodplain review committee consisting of three (3) positions as follows:

- (1) Senior design engineer with knowledge of subdivision development, hydrology, and representing engineering services.
- (2) Senior planner with knowledge of subdivision planning, platting, and representing planning.
- (3) Engineer/inspector with knowledge of construction practices and representing developmental services.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-542. - Duties and responsibilities of the floodplain administrator.

Duties and responsibilities of the floodplain administrator include, but [may] not be limited to, the following:

- (1) Maintain and hold open for public inspection all records pertaining to the provisions of this article.
- (2) Review permit application to determine whether proposed building site, including the placement of manufactured homes, will be reasonably safe from flooding.
- (3) Review, approve, or deny all applications for floodplain development permits required by adoption of this article.
- (4) Review permits for proposed development to assure that all necessary permits have been obtained from those federal, state, or local governmental agencies (including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.
- (5) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the floodplain administrator will make the necessary interpretation.
- (6) Notify, in riverine situations, adjacent communities and the state coordinating agency which is the Texas Water Development Board (TWDB), as well as the Texas Commission on Environmental Quality, prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.
- (7)

Assure that flood-carrying capacity within the altered or relocated portion of any watercourse is maintained.

- (8) When base flood elevation data has not been provided in accordance with section 14-522, the floodplain administrator will obtain, review, and reasonable utilize any base flood elevation data and floodway data available from a federal, state, or other source, in order to administer the provisions of division 5 of article V of this chapter.
- (9) When a regulatory floodway has not been designated, the floodplain administrator may not allow new construction, substantial improvements, or other development (including fill) to be permitted within zones A1-30 and AE on the city's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one (1) foot on any point within the community.
- (10) Under the provisions of 44 CFR chapter 1, section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in zones A1-30, AE, AH, on the city's FIRM, which increases the water surface elevation of the base flood by more than one (1) foot, if the community first applies for a conditional FIRM revision through FEMA.
- (11) Right of entry and stop work orders.
 - a. Whenever necessary to make an inspection to enforce any of the provisions of this article, or whenever the floodplain administrator, or the floodplain administrator's duly authorized representative, has reasonable cause to believe that there exists in any building or upon any premises any condition or code violation, which makes such building or premises unsafe, dangerous, or hazardous, the floodplain administrator, or his duly authorized representative, may:
 1. Enter such building or premises at all reasonable times to inspect the same or to perform any duty imposed upon the floodplain administrator by this article.
 2. If the building or premises is occupied, the floodplain administrator, or the floodplain administrator's authorized representative, will first present proper credentials and request entry.
 3. If the building or premises is unoccupied, the floodplain administrator, or the floodplain administrator's authorized representative, will first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and request entry.
 4. If entry is refused, the floodplain administrator has recourse to every remedy provided by law to secure entry.
 - b.

When the floodplain administrator has first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner or occupant or any other persons having charge, care, or control of any building or premises may fail or neglect, after proper request is made, to promptly permit entry by the floodplain administrator or the floodplain administrator's authorized representative for the purpose of inspection and examination under this article.

- c. Upon notice from the floodplain administrator or the floodplain administrator's authorized representative, that work on any building, structure, dike, bridge or any improvement, which would affect water drainage, is being done contrary to the provisions of this article or in a dangerous or unsafe manner, the work must be immediately stopped.
- d. Any notice to stop work must be in writing and be given to the owner of the property, or to the owner's agent, or the person doing the work, and shall state the conditions under which work may be resumed.
- e. Where an emergency exists, no written notice is required to be given by the floodplain administrator. However, written notice must follow within twenty-four (24) hours from the time oral notice to stop work is issued.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-543. - Permit procedures.

- (a) Application for a floodplain development permit must be presented to the floodplain administrator on forms furnished by the floodplain administrator and may include, but not be limited to, plans in duplicate drawn to scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, including the placement of manufactured homes, and the location of the foregoing in relation to areas of special flood hazard.
- (b) Additionally, the following information is required:
 - (1) Elevation (in relation to mean sea level), of the lowest floor (including basement) of all new and substantially improved structures;
 - (2) Elevation in relation to mean sea level to which any nonresidential structure shall be flood-proofed;
 - (3) A certificate from a registered professional engineer or architect that the nonresidential flood-proofed structure shall meet the flood-proofing criteria of subsection 14-552(2);
 - (4) Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development.
 - (5) Maintain a record of all such information in accordance with subsection 14-542(1).
- (c)

Approval or denial of a development permit by the floodplain administrator may be based on all of the provisions of this article and the following relevant factors:

- (1) The danger to life and property due to flooding or erosion damage;
 - (2) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - (3) The danger that materials may be swept onto other lands to the injury of others;
 - (4) The compatibility of the proposed use with existing and anticipated development;
 - (5) The safety of access to the property in times of flood for ordinary and emergency vehicles;
 - (6) The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;
 - (7) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;
 - (8) The necessity to the facility of a waterfront location, where applicable;
 - (9) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;
 - (10) The relationship of the proposed use to the comprehensive plan for that area.
- (d) *Revocation of permits.*
- (1) *Misrepresentation of application.* The floodplain administrator may revoke a permit or approval, issued under the provisions of this article, in case there has been any false statement or misrepresentation as to a material fact in the application or plans on which the permit or approval was based or whenever the permit or approval was issued in error.
 - (2) *Violation of code provisions.* The floodplain administrator may revoke a permit upon determination by the floodplain administrator that the construction, erection, alteration or repairs of the structure for which the permit was issued is in violation of, or not in conformity with, the provisions of this article.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-544. - Variance procedures.

- (a) The construction trade advisory and appeals board hears and renders judgment on requests for variances from the requirements of this article.
- (b) The construction trade advisory and appeals board hears and renders judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the floodplain administrator in the enforcement or administration of this article.
- (c)

Any person or persons aggrieved by the decision of the construction trade advisory and appeals board may appeal such decision to a court of competent jurisdiction.

- (d) The floodplain administrator maintains a record of all actions involving an appeal and shall report variances to the Federal Emergency Management Agency upon request.
- (e) Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the state inventory of historic places, without regard to the procedures set forth in the remainder of this article.
- (f) Variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing the relevant factors in subsection 14-541(1) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.
- (g) Upon consideration of the factors noted above and the intent of this division, the appeal board may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this chapter, section 14-502.
- (h) Variances may not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
- (i) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
- (j) *Prerequisites for granting variances:*
 - (1) Variances may only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
 - (2) Variances may only be issued upon:
 - a. Showing a good and sufficient cause;
 - b. A determination that failure to grant the variance would result in exceptional hardship to the applicant;
 - c. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
 - (3) Any applicant, to whom a variance is granted, may be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

- (k) Variances may be issued for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that:
- (1) The criteria outlined in subsections 14-534(a) through (i) are met; and
 - (2) The structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032058, § 14, 3-17-2020; Ord. No. 032888, § 1, 10-11-2022)

Secs. 14-545—14-550. - Reserved.

DIVISION 5. - PROVISIONS FOR FLOOD HAZARD REDUCTION

Sec. 14-551. - General standards.

In all areas of special flood hazards, the following provisions are required for all new construction and substantial improvements:

- (1) All new construction or substantial improvements must be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- (2) All new construction or substantial improvements must be constructed by methods and practices that minimize flood damage;
- (3) All new construction or substantial improvements must be constructed with materials resistant to flood damage;
- (4) All new construction or substantial improvements must be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and located so as to prevent water from entering or accumulating within the components during conditions of flooding;
- (5) All new and replacement water supply systems must be designed to minimize or eliminate infiltration of floodwaters into the system;
- (6) New and replacement sanitary sewage systems must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the systems into floodwaters;
- (7) On-site waste disposal systems must be located to avoid impairment to them or contamination from them during flooding; and
- (8) Additional protection is specifically recommended such that the lowest floor of any building be elevated to a level of one (1) foot higher or more above the base flood elevation since such additional protection may provide for significant reductions in insurance premiums.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-552. - Specific standards.

In all areas of special flood hazards where base flood elevation data has been provided as set forth in section 14-522, subsection 14-532(8), or subsection 14-543(c), the following provisions are required:

- (1) *Residential construction.* New construction of any residential structure must have the lowest floor (including basement) and machinery or equipment, elevated to one (1) foot above the base flood elevation. Substantial damage and substantial improvement must have the lowest floor (including basement) and machinery or equipment, elevated to one (1) foot above the base flood elevation. Attached garages and enclosures below elevated buildings must meet the minimum NFIP requirements (elevated to the base flood elevation or have proper openings). A registered professional engineer, architect, or land surveyor shall submit a certification to the floodplain administrator that the standard of this subsection as proposed in subsection 14-533(b)(1), is satisfied.
- (2) *Nonresidential construction.* New construction of any commercial, industrial, or other nonresidential structure must either have the lowest floor (including basement) elevated to one (1) foot above the base flood level or together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Substantial damage and substantial improvement must have the lowest floor (including basement), elevated to at or above the base flood elevation or together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall develop and/or review structural design, specifications and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are flood-proofed shall be maintained by the floodplain administrator.
- (3) *Enclosures.* New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access, or storage in an area other than a basement and which are subject to flooding must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and

exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:

- a. A minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding must be provided.
- b. The bottom of all openings must be no higher than one (1) foot above grade.
- c. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(4) *Manufactured homes.*

- a. All manufactured homes to be placed within zone A on a city's FHBM or FIRM must be installed using methods and practices which minimize flood damage.
 1. For the purposes of this requirement, a manufactured home must be elevated and anchored to resist flotation, collapse or lateral movement.
 2. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors.
 3. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.
- b. Manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the city's FIRM must be on sites:
 1. Outside of a manufactured home park or subdivision.
 2. In a new manufactured home park or subdivision.
 3. In an expansion to an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as a result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to one (1) foot above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.
- c. Manufactured homes must be placed on substantially improved on sites in an existing manufactured home park or subdivision with zones A1-30, AH, and AE on the city's FIRM that are not subject to the provisions of subsection (4) of this section must be elevated so that either:
 1. The lowest floor of the manufactured home is one (1) foot above the base flood elevation, or
 2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty-six (36) inches in height above grade and be securely anchored to an adequately anchored foundation

system to resist flotation, collapse and lateral movement.

- (5) *Recreational vehicles*. Recreational vehicles placed on sites within zones A1-30, AH, and AE on the city's FIRM either:
 - a. Must be on the site for fewer than one hundred eighty (180) consecutive days,
 - b. Must be fully licensed and ready for highway use, or
 - c. Must meet the permit requirements of subsection 14-545(a), and the elevation and anchoring requirements for manufactured homes in subsection (4) of this section.
- (6) A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect type utilities and security devices, and has no permanently attached additions.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 031740, § 1, 4-16-2019; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-553. - Standards for subdivision proposals.

- (a) All subdivision proposals including the placement of manufactured home parks and subdivisions must be consistent with sections 14-501, 14-502, and 14-503 of this Code.
- (b) All proposals for the development of subdivisions, including the placement of manufactured home parks and subdivisions, must meet development permit requirements of section 14-523, section 14-533, and the provisions of division 5 of article V of this chapter.
- (c) Base flood elevation data must be generated for subdivision proposals and other proposed developments, including the placement of manufactured home parks and subdivisions, which is greater than fifty (50) lots or five (5) acres, whichever is lesser, if not otherwise provided under section 14-522 or subsection 14-532(8) of this Code.
- (d) All subdivision proposals, including the placement of manufactured home parks and subdivisions, must have adequate drainage provided to reduce exposure to flood hazards.
- (e) All subdivision proposals, including the placement of manufactured home parks and subdivisions, must have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.

(Ord. No. 25467, § 1, 9-9-2003)

Sec. 14-554. - Standards for areas of shallow flooding (AO/AH zones).

Locations within the areas of special flood hazard established in section 14-522 are designated as shallow flooding areas. These areas have special flood hazards associated with base flood depths of one (1) to three (3) feet, where a clearly defined channel does not exist and where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

- (1) All new construction, of residential structures must have the lowest floor (including basement) and machinery or equipment elevated above the highest adjacent grade at least as high as the depth number specified in feet on the city's FIRM (at least two (2) feet if no depth number is specified) plus one (1) foot. Substantial damage and substantial improvement must have the lowest floor (including basement) and machinery or equipment, elevated above the highest adjacent grade at least as high as the depth number specified in feet on the city's FIRM (at least two (2) feet if no depth number is specified) plus one (1) foot. Attached garages and enclosures below elevated buildings must meet the minimum NFIP requirements (elevated to the base flood elevation or have proper openings).
- (2) All new construction of nonresidential structures:
 - a. Must have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the city's FIRM (at least two (2)) feet plus one (1) foot, if no depth number is specified; or
 - b. Substantial damage and substantial improvements must have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the city's FIRM (at least two (2)) feet, if no depth number is specified; or
 - c. Together with attendant utility and sanitary facilities must be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.
- (3) A registered professional engineer or architect shall submit a certification to the floodplain administrator that the standards of this section, as proposed in subsection 14-533(b)(1), are satisfied.
- (4) Structures within zones AH or AO must have adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 031740, § 2, 4-16-2019; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-555. - Floodways.

- (a) Channels of streams, which must be kept clear of encroachments to enable a 100-year flood to pass without an increase in flood height, and which are located within areas of special flood hazard established in section 14-522 are designated as regulatory floodways.
- (b) Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles, and erosion potential, the following provisions shall apply:
 - (1)

Encroachments are prohibited, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in an increase in flood levels within the community during the occurrence of the base flood discharge.

- (2) If subsection (b)(1) of this section, is satisfied, all new construction and substantial improvements must comply with all applicable flood hazard reduction provisions of division 5 of article V of this Code.
- (3) Under the provisions of 44 CFR 65.12, of the National Flood Insurance Program Regulations, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision through FEMA.
- (4) The placement of manufactured homes is prohibited, except in an existing manufactured home park or existing manufactured home subdivision.
- (5) The storage of hazardous materials, in any form, is prohibited within the adopted regulatory floodway.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 032888, § 1, 10-11-2022)

Sec. 14-556. - Coastal high hazard areas.

- (a) Areas that are subject to possible high-energy wave action, and which are identified as areas of special flood hazard established in section 14-522, are areas designated as coastal high hazard areas (zones V1-30, VE, and/or V).
- (b) These areas have special flood hazards associated with high-velocity waters from tidal surges and hurricane wave wash; therefore, in addition to meeting all provisions outlined in this article, the following provisions also apply:
 - (1) Obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement. The floodplain administrator maintains a record of all this information.
 - (2) All new construction must be located landward of the reach of mean high tide.
 - (3) All new construction and substantial damage must be elevated on pilings and columns so that:
 - a. The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to one (1) foot above the base flood elevation.
 - b.

Substantial improvements must have the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) elevated to one (1) foot above the base flood elevation.

- c. The pile or column foundation and structure attached to the foundation is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.
 1. Water loading values used must be those associated with the base flood.
 2. Wind loading values used shall be those required by applicable state or local building standards.
- (4) A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of subsections (3)a. and (3)b. of this section.
- (5) All new construction and substantial improvements must have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system.
- (6) For the purpose of this section, a breakaway wall shall have a design safe loading resistance of not less than ten (10), and not more than twenty (20) pounds per square foot.
- (7) Use of breakaway walls, which exceed a design safe loading resistance of twenty (20) pounds per square foot (either by design or when so required by local or state codes), may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:
 - a. Breakaway wall collapse must result from a water load less than that which would occur during the base flood; and
 - b. The elevated portion of the building and supporting foundation system may not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural).
 1. Water loading values used shall be those associated with the base flood.
 2. Wind loading values used shall be those required by applicable state or local building standards.
- (8) Enclosed space below the lowest floor may be useable solely for parking of vehicles, building access or storage. The enclosed space below the lowest floor may not be used for human habitation.

- a. All enclosed areas below base flood elevation that are greater than five (5) feet in height will be required to sign a non-conversion agreement that will be filed with the deed.
- (9) The use of fill for structural support of buildings is prohibited.
- (10) The use of manmade alteration of sand dunes and mangrove stands, which would increase potential flood damage, is prohibited.
- (11) Manufactured homes, which have incurred substantial damage as the result of a flood, must meet the standards of subsections (b)(1) through (b)(10) of this section, if they are placed or substantially improved within zones V1-30, V, and VE on the city's FIRM on sites:
 - a. Outside of a manufactured home park or subdivision,
 - b. In a new manufactured home park or subdivision,
 - c. In an expansion to an existing manufactured home park or subdivision.
- (12) Manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within zones V1-30, V, and VE on the city's FIRM meet the requirements of subsection 14-542(4) of this Code.
- (13) Recreational vehicles, which are placed on sites within zones V1-30, V, and VE on the city's FIRM, must either:
 - a. Be on the site for fewer than one hundred eighty (180) consecutive days,
 - b. Be fully licensed and ready for highway use, or
 - c. Meet the requirements in section 14-522 of this article and subsections (b)(1) through (b)(10) of this section.
- (14) A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect type utilities and security devices, and has no permanently attached additions.
- (15) For properties within the boundaries of the North Beach Development Plan, minor grading and the placement of minor quantities of nonstructural fill are allowed in zone V only for landscaping, drainage under and around buildings, and support of parking slabs, pool decks, patios, walkways, and similar site elements. Nonstructural fill shall not prevent the free passage of floodwater and waves beneath elevated buildings, divert floodwater or waves such that building damage is exacerbated, or lead to damaging flood and wave conditions on a site or adjacent sites. Nonstructural fill is assumed to wash away and shall not be used in foundation design calculations.
 - a. Nonstructural fill placed on zone V sites shall be similar to natural soils in the area. In many coastal areas, natural soils are clean sand or sandy soils free of large quantities of clay, silt, and organic material. Nonstructural fill shall not contain large rocks and debris. The developer/owner shall submit test results providing the classification of the existing

and proposed soil using the Unified Soil Classification System (American Society for Testing and Materials (ASTM) Standard D2487) to the city's floodplain administrator for approval prior to fill being placed on zone V sites.

- b. Placement of up to two (2) feet of nonstructural fill under or around an elevated building is allowed without engineering analysis or certification, provided, basic site drainage principles are not violated; and provided there are no other site-specific conditions or characteristics that would render the placement of the fill damaging to nearby buildings. Placement of fill under or around an elevated building that exceeds two (2) feet or that does not abide by basic site drainage principles requires an engineering analysis showing no diversion of floodwaters or waves that building damage is exacerbated or lead to damaging flood and wave conditions on the site or adjacent sites. In cases where site development involves removing a layer of soil and fill is added to the site later, the fill thickness should be evaluated relative to the pre-removal soil elevation, not the removed soil elevation.
- c. Minimum slopes for building sites to facilitate drainage away from buildings shall be shallower than one (1) unit vertical to five (5) units horizontal (regardless of fill height).
- d. Parks, dunes, and dune vegetation will be conserved and remain in their natural state and not elevated. Placement of nonstructural fill in parks, dunes, and dune vegetation is prohibited.

(Ord. No. 25467, § 1, 9-9-2003; Ord. No. 031740, § 3, 4-16-2019; Ord. No. 032888, § 1, 10-11-2022; Ord. No. 033185, § 1, 10-10-2023)

Sec. 14-557. - Penalties for non-compliance.

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this article and other applicable regulations. Violation of the provisions of this article by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with the conditions) shall constitute a misdemeanor. Any person who violates this article or fails to comply with any of its requirements shall upon conviction thereof be fined not more than five hundred dollars (\$500.00) for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the city from taking such other lawful action as is necessary to prevent or remedy any violation.

(Ord. No. 032888, § 1, 10-11-2022)

Secs. 14-558—14-600. - Reserved.

Flood Damage Prevention Ordinance

Of

Nueces County

FLOOD DAMAGE PREVENTION ORDINANCE

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FLOOD DAMAGE PREVENTION ORDINANCE

ARTICLE I

STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE, AND METHODS

SECTION A STATUTORY AUTHORIZATION

The Legislature of the State of Texas has in both Texas Local Government Code §240.901 and Texas Water Code §16.315, delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Therefore, the Commissioners Court of Nueces County, Texas, does hereby order as follows:

SECTION B FINDINGS OF FACT

- (1) The flood hazard areas of Nueces County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services and extraordinary public expenditures for flood prevention and relief, all of which adversely affect the public health, safety and general welfare.
- (2) These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights, velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, floodproofed or otherwise protected from flood damage.

SECTION C STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- (1) Protect human life and health;
- (2) Minimize expenditure of public money for costly flood control projects;
- (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- (4) Minimize prolonged business interruptions;
- (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;
- (6) 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
- (7) Ensure that potential buyers are notified that property is in flood area.

SECTION D METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this Ordinance uses the following methods:

- (1) 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;
- (2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;
- (4) Control filling, grading, dredging and other development which may increase flood damage;

- (5) Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

ARTICLE 2

DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

ALLUVIAL FAN FLOODING – means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.

APEX – means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

APPURTENANT STRUCTURE – means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

AREA OF FUTURE CONDITIONS FLOOD HAZARD – means the land area that would be inundated by the 1-percent-annual chance (100 year) flood based on future conditions hydrology.

AREAS OF SHALLOW FLOODING – means a designated AO, AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a one percent change or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

AREA OF SPECIAL FLOOD HAZARD – is the land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. The areas may be designated as Zone A on the Flood Hazard Boundary Map (FHBM). After detailed ratemaking has been completed in preparation for publication of the FIRM, Zone A usually is refined into zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE or V.

BASE FLOOD – means the flood having a 1 percent chance of being equaled or exceeded in any given year.

BASE FLOOD ELEVATION (BFE) – The elevation shown on the Flood Insurance Rate Map (FIRM) and found in the accompanying Flood Insurance Study (FIS) for Zones A, AE, AH, A1-A30, AR, V1-V30, or VE that indicates the water surface elevation resulting from the flood that has a 1 % chance of equaling or exceeding that level in any given year - also called the Base Flood.

BASEMENT – means any area of the building having its floor subgrade (below ground level) on all sides.

BREAKAWAY WALL – means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

COASTAL, HIGH HAZARD AREA – means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

CRITICAL FEATURE – means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

DEVELOPMENT – means any man-made change to improved and unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

ELEVATED BUILDING – means a nonbasement building (i) built, in the case of a building in Zones A1-30, AE, A 199, AO, AH, B, C, X and D to have the top of the elevated floor, or in the case of a building in Zones V1-30, VE, or V, to have the bottom of the lowest horizontal structure member of the elevated floor elevated above the ground level by means of pilings, columns (posts and piers), or shear walls parallel to the floor of the water and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood. In the case of Zones A1-30, AE, A, A99, AO, AH, B, C, X, and D, “elevated building” also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In the case of Zones V1-30, VE, or V, “elevated building” also includes a building otherwise meeting the definition of “elevated building,” even though the lower area is enclosed by means of breakaway walls if the breakaway walls met the standards of Section 60.3(e)(5) of the National Flood Insurance Program regulations.

EXISTING CONSTRUCTION – means for the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION – means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION – means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD OR FLOODING – means a general and temporary condition of partial or complete inundation of normally dry land areas from:

- (1) the overflow of inland or tidal waters.
- (2) the unusual and rapid accumulation or runoff of surface waters from any source.

FLOOD ELEVATION STUDY -- means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/ or flood-related erosion hazards.

FLOOD INSURANCE RATE MAP (FIRM) – means an official map of a community, on which the Federal Emergency Management Agency has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY -- is the official report provided by the Federal Emergency Management Agency. The report contains flood profiles, water surface elevation of the base flood, as well as the Flood Boundary-Floodway Map.

FLOODPLAIN OR FLOOD-PRONE AREA – means any land area susceptible to being inundated by water from any source (see definition of flooding).

FLOODPLAIN MANAGEMENT – means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

FLOODPLAIN MANAGEMENT REGULATIONS – means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

FLOOD PROTECTION SYSTEM – means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

FLOOD PROOFING – means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

FLOODWAY (REGULATORY FLOODWAY) – means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

FUNCTIONALLY DEPENDENT USE – means a use, which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

HIGHEST ADJACENT GRADE – means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

HISTORIC STRUCTURE – means any structure that is:

- (1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
- (2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
- (3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or
- (4) Individually listed on a local inventory or historic places in communities with historic preservation programs that have been certified either:
 - (a) By an approved state program as determined by the Secretary of the Interior or;
 - (b) Directly by the Secretary of the Interior in states without approved programs.

LEVEE – means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

LEVEE SYSTEM – means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

LOWEST FLOOR – means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking or vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirement of Section 60.3 of the National Flood Insurance Program regulations.

MANUFACTURED HOME – means a structure transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION – means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

MEAN SEA LEVEL – means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

NEW CONSTRUCTION – means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION -- means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.

PRIMARY FRONTAL DUNE – means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

RECREATIONAL VEHICLE – means a vehicle which is (i) built on a single chassis; (ii) 400 square feet or less when measured at the largest horizontal projections; (iii) designed to be self-propelled or permanently towable by a light duty truck; and (iv) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel or seasonal use.

REGULATORY FLOODWAY -- means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface

elevation more than a designated height.

RIVERINE – means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

SAND DUNES – means naturally occurring accumulations of sand in ridges or mounds landward of the beach.

START OF CONSTRUCTION – (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE – means a walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

SUBSTANTIAL DAMAGE – means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT – means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either: (1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or (2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure."

VARIANCE – means a grant of relief by a community from the terms of a floodplain management regulation. (For full requirements see Section 60.6 of the National Flood Insurance Program regulations).

VIOLATION – means the failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Section 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

WATER SURFACE ELEVATION – means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

ARTICLE 3

GENERAL PROVISIONS

SECTION A LANDS TO WHICH THIS ORDINANCE APPLIES

The ordinance shall apply to all areas of special flood hazard with the jurisdiction of Nueces County.

SECTION B BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard identified by the Federal Emergency Management Agency in a scientific and engineering report entitled, "The Flood Insurance Study for Nueces County," dated October 13, 2022, with accompanying Flood Insurance Rate Map and Flood Boundary-Floodway Maps (FIRM and FBFM) and any revisions thereto are hereby adopted by reference and declared to be a part of this ordinance.

SECTION C ESTABLISHMENT OF DEVELOPMENT PERMIT

A Development Permit shall be required to ensure conformance with the provisions of this ordinance.

SECTION D COMPLIANCE

No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this ordinance and other applicable regulations.

SECTION E ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

SECTION F INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be; (1) considered as minimum requirements; (2) liberally construed in favor of the governing body; and (3) deemed neither to limit nor repeal any other powers granted under State statutes.

SECTION G WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the community or any official or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

SECTION H SEVERABILITY

If any section, clause, sentence, or phrase of this Ordinance is held to be invalid or unconstitutional by any court of competent jurisdiction, then said holding shall in no way affect the validity of the remaining portions of this Ordinance.

ARTICLE 4

ADMINISTRATION

SECTION A DESIGNATION OF THE FLOODPLAIN ADMINISTRATOR

The Nueces County Engineer is hereby appointed the Floodplain Administrator to administer and implement the provisions of this ordinance and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.

SECTION B DUTIES & RESPONSIBILITIES OF THE FLOODPLAIN ADMINISTRATOR

Duties and responsibilities of the Floodplain Administrator shall include, but not be limited to, the following:

- (1) Maintain and hold open for public inspection all records pertaining to the provisions of this ordinance.
- (2) Review permit application to determine whether proposes building site, including the placement of manufactured homes, will be reasonably safe from flooding.
- (3) Review, approve or deny all applications for development permits required by adoption of this ordinance.
- (4) Review permits for proposed development to assure that all necessary permits have been obtained from those Federal, State or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.
- (5) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the Floodplain Administrator shall make the necessary interpretation.
- (6) Notify, in riverine situations, adjacent communities and the State Coordinating Agency which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality (TCEQ), prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.
- (7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.
- (8) When base flood elevation data has not been provided in accordance with Article 3, Section B, the Floodplain Administrator shall obtain, review and reasonably utilize any base flood elevation data and floodway data available from a Federal, State or other source, in order to administer the provisions of Article 5.
- (9) When a regulatory floodway has not been designated, the Floodplain Administrator must require that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones AI-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- (10) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones AI-30, AE, AH, on the community's FIRM which increases the water surface elevation of the base flood by more than 1 foot, provided that the community **first** completes all of the provisions required by Section 65.12, including, where applicable, applying for a conditional FIRM revision through FEMA.

SECTION C PERMIT PROCEDURE

- (1) Application for a Floodplain Development Permit shall be presented to the Floodplain Administrator on forms furnished by him/her and may include, but not be limited to, plans in duplicate drawn to

scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, including the placement of manufactured homes, and the location of the foregoing in relation to areas of special flood hazard.

Additionally, the following information is required:

- (a) Elevation (in relation to mean sea level), of the lowest floor (including basement) of all new and substantially improved structures;
- (b) Elevation in relation to mean sea level to which any nonresidential structure shall be floodproofed;
- (c) A certificate from a registered professional engineer or architect that the nonresidential floodproofed structure shall meet the floodproofing criteria of Article 5, Section B (2);
- (d) Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development;
- (e) Maintain a record of all such information in accordance with Article 4, Section (B)(1);
- (2) Approval or denial of a Floodplain Development Permit by the Floodplain Administrator shall be based on all of the provisions of this ordinance and the following relevant factors:
 - (a) The danger to life and property due to flooding or erosion damage;
 - (b) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - (c) The danger that materials may be swept onto other lands to the injury of others;
 - (d) The compatibility of the proposed use with existing and anticipated development;
 - (e) The safety of access to the property in times of flood for ordinary and emergency vehicles;
 - (f) The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;
 - (g) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;
 - (h) The necessity to the facility of a waterfront location, where applicable;
 - (i) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;
 - (j) The relationship of the proposed use to the comprehensive plan for that area.

SECTION D VARIANCE PROCEDURES

- (1) The Commissioners Court as established by Nueces County shall hear and render judgment on requests for variances from the requirements of this ordinance.
- (2) The Commissioners Court shall hear and render judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the County Engineer in the enforcement or administration of this ordinance.
- (3) Any person or persons aggrieved by the decision of the Commissioners Court may appeal such decision in the courts of competent jurisdiction.
- (4) The Floodplain Administrator shall maintain a record of all actions involving an appeal and shall report variances to the Federal Emergency Management Agency upon request.
- (5) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this ordinance.
- (6) Variances may be issued for new construction and substantial improvements to be erected on a lot of 1/2 acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing the relevant factors in Section C (2) of this Article have been fully considered. As the lot size increases beyond the 1/2 half acre, the technical justification required for issuing the variance increases.

- (7) Upon consideration of the factors noted above and the intent of this ordinance, the Appeal Board may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this ordinance (Article 1, Section C).
- (8) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
- (9) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
- (10) Prerequisites for granting variances:
 - (a) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
 - (b) Variances shall only be issued upon: (i) showing a good and sufficient cause; (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
 - (c) Any application to which a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.
- (11) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that (i) the criteria outlined in Article 4, Section D (1)-(9) are met, and (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

ARTICLE 5

PROVISIONS FOR FLOOD HAZARD REDUCTION

SECTION A GENERAL STANDARDS

In all areas of special flood hazards the following provisions are required for all new construction and substantial improvements:

- (1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- (2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
- (3) All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
- (4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/ or located so as to prevent water from entering or accumulating within the components during conditions of flooding;
- (5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
- (6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from the systems into flood waters; and,

- (7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

SECTION B SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data has been provided as set forth in (i) Article 3, Section B, (ii) Article 4, Section B (8), or (iii) Article 5, Section C (3), the following provisions are required:

- (1) **Residential Construction** – new construction and substantial improvement of any residential structure shall have the lowest floor (including basement), elevated to or above the base flood elevation. A registered professional engineer, architect, or land surveyor shall submit a certification to the Floodplain Administrator that the standard of this subsection as proposed in Article 4, Section C (1) a., is satisfied.
- (2) **Nonresidential Construction** – new construction and substantial improvements of any commercial, industrial or other nonresidential structure shall either have the lowest floor (including basement) elevated to or above the base flood level or together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained by the Floodplain Administrator.
- (3) **Enclosures** – new construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:
 - (a) A minimum of two openings on separate walls having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
 - (b) The bottom of all openings shall be no higher than one foot above grade.
 - (c) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
- (4) **Manufactured Homes** –
 - (a) Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices that minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and Local anchoring requirements for resisting wind forces.
 - (b) Require that manufactured homes that are placed or substantially improved within zones A1-30, AH and AE on the community's FIRM on sites (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision, or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as a result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

- (c) Require that manufactured homes be placed or substantially improved on sites in an existing manufactured home park or subdivision with Zones A1-30, AH and AE on the community's FIRM that are not subject to the provisions of paragraph (4) of this section be elevated so that either:
 - (i) the lowest floor of the manufactured home is at or above the base flood elevation, or
 - (ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.
- (5) **Recreational Vehicles** – Require that recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either (i) be on the site for fewer than 180 consecutive days, or (ii) be fully licensed and ready for highway use, or (iii) meet the permit requirements of Article 4, Section C (1), and the elevation and anchoring requirements for "manufactured homes" in paragraph (4) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

SECTION C STANDARDS FOR SUBDIVISION PROPOSALS

- (1) All subdivision proposals including the placement of manufactured home parks and subdivisions shall be consistent with Article 1, Sections B, C and D of this ordinance.
- (2) All proposals for the development of subdivisions including the placement of manufactured home parks and subdivisions shall meet Development Permit requirements of Article 3, Section C; Article 4, Section C; and the provisions of Article 5 of this ordinance.
- (3) Base flood elevation data shall be generated for subdivision proposals and other proposed development including the placement of manufactured home parks and subdivisions which is greater than 50 lots or 5 acres, whichever is lesser, if not otherwise provided pursuant to Article 3, Section B or Article 4, Section B (8) of this ordinance.
- (4) All subdivision proposals including the placement of manufactured home parks and subdivisions shall have adequate drainage provided to reduce exposure to flood hazards.
- (5) All subdivision proposals including the placement of manufactured home parks and subdivisions shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.

SECTION D STANDARDS FOR AREAS OF SHALLOW FLOODING (AO/AH ZONES)

Located within the areas of special flood hazard established in Article 3, Section B, are areas designated as shallow flooding. These areas have special flood hazards associated with flood depths of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

- (1) All new construction and substantial improvements of **residential** structures have the lowest floor (including basement) elevated to or above the base flood elevation or the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least 2 feet if no depth number is specified).
- (2) All new construction and substantial improvements of **non-residential** structures;
 - (a) have the lowest floor (including basement) elevated to or above the base flood elevation or the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least 2 feet if no depth number is specified), or
 - (b) together with attendant utility and sanitary facilities be designed so that below the base specified flood depth in an AO Zone, or below the Base Flood Elevation in an AH Zone, level the structure is watertight with walls substantially impermeable to the passage of water and with structural

components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.

- (3) A registered professional engineer or architect shall submit a certification to the Floodplain Administrator that the standards of this Section, as proposed in Article 4, Section C(1)a., are satisfied.
- (4) Require within Zones AH or AO adequate drainage paths around structures on slopes, to guide flood waters around and away from proposed structures.

SECTION E FLOODWAYS

Floodways – located within areas of special flood hazard established in Article 3, Section B, are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

- (1) Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of base flood discharge.
- (2) If Article 5, Section E(1) above is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Article 5.
- (3) Under provisions of 44 CFT Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may permit encroachments within the adopted regulatory floodway provided that the community first applies for a conditional FIRM and floodway revision through FEMA.

SECTION F COASTAL HIGH HAZARD AREAS

Located within the areas of special flood hazard established in Article 3, Section B, are areas designated as Coastal High Hazard Areas (Zones V1-30, VE, and/or V). These areas have special flood hazards associated with high velocity waters from tidal surges and hurricane wave wash; therefore, in addition to meeting all provisions outlined in this ordinance, the following provisions must also apply:

- (1) Obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement. The Floodplain Administrator shall maintain a record of all such information.
- (2) All new construction shall be located landward of the reach of mean high tide.
- (3) All new construction and substantial improvements shall be elevated on pilings and columns so that:
 - (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level;
 - (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of (3)(i) and (ii) of this Section.
- (4) Provide that all new construction and substantial improvements have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system.

For the purpose of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:

- (i) breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and
 - (ii) the elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. Such enclosed space shall be useable solely for parking of vehicles, building access, or storage. Such space shall not be used for human habitation.
- (5) Prohibit the use of fill or structural support of buildings.
- (6) Prohibit man-made alteration of sand dunes and mangrove stands which increase potential flood damage.
- (7) **Manufactured Homes –**
Require that manufactured homes placed or substantially improved within Zone V1-30, V, and VE on the community’s FIRM on sites (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred “substantial damage” as the result of a flood, meet the standards of paragraphs (1) through (6) of this Section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V and VE on the community’s FIRM meet the requirements of Article 5, Section B(4) of this ordinance.
- (8) **Recreational Vehicles –**
Require that recreational vehicles placed on sites within Zones V1-30, V and VE on the community’s FIRM either (i) be on the site for fewer than 180 consecutive days, (ii) be fully licensed and ready for highway use, or (iii) meet the requirements in Article 3, Section C of this ordinance and paragraphs (1) through (6) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

ARTICLE 6

COMPLIANCE AND PENALTIES

SECTION A UTILITY CONNECTIONS

Final connections of utility services shall not be made until after the County Engineer has approved the building or structure to be in compliance with the Flood Control Ordinance of Nueces County. All utility companies servicing customers within the County of Nueces shall be apprised of this order and specifically this requirement.

SECTION B PENALTIES FOR NONCOMPLIANCE

Any person, firm or corporation who violates any provision of this regulation, or who permits any building or other structure to remain in violation of this regulation, shall be subject to a civil penalty of not less than \$50 nor more than \$200 for each act of violation and for each day of such violation.

Whenever it appears that any person, firm or corporation has violated or is violating or threatening to violate, any provision of this regulation, the Commissioners Court may cause a civil suit to be instituted in a District Court for injunctive relief to restrain the person, firm or corporation from continuing the violation or threat of violation, or for the assessment and recovery of a civil penalty of not less than \$50, nor more than \$200 for each act of violation and for each day of violation, as the Court may deem proper, or for both injunctive relief and civil penalties.

CERTIFICATION OF ADOPTION

So Adopted and Effective as of this the 29 day of August, 2022.

Bd C

Barbara Canales,
Nueces County Judge

R.A.
Roberto G. Hernandez
Nueces County Commissioner, Precinct 1



AG
Joe A. Gonzalez
Nueces County Commissioner, Precinct 2

J.M.
John Marez
Nueces County Commissioner, Precinct 3

B. Chesney
Brent Chesney
Nueces County Commissioner, Precinct 4

Attest: *Kara Sands*
Kara Sands, Nueces County Clerk

20220509-8/29

City of Port Aransas

Chapter 8 - FLOOD DAMAGE PREVENTION

[1]

Footnotes:

ARTICLE I. - IN GENERAL

Sec. 8-1. - Statutory authorization.

The legislature of the State of Texas has in Vernon's Ann. Civ. St. delegated the responsibility to local governmental units to adopt regulations designed to minimize flood losses. Therefore, the city council of Port Aransas, Texas, does ordain as follows.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-2. - Findings of fact.

- (a) The flood hazard areas of Port Aransas are subject to periodic inundation which results 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 the public health, safety and general welfare.
- (b) 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 hazards areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, floodproofed or otherwise protected from flood damage.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-3. - Statement of purpose.

It is the purpose of this chapter to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- (1) Protect human life and health;
- (2) Minimize expenditure of public money for costly flood control projects;
- (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- (4) Minimize prolonged business interruptions;
- (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;

- (6) 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
- (7) Insure that potential buyers are notified that property is in a flood area.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-4. - Methods of reducing flood losses.

In order to accomplish its purposes, this chapter uses the following methods:

- (1) 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;
- (2) Require that uses vulnerable to floods, including facilities which service such uses, be protected against flood damage at the time of initial construction;
- (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;
- (4) Control filling, grading, dredging and other development which may increase flood damage;
- (5) Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-5. - Definitions.

Unless specifically defined below, words or phrases used in this chapter shall be interpreted to give them the meaning they have in common usage and to give this chapter its most reasonable application.

Alluvial fan flooding means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.

Apex means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and the alluvial fan flooding can occur.

Appurtenant structure means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

Area of future conditions flood hazard means the land area that would be inundated by the one-percent-annual chance (100-year) flood based on future conditions hydrology.

Area of shallow flooding means a designated AO, AH, or VO zone on a community's flood insurance rate map (FIRM) with a one (1) percent chance or greater annual chance of flooding to an average depth of one (1) to three (3) feet where a clearly defined channel does not exist, where the path of flooding is

unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of special flood hazard is the land within a community subject to a one (1) percent or greater chance of flooding in any given year. The area(s) may be designated as Zone(s) A, AE, AH, AO, A1-99, VO, V1-30, VE or V on the flood insurance rate map (FIRM) after detailed ratemaking has been completed.

Base flood means the flood having a one-percent chance of being equalled or exceeded in any given year.

Base flood elevation (BFE). The elevation shown on the flood insurance rate map (FIRM) and found in the accompanying flood insurance study (FIS) for Zones A, AE, AH, A1—A30, AR, V1—V30, or VE that indicates the water surface elevation resulting from the flood that has a one-percent chance of equaling or exceeding that level in any given year—also called the base flood.

Basement means any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway wall means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

Critical feature means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

Development means any manmade change in improved and unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

Elevated building means, for insurance purposes, a non-basement building, which has its lowest elevated floor, raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

Existing construction means for the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Expansion to an existing manufactured home park or subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the

pouring of concrete pads).

Flood or flooding means a general and temporary condition of partial or complete inundation of normally dry areas from:

- (1) The overflow of inland or tidal waters.
- (2) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood elevation study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood insurance rate map (FIRM) means an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood insurance study. See "flood elevation study."

Floodplain or flood-prone area means any land area susceptible to being inundated by water from any source (see definition of flooding).

Floodplain management means the operation of an overall program of corrective and preventative measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood protection system means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the areas within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood proofing means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway (regulatory floodway). See "regulatory floodway."

Functionally dependent use means a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and shipbuilding and ship repair facilities, but does not include longterm storage or related manufacturing facilities.

Highest adjacent grade means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historical structure means any structure that is:

- (1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the national register;
- (2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;
- (3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or
- (4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
 - a. By an approved state program as determined by the Secretary of the Interior; or
 - b. Directly by the Secretary of the Interior in states without approved programs.

Levee means a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee system means a flood protection system which consists of a levee or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking or [of] vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided that such enclosure is not built so as to render the structure in violation of the applicable nonelevation design requirement of Section 60.3 of the National Flood Insurance Program regulations.

Manufactured home means a structure transportable in one (1) or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

Manufactured home park or subdivision means a parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

Mean sea level means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's flood insurance rate map are referenced.

New construction means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after December 31, 1974, and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

New manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.

Primary frontal dune means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Recreational vehicle means a vehicle which is:

- (1) built on a single chassis;
- (2) four hundred (400) square feet or less when measured at the largest horizontal projections;
- (3) designed to be self-propelled or permanently towable by a light duty truck; and
- (4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Regulatory floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Riverine means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Sand dunes means naturally occurring accumulations of sand in ridges or mounds landward of the beach.

Special flood hazard area. See "area of special flood hazard."

Start of construction (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within one hundred eighty (180) days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of a slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure means a walled and roofed building, including a gas or liquid storage tank, that is principally aboveground, as well as a manufactured home.

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred.

Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure before "start of construction" of the improvement. This includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either:

- (1) Any project for the improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary conditions, or
- (2) Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Variance is a grant of relief to a person from the requirements of this chapter when specific enforcement would result in unnecessary hardship. A variance, therefore, permits construction or development in a manner otherwise prohibited by this chapter. (For full requirements see Section 60.6 of the National Flood Insurance Program regulations.)

Violation means the failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Section 60.3(b)(5)(i), (c)(4), (c)(10),

(d)(3), (e)(2), (e)(4), or (e)(5) [of the National Flood Insurance Program regulations] is presumed to be in violation until such time as that documentation is provided.

Water surface elevation means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

(Ord. No. 92-10, § 1, 6-18-92; Ord. No. 2015-02, § 1, 1-15-15)

Sec. 8-6. - Lands to which this chapter applies.

This chapter shall apply to all areas of special flood hazard within the jurisdiction of Port Aransas.

(Ord. No. 92-10, § 1, 6-18-91)

Sec. 8-7. - Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled, "The Flood Insurance Study (FIS) for Aransas County and incorporated areas," dated May 4, 1992, with accompanying **Flood Insurance Rate Maps (FIRM) dated May 4, 1992**, and the Flood Insurance Study (FIS) for Nueces County and incorporated areas, dated May 4, 1992, with accompanying **Flood Insurance Rate Maps (FIRM) dated May 4, 1992**, and any revisions thereto are **hereby adopted by reference and declared to be a part of this chapter.**

(Ord. No. 92-10, § 1, 6-18-91; Ord. No. 2015-02, § 1, 1-15-15)

Sec. 8-8. - Establishment of development permit.

A development permit shall be required to ensure conformance with the provisions of this chapter.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-9. - Compliance.

No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this chapter and other applicable regulations.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-10. - Abrogation and greater restrictions.

This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However where this chapter and another [ordinance], easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-11. - Interpretation.

In the interpretation and application of this chapter, all provisions shall be:

- (1) Considered as minimum requirements;
- (2) Liberally construed in favor of the governing body; and
- (3) Deemed neither to limit nor repeal any other powers granted under state statutes.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-12. - Warning and disclaimer of liability.

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the community or any official or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.

(Ord. No. 92-10, § 1, 6-18-92)

ARTICLE II. - ADMINISTRATION

Sec. 8-13. - Designation of the floodplain administrator.

The building inspector is hereby appointed the floodplain administrator to administer and implement the provisions of this chapter and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-14. - Duties and responsibilities of the floodplain administrator.

Duties and responsibilities of the floodplain administrator shall include, but not be limited to, the following:

- (1) Maintain and hold open for public inspection all records pertaining to the provisions of this chapter.
- (2)

Review permit application to determine whether proposed building site, including the placement of manufactured homes, will be reasonably safe from flooding.

- (3) Review, approve or deny all applications for development permits required by adoption of this chapter.
- (4) Review permits for proposed development to assure that all necessary permits have been obtained from those federal, state or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.
- (5) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the floodplain administrator shall make the necessary interpretation.
- (6) Notify, in riverine situations, adjacent communities and the state coordinating agency which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality (TCEQ), prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.
- (7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.
- (8) When base flood elevation data has not been provided in accordance with Article I, section 8-7, the floodplain administrator shall obtain, review and reasonably utilize any base flood elevation data and floodway data available from a federal, state or other source, in order to administer the provisions of Article III.
- (9) When a regulatory floodway has not been designated, the floodplain administrator must require that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1—30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- (10) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones A1—30, AE, AH, on the community's FIRM which increases the water surface elevation of the base flood by more than one foot, provided that the community first completes all of the provisions required by Section 65.12.

(Ord. No. 92-10, § 1, 6-18-92; Ord. No. 2015-02, § 2, 1-15-15)

Sec. 8-15. - Permit procedures.

- (a) Application for a development permit shall be presented to the floodplain administrator on forms furnished by him/her and may include, but not be limited to, plans in duplicate drawn to scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, including the placement of manufactured homes, and the location of the foregoing in relation to areas of special flood hazard. Additionally, the following information is required:
 - (1) Elevation (in relation to mean sea level), of the lowest floor (including basement) of all new and substantially improved structures;
 - (2) Elevation in relation to mean sea level to which any nonresidential structure shall be floodproofed;
 - (3) A certificate from a registered professional engineer or architect that the nonresidential floodproofed structure shall meet the floodproofing criteria of Article III, Section 8-18(2);
 - (4) Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development;
 - (5) Maintain a record of all such information in accordance with Article II, Section 8-14(1).
- (b) Approval or denial of a development permit by the floodplain administrator shall be based on all of the provisions of this chapter and the following relevant factors:
 - (1) The danger to life and property due to flooding or erosion damage;
 - (2) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - (3) The danger that materials may be swept onto other lands to the injury of others;
 - (4) The compatibility of the proposed use with existing and anticipated development;
 - (5) The safety of access to the property in times of flood for ordinary and emergency vehicles;
 - (6) The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;
 - (7) The expected heights, velocity, duration, rate of rise and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site;
 - (8) The necessity to the facility of a waterfront location, where applicable;
 - (9) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;

(Ord. No. 92-10, § 1, 6-18-92; Ord. No. 2015-02, § 2, 1-15-15)

Sec. 8-16. - Variance procedures.

- (a) The appeal board as established by the community shall hear and render judgment on requests for variances from the requirements of this chapter.
- (b) The appeal board shall hear and render judgement on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the floodplain administrator in the enforcement or administration of this chapter.
- (c) Any person or persons aggrieved by the decision of the appeal board may appeal such decision in the courts of competent jurisdiction.
- (d) The floodplain administrator shall maintain a record of all actions involving an appeal and shall report variances to the Federal Emergency Management Agency upon request.
- (e) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this chapter.
- (f) Variances may be issued for new construction and substantial improvements to be erected on a lot of one-half (½) acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base of flood level, providing the relevant factors in section 8-15(b) of this article have been fully considered. As the lot size increases beyond the one-half (½) acre, the technical justification required for issuing the variance increases.
- (g) Upon consideration of the factors noted above and the intent of this chapter, the city council may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this chapter (Article I, section 8-3).
- (h) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
- (i) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
- (j) Prerequisites for granting variances:
 - (1) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
 - (2) Variances shall only be issued upon, (i) showing a good and sufficient cause; (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public or conflict with existing local laws or ordinances.

- (3) Any application to whom a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.
- (k) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that (i) the criteria outlined in Article II, section 8-16(a) through (i) are met, and (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(Ord. No. 92-10, § 1, 6-18-92)

ARTICLE III. - PROVISIONS FOR FLOOD HAZARD REDUCTION

Footnotes:

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Editor's note— Retitled from "Standards for Flood Hazard Reduction" by Ord. No. 2015-02, § 3, adopted Jan. 15, 2015.

Sec. 8-17. - General standards.

In all areas of special flood hazards the following provisions are required for all new construction and substantial improvements:

- (1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- (2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
- (3) All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
- (4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during the conditions of flooding;
- (5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
- (6)

New and replacement sanitary sewer systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from the systems into flood waters; and,

- (7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-18. - Specific standards.

In all areas of special flood hazards where base flood elevation data has been provided as set forth in (i) Article I, section 8-7, (ii) Article II, section 8-14(6) or (iii) Article III, section 8-19(c), the following provisions are required:

- (1) *Residential construction.* New construction and substantial improvement of any residential structure shall have the lowest floor (including basement), elevated to or above the base flood elevation. A registered professional engineer, architect, or land surveyor shall submit a certification to the floodplain administrator that the standard of this subsection as proposed in Article II, section 8-15(a), is satisfied.
- (2) *Nonresidential construction.* New construction and substantial improvements of any commercial, industrial or other nonresidential structure shall either have the lowest floor (including basement) elevated to or above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained by the floodplain administrator.
- (3) *Enclosures.* New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:
 - a. A minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided.

- b. The bottom of all openings shall be no higher than one (1) foot above grade.
- c. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(4) *Manufactured homes:*

- a. Require that all manufactured homes to be placed within Zone A on a community's FIRM shall be installed using methods and practices which minimize flood damage. For the purpose of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.
- b. Require that manufactured homes that are placed or substantially improved within Zones AH and AE on the community's FIRM on sites: (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision, or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as a result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.
- c. Require that manufactured homes be placed or substantially improved on sites in an existing manufactured home park or subdivision with Zones AH and AE on the community's FIRM that are not subject to the provisions of paragraph (4) of this section to be elevated so that either:
 - (i) the lowest floor of the manufactured home is at or above the base flood elevation, or
 - (ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty-six (36) inches in height above grade and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

- (5) *Recreational vehicles.* Require that recreational vehicles placed on sites within Zones AH and AE on the community's FIRM either: (i) be on the site for fewer than one hundred eighty (180) consecutive days, (ii) be fully licensed and ready for highway use, or (iii) meet the permit requirements of Article II, Section 8-15, and the elevation and anchoring requirements for "manufactured homes" in paragraph (4) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-19. - Standards for subdivision proposals.

- (a) All subdivisions proposals including the placement of manufactured home parks and subdivisions shall be consistent with Article I, Sections 8-2, 8-3, and 8-4 of this chapter.
- (b) All proposals for the development of subdivisions including the placement of manufactured home parks and subdivisions shall meet development permit requirements of Article I, section 8-8; Article II, section 8-15; and the provisions of Article III of this chapter.
- (c) Base flood elevation data shall be generated for subdivision proposals and other proposed development including the placement of manufactured home parks and subdivisions which is greater than fifty (50) lots or five (5) acres, whichever is less, if not otherwise provided pursuant to Article I, section 8-7 or Article II, section 8-14(6) of this chapter.
- (d) All subdivision proposals including the placement of manufactured home parks and subdivisions shall have adequate drainage provided to reduce exposure to flood hazards.
- (e) All subdivision proposals including the placement of manufactured mobile home parks and subdivisions shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-20. - Standards for areas of shallow flooding (AO/AH Zones).

Located within the areas of special flood hazard established in Article I, section 8-7, are areas designated as shallow flooding. These areas have special flood hazards associated with base flood depths of one (1) to three (3) feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

- (1) All new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two (2) feet if no depth number is specified).
- (2) All new construction and substantial improvements of nonresidential structures:
 - a. Have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two (2) feet if no depth number is specified), or;
 - b.

Together with attendant utility and sanitary facilities be designed so that below the base flood level the structure is so watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.

- (3) A registered professional engineer or architect shall submit a certification to the floodplain administrator that the standards of this section, as proposed in Article II, Section 8-15(a)(1), are satisfied.
- (4) Require within Zones AH or AO adequate drainage paths around structures on slopes, to guide flood waters around and away from proposed structures.

(Ord. No. 92-10, § 1, 6-18-92)

Sec. 8-21. - Coastal high hazard areas.

Located within the areas of special flood hazard established in Article I, section 8-7, are areas designated as coastal high hazard areas (Zones V1-30, VE and/or V). These areas have special flood hazards associated with high velocity waters from tidal surges and hurricane wave wash; therefore, in addition to meeting all provisions outlined in this chapter, the following provisions must also apply:

- (1) Obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement. The Floodplain Administrator shall maintain a record of all such information.
- (2) All new construction shall be located landward of the reach of mean high tide.
- (3) All new construction and substantial improvements shall be elevated on pilings and columns so that:
 - a. The bottom of the lowest horizontal structural member of the lowest floor (excluding pilings or columns) is elevated to or above the base flood level;
 - b. The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable state or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of subsection (3)(a) and (b) of this section.
- (4) Provide that all new construction and substantial improvements have the space below the lowest floor either free of obstruction or constructed with nonsupporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads

without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system.

For the purpose of this section, a breakaway wall shall have a design safe loading resistance of not less than ten (10) and no more than twenty (20) pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of twenty (20) pounds per square foot (either by design or when so required by local or state codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:

- a. Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and
 - b. The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by the applicable state or local building standards. Such enclosed space shall be usable solely for parking of vehicles, building access, or storage. Such space shall not be used for human habitation.
- (5) Prohibit the use of fill for structural support of buildings.
 - (6) Prohibit manmade alteration of sand dunes and mangrove stands which would increase potential flood damage.
 - (7) Manufactured homes. Require that manufactured homes placed or substantially improved within Zone V1-30, V, and VE on the community's FIRM on sites: (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision, or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards of paragraphs (1) through (6) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V, and VE on the community's FIRM meet the requirements of Article III, Section 8-18(4) of this chapter.
 - (8) Recreational vehicles. Require that recreational vehicles placed on sites within Zones V1-30, V and VE on the community's FIRM either: (i) be on the site for fewer than one hundred eighty (180) consecutive days, (ii) be fully licensed and ready for highway use, or (iii) meet the requirements in Article I, Section 8-8 of this chapter and paragraphs (1) through (6) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(Ord. No. 92-10, § 1, 6-18-92)

ARTICLE 3.05 FLOOD DAMAGE PREVENTION

§ 3.05.001. Statutory authorization, findings of fact, purpose and methods.

- (a) Statutory authorization. The legislature of the state has, in Texas Water Code, section 16.315, delegated the responsibility to local governmental units to adopt regulations designed to minimize flood losses. Therefore, the city council does ordain as follows.
- (b) Findings of fact.
- (1) The flood hazard areas of the city are subject to periodic inundation which results 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 the public health, safety and general welfare.
 - (2) 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, floodproofed or otherwise protected from flood damage.
- (c) Statement of purpose. It is the purpose of this article to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:
- (1) Protect human life and health;
 - (2) Minimize expenditure of public money for costly flood control projects;
 - (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
 - (4) Minimize prolonged business interruptions;
 - (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;
 - (6) Help maintain a stable tax base by providing for the sound use and development of floodprone areas in such a manner as to minimize future flood blight areas; and
 - (7) Insure that potential buyers are notified that property is in a flood area.
- (d) Methods of reducing flood losses. In order to accomplish its purposes, this article uses the following methods:
- (1) 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;

- (2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
 - (3) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
 - (4) Control filling, grading, dredging and other development which may increase flood damage;
 - (5) Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.
- (Ordinance 785, art. 1, adopted 5/11/87)

§ 3.05.002. Definitions.

Unless specifically defined below, words or phrases used in this article shall be interpreted to give them the meaning they have in common usage and to give this article its most reasonable application.

Appeal. A request for a review of the floodplain administrator’s interpretation of any provision of this article or a request for a variance.

Area of shallow flooding. A designated AO, AH, or VO zone on a community’s flood insurance rate map (FIRM) with a one-percent chance or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of special flood hazard. The land in the floodplain within a community subject to a 1-percent or greater chance of flooding in any given year. The area may be designated as zone A on the flood hazard boundary map (FHBM). After detailed ratemaking has been completed in preparation for publication of the FIRM, zone A usually is refined into zone A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AO, AR/AH, AR/A, VO, V1-30, VE or V.

Base flood elevation (BFE). The elevation shown on the flood insurance rate map (FIRM) and found in the accompanying flood insurance study (FIS) for zones A, AR, AH, A1-A30, AR, V1-V30, or VE that indicates the water surface elevation resulting from the flood that has a 1% chance of equaling or exceeding that level in any given year - also called the base flood.

Critical feature. An integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

Development. Any manmade change in improved and unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.

Elevated building. A nonbasement building (i) built, in the case of a building in zones A1-30, AE, A, A99, AO, AH, B, C, X, and D, to have the top of the elevated floor, or, in the case of a building in zone V1-30, VE, or V, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the ground level by means of

pilings, columns (posts and piers), or shear walls parallel to the flow of the water and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood. In the case of zones A1-30, AE, A, A99, AO, AH, B, C, X, and D, “elevated building” also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of floodwaters. In the case of zone V1-30, VE, or V, “elevated building” also includes a building otherwise meeting the definition of “elevated building,” even though the lower area is enclosed by means of breakaway walls, if the breakaway walls meet the standards of section 60.3(e)(5) of the National Flood Insurance Program regulations.

Existing construction. For the purposes of determining rates, structures for which the “start of construction” commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. “Existing construction” may also be referred to as “existing structures.”

Existing manufactured home park or subdivision. A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Expansion to an existing manufactured home park or subdivision. The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

Flood insurance rate map (FIRM). An official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood insurance study. The official report provided by the Federal Emergency Management Agency. The report contains flood profiles, and the water surface elevation of the base flood, as well as the flood boundary-floodway map.

Flood or flooding. A general and temporary condition of partial or complete inundation of normally dry land areas from:

- (1) The overflow of inland or tidal waters;
- (2) The unusual and rapid accumulation or runoff of surface waters from any source.

Floodplain or floodprone area. Any land area susceptible to being inundated by water from any source (see definition of flooding).

Flood protection system. Those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the areas within a community subject to a “special flood hazard” and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood-modifying works are those constructed in conformance with sound engineering standards.

Floodway (regulatory floodway). The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Functionally dependent use. A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and shipbuilding and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Habitable floor. Any floor usable for the following purposes, which include working, sleeping, eating, cooking or recreation, or a combination thereof. A floor used for storage purposes only is not a “habitable floor.”

Highest adjacent grade. The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic structure. Any structure that is:

- (1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
- (2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary [of the Interior] to qualify as a registered historic district;
- (3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or
- (4) Individually listed on a local inventory or historic places in communities with historic preservation programs that have been certified either:
 - (A) By an approved state program as determined by the Secretary of the Interior; or
 - (B) Directly by the Secretary of the Interior in states without approved programs.

Levee. A manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee system. A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor. The lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building’s lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirement of section 60.3 of the National Flood Insurance Program regulations.

Manufactured home. A structure transportable in one or more sections, which is built on a

permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term “manufactured home” does not include a “recreational vehicle.”

Manufactured home park or subdivision. A parcel (or contiguous parcels) of land divided into two or ore manufactured home lots for rent or sale.

Mean sea level. For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929, or other datum, to which base flood elevations shown on a community’s flood insurance rate map are referenced.

New construction. For the purpose of determining insurance rates, structured for which the “start of construction” commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, “new construction” means structures for which the “start of construction” commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvement to such structures.

New manufactured home park or subdivision. A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after effective date of floodplain management regulations adopted by a community.

Recreational vehicle. A vehicle which is:

- (1) Built on a single chassis;
- (2) 400 square feet or less when measured at the largest horizontal projections;
- (3) Designed to be self-propelled or permanently towable by a light duty truck; and
- (4) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Special flood hazard area. See area of special flood hazard.

Start of construction. For other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348), includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the

actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure. A walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

Substantial damage. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement. Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before “start of construction” of the improvement. This term includes structures which have incurred “substantial damage,” regardless of the actual repair work performed. The term does not, however, include either:

- (1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or
- (2) Any alteration of a “historic structure,” provided that the alteration will not preclude the structure’s continued designation as a “historic structure.”

Variance. A grant of relief to a person from the requirements of this article when specific enforcement would result in unnecessary hardship. A variance, therefore, permits construction or development in a manner otherwise prohibited by this article. (For full requirements see section 60.6 of the National Flood Insurance Program regulations.)

Violation. The failure of a structure or other development to be fully compliant with the community’s floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in section 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) [of the National Flood Insurance Program regulations] is presumed to be in violation until such time as that documentation is provided.

Water surface elevation. The height, in relation to the National Geodetic Vertical Datum (NGVD) or 1929 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.
(Ordinance 1090 adopted 2/17/20 ; Ordinance 785, art. 2, adopted 5/11/87)

§ 3.05.003. General provisions.

- (a) Lands to which this article applies. This article shall apply to all areas of special flood hazard within the jurisdiction of the city.
- (b) Basis for establishing areas of special flood hazard. The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled “The Revised Preliminary Flood Insurance Study (FIS) for Nueces County, Texas, and Incorporated Areas,” dated May 30,

2018, with accompanying revised preliminary flood insurance rate maps (FIRM) dated May 30, 2018 and any revisions thereto are hereby adopted by reference and declared to be a part of this article.

- (c) Establishment of development permit. A development permit shall be required to ensure conformance with the provisions of this article.
- (d) Compliance. No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this article and other applicable regulations.
- (e) Abrogation and greater restrictions. This article is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this article and another ordinance conflict or overlap, whichever imposes the more stringent restrictions shall prevail.
- (f) Interpretation. In the interpretation and application of this article, all provisions shall be:
 - (1) Considered as minimum requirements;
 - (2) Liberally construed in favor of the governing body; and
 - (3) Deemed neither to limit nor repeal any other powers granted under state statutes.
- (g) Warning and disclaimer of liability. The degree of flood protection required by this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by manmade or natural causes. This article does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This article shall not create liability on the part of the community or any official or employee thereof for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder.

(Ordinance 1090 adopted 2/17/20 ; Ordinance 785, art. 3, adopted 5/11/87)

§ 3.05.004. Administration.

- (a) Designation of floodplain administrator. The city inspector is hereby appointed the floodplain administrator to administer and implement the provisions of this article and other appropriate sections of 44 CFR (National Flood Insurance Program Regulations) pertaining to floodplain management.
- (b) Duties and responsibilities of floodplain administrator. Duties and responsibilities of the floodplain administrator shall include, but not be limited to, the following:
 - (1) Maintain and hold open for public inspection all records pertaining to the provisions of this article.
 - (2) Review permit applications to determine whether proposed building sites will be reasonably safe from flooding.

- (3) Review, approve or deny all applications for development permits required by adoption of this article.
 - (4) Review permits for proposed development to assure that all necessary permits have been obtained from those federal, state or local governmental agencies (including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.
 - (5) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, [where there appears to be a conflict between a mapped boundary and] actual field conditions), the floodplain administrator shall make the necessary interpretation.
 - (6) Notify, in riverine situations, adjacent communities and the state coordinating agency, which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality (TCEQ), prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.
 - (7) Assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained.
 - (8) When base flood elevation data has not been provided in accordance with section 3.05.003(b), the floodplain administrator shall obtain, review and reasonably utilize any base flood elevation data and floodway data available from a federal, state or other source, in order to administer the provisions of section 3.05.005.
 - (9) When a regulatory floodway has not been designated, the floodplain administrator must require that no new construction, substantial improvements, or other development (including fill) shall be permitted within zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- (c) Permit procedure.
- (1) Application for a development permit shall be presented to the floodplain administrator on forms furnished by him/her and may include, but not be limited to, plans in duplicate drawn to scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, and the location of the foregoing in relation to areas of special flood hazard. Additionally, the following information is required:
 - (A) Elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures;
 - (B) Elevation in relation to mean sea level to which any nonresidential structure shall be floodproofed;

- (C) A certificate from a registered professional engineer or architect that the nonresidential floodproofed structure shall meet the floodproofing criteria of section 3.05.005(b)(2);
 - (D) Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development;
 - (E) Maintain a record of all such information in accordance with subsection (b)(1) of this section.
- (2) Approval or denial of a development permit by the floodplain administrator shall be based on all of the provisions of this article and the following relevant factors:
- (A) The danger to life and property due to flooding or erosion damage;
 - (B) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - (C) The danger that materials may be swept onto other lands to the injury of others;
 - (D) The compatibility of the proposed use with existing and anticipated development;
 - (E) The safety of access to the property in times of flood for ordinary and emergency vehicles;
 - (F) The costs of providing governmental services during and after flood conditions, including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;
 - (G) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;
 - (H) The necessity to the facility of a waterfront location, where applicable;
 - (I) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;
 - (J) The relationship of the proposed use to the comprehensive plan for that area.
- (d) Variance procedures.
- (1) The city council shall hear and render judgment on requests for variances from the requirements of this article.
 - (2) The city council shall hear and render judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the floodplain administrator in the enforcement or administration of this article.

- (3) Any person or persons aggrieved by the decision of the city council may appeal such decision in the courts of competent jurisdiction.
- (4) The floodplain administrator shall maintain a record of all actions involving an appeal and shall report variances to the Federal Emergency Management Agency upon request.
- (5) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the state inventory of historic places, without regard to the procedures set forth in the remainder of this article.
- (6) Variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing the relevant factors in subsection (c)(2) of this section have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.
- (7) Upon consideration of the factors noted above and the intent of this article, the city council may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this article (section 3.05.001(c)).
- (8) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
- (9) Prerequisites for granting variances:
 - (A) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
 - (B) Variances shall only be issued upon:
 - (i) Showing a good and sufficient cause;
 - (ii) A determination that failure to grant the variance would result in exceptional hardship to the applicant; and
 - (iii) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, or extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
 - (C) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

(10) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that:

(A) The criteria outlined in subsections (d)(1) through (9) of this section are met; and

(B) The structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(Ordinance 1090 adopted 2/17/20 ; Ordinance 785, art. 4, adopted 5/11/87 ; Ordinance adopting Code)

§ 3.05.005. Provisions for flood hazard reduction.

(a) General standards. In all areas of special flood hazards, the following provisions are required for all new construction and substantial improvements:

- (1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- (2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
- (3) All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
- (4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;
- (5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;
- (6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the systems into floodwaters; and
- (7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(b) Specific standards. In all areas of special flood hazards where base flood elevation data has been provided as set forth in section 3.05.003(b), section 3.05.004(b)(8), or subsection (c)(3) of this section, the following provisions are required:

- (1) Residential construction. New construction and substantial improvement of any residential structure shall have the lowest floor (including basement) elevated

to or above the base flood elevation. A registered professional engineer, architect, or land surveyor shall submit a certification to the floodplain administrator that the standard of this subsection, as proposed in section 3.05.004(c)(1)(A), is satisfied.

- (2) Nonresidential construction. New construction and substantial improvements of any commercial, industrial or other nonresidential structure shall either have the lowest floor (including basement) elevated to or above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained by the floodplain administrator.
- (3) Enclosures. New construction and substantial improvements with fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:
 - (A) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
 - (B) The bottom of all openings shall be no higher than one foot above grade.
 - (C) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
- (4) Manufactured homes.
 - (A) Require that all manufactured homes to be placed within zone A shall be installed using methods and practices which minimize flood damage. For the purpose of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.
 - (B) All manufactured homes shall be in compliance with subsection (b)(1) of this section.

(C) Require that all manufactured homes to be placed or substantially improved within zones A1-30, AH and AE on the community's FIRM be elevated on a permanent foundation such that the lowest floor of the manufactured home is at or above the base flood elevation, and be securely anchored to an adequately anchored foundation system in accordance with the provisions of subsection (b)(4) of this section.

(c) Standards for subdivision proposals.

- (1) All subdivision proposals, including manufactured home parks and subdivisions, shall be consistent with section 3.05.001(b), (c) and (d) of this article.
- (2) All proposals for the development of subdivisions, including manufactured home parks and subdivisions, shall meet development permit requirements of section 3.05.003(c) and section 3.05.004(c) of this article, and the provisions of this section.
- (3) Base flood elevation data shall be generated for subdivision proposals and other proposed development, including manufactured home parks and subdivisions, which is greater than 50 lots or 5 acres, whichever is lesser, if not otherwise provided pursuant to section 3.05.003(b) or section 3.05.004(b)(8) of this article.
- (4) All subdivision proposals, including manufactured home parks and subdivisions, shall have adequate drainage provided to reduce exposure to flood hazards.
- (5) All subdivision proposals, including manufactured home parks and subdivisions, shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.

(d) Standards for areas of shallow flooding (AO/AH zones). Located within the areas of special flood hazard established in section 3.05.003(b) are areas designated as shallow flooding. These areas have special flood hazards associated with base flood depths of 1 to 3 feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply:

- (1) All new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified.
- (2) All new construction and substantial improvements of nonresidential structures:
 - (A) Have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified); or
 - (B) Together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural

components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.

- (3) A registered professional engineer or architect shall submit a certification to the floodplain administrator that the standards of this subsection, as proposed in section 3.05.004(c)(1)(A), are satisfied.
 - (4) Require within zone AH or AO adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.
- (e) Floodways. Located within areas of special flood hazard established in section 3.05.003(b) are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters, which carry debris, potential projectiles and erosion potential, the following provisions shall apply:
- (1) Encroachments are prohibited, including fill, new construction, substantial improvements and other development, unless certification by a professional registered engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels within the community during the occurrence of the base flood discharge.
 - (2) If subsection (e)(1) above is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of this section.
- (f) Recreational vehicles. Require that recreational vehicles placed on sites within zones V1-30, V, and VE on the community's FIRM either:
- (1) Be on the site for fewer than 180 consecutive days;
 - (2) Be fully licensed and ready for highway use; or
 - (3) Meet the permit requirements of section 3.05.004(c) of this article.
- A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.
- (g) Penalties for noncompliance. No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this article and other applicable regulations. Violation of the provisions of this article by failure to comply with any of its requirement (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this article or fails to comply with any of its requirements shall upon conviction thereof be fined not more than \$500.00 for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the city council from taking such other lawful action as is necessary to prevent or remedy any violation.
(Ordinance 785, art. 5, adopted 5/11/87 ; Ordinance 1090 adopted 2/17/20)

Appendix H: Substantial Damage Management Plan

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City of Corpus Christi



City of Corpus Christi Floodplain
Management Division Public Works
Department



X 
Al Raymond III, AIA, CBO
Director of Development Services



X 
Gabriel Hinojosa, P.E., CFM, FPA
Interim Director of Public Works

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CITY OF CORPUS CHRISTI

SUBSTANTIAL DAMAGE MANAGEMENT PLAN (SDP)

Introduction

The City of Corpus Christi has developed this Substantial Damage Plan (SDP) to help prepare both resources and materials prior to a major event. The SDP includes many of the resources needed to successfully navigate the substantial damage process including evaluating damage to buildings and addressing those that have been substantially damaged, as required under the National Flood Insurance Program (NFIP). The plan will also help residents mitigate properties to avoid damages prior to the next event.

The City of Corpus Christi SDP followed the six-step planning process outlined in the 2021 Addendum to the 2017 CRS Coordinator's Manual.

1. Assess community's vulnerability to substantial damage.
2. Identify community's team for management of substantial damage properties.
3. Identify Pre and post-event efforts related to substantial damage.
4. Build a property database for substantial damage estimates.
5. Identify actions community can take to address potential substantial damage.
6. Determine implementation steps and procedures for updating the plan.

When buildings undergo repair or improvement, it is an opportunity for the City to reduce flood damage to existing structures. As an NFIP participant, the City must determine whether proposed work qualifies as substantial improvement or repair of substantial damage (referred to as an SI/SD determination). If work on the structures constitutes SI/SD, then structures must be brought into compliance with NFIP requirements for new construction

The City of Corpus Christi's Substantial Damage language is established and defined in the City's Floodplain Ordinance, City of Corpus Christi Municode, Chapter 14, Article V. The ordinance was published and available on the City's Website, on September 9, 2003, ordinance number 25467. Specifically, the ordinance includes the following definitions in Section 2:

"Substantial Damage"

Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed 50% of the market value of the structure before the damage occurred.

"Substantial Improvement"

Any reconstruction, rehabilitation, addition, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. This includes structures which have incurred

substantial damage, regardless of the actual repair work performed. The term does not, however, include either (1) any project for improvement of a structure to correct existing state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are at the minimum necessary conditions; or (2) any alteration of a structure, provided that the alteration will not preclude the structure's continued designation as a historic structure

Roles and Responsibilities

NFIP Overview

The original legislation for the NFIP was passed in 1968. Congress expressly found that "a program of flood insurance can promote the public interest by encouraging sound land use by minimizing exposure of property to flood losses". The NFIP is administered by the Federal Emergency Management Agency (FEMA) and is intended to encourage states and local governments to recognize and incorporate flood hazards in their land use and development decisions. The NFIP has three (3) main elements:

1. Hazard identification and mapping, in which engineering studies are conducted and flood maps are prepared to delineate areas that are predicted to be subject to flooding under certain conditions.
2. Floodplain management criteria, which establish the minimum requirements for communities to adopt and apply to development within mapped flood hazard areas; and
3. Flood insurance, which provide financial protection for property owners to cover flood-related damage to buildings and contents.

The NFIP establishes distinct responsibilities for Federal, State and Local levels of government. For local officials who administer the SI/SD requirements of their regulations and codes, it is important to recognize how these established roles affect responsibilities for SI/SD. As outlined in the NFIP regulations:

- Communities are responsible for regulating all development in mapped flood hazard areas, issuing permits and enforcing the requirements, including SI/SD requirements for improvements and repairs of structures.
- States generally are responsible for providing technical assistance to communities, monitoring community programs, and coordinating between communities and the NFIP.
- FEMA promulgates the minimum regulatory requirements, supports State programs, provides technical assistance, monitors community programs verifying compliance with the minimum NFIP criteria, and produces flood hazard maps and data.

State's Role

The Governor has designated the Texas Water Development Board (TWDB) as the NFIP State Coordinating Agency. The TWDB is specially charged with being the link between Federal, State and Local governments. The TWDB stays current on NFIP issues and can advise communities on specific provisions and any State requirements. As outlined in the NFIP regulations States have the following key responsibilities:

- Encourage and provide assistance for communities to qualify for participation in the NFIP.
- Guide and assist communities develop, implement, and maintain floodplain management regulations.
- Provide technical assistance and participate in training opportunities.
- Assist in the delineation of flood-prone areas and notify FEMA of problems with community programs if they cannot be resolved through technical assistance.

City of Corpus Christi's Role

The NFIP regulations contained in 44 CFR S 59.22 and S 60.3 outline the responsibilities that the City must accept in order to become and remain eligible to participate in the NFIP:

- Designate an agency that is charged with the responsibility to administer floodplain management requirements.
- Determine whether proposed development activities are located in SFHAs, review proposals to ensure compliance with the floodplain management regulations and building codes, and issue approvals or denials for permits.
- Maintain records of issued permits, elevation data, inspections, and enforcement actions.
- Assist in the preparation and revision of floodplain maps and help residents obtain information on flood hazards, floodplain map data and compliant construction measures.

For existing buildings that are located in the SFHAs, in addition to the requirements above, the city responsibilities also include:

- Determine whether proposed improvements are "substantial improvements", substantial improvement of buildings trigger requirements for permits and compliance.
- Determine whether work necessary to restore a damaged building to its pre-damage condition constitutes repair of "substantial damage" repair of substantially damaged buildings triggers requirements for permits and compliance.

Assessment of Vulnerability to Substantial Damage

Flood Risk in Corpus Christi

Corpus Christi is the eighth largest city in Texas and sixtieth most populous City in the United States with a census-estimated 2021 population of 348 thousand people within a land area of 480 square miles. The city is a coastal community with elevations ranging from sea level to 85ft above sea level, is prone to flooding and vulnerable to hurricanes.

In the Corpus Christi area you will find the Gulf of Mexico, several large bays, estuaries, rivers, and creeks. Corpus Christi Bay has two main extensions, Nueces Bay which extends to the Nueces River, and Oso Bay which extends to Oso Creek. La Volla Creek watershed is another tributary to Oso Creek. Together with extensions the Corpus Christi Bay forms one of the seven major estuaries along the Gulf coast of Texas. Laguna Madre, the second largest of the Texas estuaries, is a long, shallow, hypersaline lagoon along Padre Island. Flooding from the Nueces River, Nueces Bay, and Oso Bay happen slowly and can usually be forecast in advance. However, flash flooding along the Oso and La Volla Creeks can occur suddenly and unexpectedly.

Approximately 16% of the total City area lies within the Special Flood Hazard Area (SFHA) on FEMA flood maps. With its proximity to the Gulf Coast, growing population, and increased development the City of Corpus Christi has implemented structural and nonstructural mitigation strategies as part of a comprehensive flood mitigation program.

Corpus Christi can flood in any season, but floods are most common during the spring and summer months. Water heights for the Nueces River and Oso Creek are monitored using the National Weather Service website.

Flood History in Corpus Christi

Rain falls throughout the year in Corpus Christi. The wetter season lasts approximately 6 months from May through October with a greater than 22% chance of a given day being a wet day.

Floodwaters rise slowly, persist for unusually long periods, and recede slowly. The severity of flood damage is directly related to flood stage (the height of the flood waters) at a given location.

In Corpus Christi, two primary gages are used to monitor flood risk. Those gages exist in Oso Creek and Nueces River near Bluntzer.

Recent Crests at the Oso Creek Gage:
Major Flood Stage: 25ft
Moderate Flood Stage: 20ft
Flood Stage: 20ft
Action Stage: 11ft

- (1) 14.78 ft on 10/15/2021
- (2) 25.41 ft on 10/01/2021
- (3) 9.93 ft on 09/13/2021
- (4) 27.69 ft on 07/09/2021
- (5) 11.66 ft on 07/07/2021
- (6) 13.43 ft on 06/23/2021
- (7) 12.05 ft on 06/05/2021
- (8) 26.63 ft on 05/20/2021
- (9) 10.93 ft on 05/17/2021
- (10) 14.30ft on 05/01/2021

Recent Crests at the Bluntzer Gage:
Major Flood Stage: 24ft
Moderate Flood Stage: 21ft
Flood Stage: 18ft
Action Stage: 12ft

- (1) 15.09 ft on 10/02/2021
- (2) 22.40 ft on 07/09/2021
- (3) 15.09 ft on 06/05/2021
- (4) 15.56 ft on 05/20/2021
- (5) 12.19 ft on 05/17/2021
- (6) 10.06 ft on 05/13/2021
- (7) 19.25 ft on 12/09/2018
- (8) 26.59 ft on 11/02/2018
- (9) 9.86 ft on 06/01/2017
- (10) 9.68ft on 04/18/2017

Prior Damage Determinations

To date the City of Corpus Christi has not made any substantial damage or substantial improvement determinations.

General Description of Structures in a Substantial Damage Areas

Within the jurisdiction of the City of Corpus Christi, 93% of all structures located within a substantial damage area are single family dwellings.

The Substantial Damage Management Team

- **City Floodplain Administrator & Certified Floodplain Manager**
Primary substantial damage administration and oversight, field inspections, record management, SDE entry, communication with elected officials and residents, post- event compliance and follow up.
 - Outreach efforts and mailings prior to an event.
 - Notification on permitting procedures for rebuilding.
 - Ensure follow-up coordination with structure owners is completed.
 - Coordinate final storage of SI/SD files
 - Organize press release and provide information on flood hazards, floodplain map data, advisory flood data and compliance to residents and property owners.
 - Review elevation certificates.
 - Take corrective action necessary to ensure compliance.
 - Determine if damaged structures have been designated as historic or that may be eligible for such designation.

Following a disaster, there are several different offices and local officials in the City of Corpus Christi who are involved in the response and recovery process but may not be directly involved in substantial damage determination.

The Development Services department heads the city's Damage Assessment Team (DAT). DAT performs a Preliminary Damage Assessment (PDA) after an event that causes damage to our jurisdiction. DAT is made up of representatives from the City of Corpus Christi Building, Plumbing, Mechanical, and Electrical Inspectors, Code Compliance Officers, Fire Inspectors, Police Directed Patrol Officers (DPO's), Public Works Streets & Stormwater Department, Solid Waste, and various clerical support staff. The team is activated for various events including but not limited to, wind, rain, fire, or any other damage causing event by the Emergency Operations Center (EOC).

After the initial inspections by the DAT team the information is passed on to the Hazard Mitigation Team (HMT). HMT is a multi-disciplined organization composed of representatives of mutually supporting organizations and agencies from local governments and the private, public, and civic sectors a list of team members is attached in the appendix. HMT is headed by the EOC and conducts site surveys to record damage “footprint” and record and map high-water marks and other benchmarks to verify inputs and results of the DAT team, aids staff in prioritization of damage assessment operations, assists with substantial damage determinations, and prepares requests for a state and/or federal disaster declaration by providing detailed incident impact data.

Communication and Coordination

Damage Assessment Team Training

Training of the damage assessment team occurs on an annual basis. Resources used to train the damage assessment team include the four degrees of damage established by FEMA but also hands-on use of the Texas Department of Emergency Management iSTAT app. The city's Floodplain Administrator and Certified Floodplain Manager (CFM) will obtain annual training on substantial damage regulations and meet periodically to review substantial damage plans and procedures.

The city's Floodplain Administrator & CFM will assist with post-flood substantial damage determination and closely monitor construction within the special flood hazard areas. Most existing staff have prior experience doing damage assessment work. However, when new staff are engaged in the substantial damage process, pre-deployment training will take place.

After a disaster or when damages appear imminent, the DAT leader will schedule a meeting with the team as soon as possible to review roles and responsibilities and ensure all members are trained and have all necessary tools to carry out their work.

Substantial Damage Determination Process

Field Inspections

During an event, the initial damage assessments, led by the Damage Assessment Team, includes a windshield inspection of the entire jurisdiction to identify every affected structure and those with obvious structural damage. The community is divided into manageable geographic segments for defining specific types of information concerning what is vulnerable and at risk in each sector. Sectioning facilitates mitigation, preparedness planning as well as response, search and rescue, and damage assessment operations.

During this field inspection phase damaged structures are inventoried, notes taken, and damages photographed. At the same time each structure is rated per the four degrees of damage and structures deemed Major or Destroyed are red tagged with City Occupancy Prohibited Notices. A copy of that notice is in the appendix of this plan.

Damage Assessments

Once the initial filed assessment, site surveys to record damage “footprint” and record and map

high-water marks and other benchmarks to verify inputs and results of the DAT and HMT teams are completed, and notices posted on structures deemed Major or Destroyed the Floodplain Management Division staff will mail letters to property owners notifying them of permitting procedures and substantial damage requirements.

Field data will be disseminated to the Floodplain Administrator and Management teams. Collected data will then be mapped and become a layer in the City of Corpus Christi's GIS system and uploaded into the Substantial damage estimator tool. The CFM will maintain data collected during PDA & HMT assessments to help track all building permits required in the special flood hazard area within the jurisdiction.

Market Value Determination

Market values are provided by the Nueces County Appraisal District. The value is for the structure only (land value not included). The City of Corpus Christi has determined that obtaining market value from the Nueces County Appraisal District is both quick and equitable. The value is fair, and residents have paid taxes on those values and did not dispute the value for tax assessment purposes. If property owners do not agree with the Assessor's market value, they can obtain a private appraisal and use that to appeal the determined market value.

Timeline for Completion of Substantial Damage

Damage assessment times in Corpus Christi will depend on flood conditions and severity of damage within the jurisdiction. Given the number of low-lying areas and at-risk buildings within the Corpus Christi, field inspections may take anywhere from 4 – 5 staff days to over two weeks. Entering data into the iSTAT app and completing damage assessments takes about the same time. Therefore, total time allotted for field inspections and damage assessments will be three weeks. If damages are catastrophic and the DAT team is unable to complete damage assessments within the time allotted the city will request assistance from FEMA and the TWDB.

Methods Used to Notify Residents on Substantial Damage

After a disaster, the City will post notices on each damaged building deemed Major or Destroyed informing the owner occupancy is prohibited. As a rule, property owners are eager to rebuild, so notices will be posted as soon as it is safe to post them in the field.

In addition, a press release will be issued, and letters sent to properties deemed Major or Destroyed informing them of permitting procedures, substantial damage requirements, and steps for compliance with the City's Floodplain Ordinance. More information on substantial damage is provided on the city's Floodplain management website with links and resources that can be shared with owners of substantially damaged structures.

Compliance with Substantial Damage

Corpus Christi has a very strong compliance & permitting program, therefore, with every flood, our goal is to have fewer and fewer structures remain at risk of flooding and the time needed to complete damage assessments reduced with every event.

If structures are found to be non-compliant, a noncompliance letter will be sent to the property owner by the Floodplain Administrator. There will be three (3) attempts to contact the property

owner. If the property owner fails to comply or ignores the three non-compliance letters, a citation will be issued by the City of Corpus Christi via certified mail.

Further noncompliance may result in enforcing section 14-557 of the Flood Hazard Prevention Code.

Sec. 14-557. – Penalties for Non-Compliance.

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this code and other applicable regulations. Violation of the provisions of this code by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with the conditions) shall constitute a misdemeanor. Any person who violates this code or fails to comply with any of its requirements shall upon conviction thereof be fined not more than \$500 for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the City from taking such other lawful action as is necessary to prevent or remedy any violation.”

Appeal Process for Substantial Damage

When property owners do not agree with their substantial damage determination, they may appeal. Property owners have 30 days after notice to appeal damage determinations. Appeals are presented before the Construction Trade Advisory & Appeals Board. The board is composed of nine members with construction, Electrical, Plumbing, and HVAC backgrounds appointed to a three-year term by City Council.

Annual & Post-event Evaluation of the Substantial Damage Plan

The DAT coordinator will provide an annual update or annual evaluation report to the City of Corpus Christi's EOC on the city's damage assessment procedures in place and the Floodplain Administrator will provide updates on changes needed to administer and enforce substantial damage regulations.

During the annual review of the Substantial Damage Plan, the Floodplain Administrator and CFM will review all six steps to ensure no changes have occurred. The Annual Evaluation Report template provided by CRS will be used for reference. In addition, the city's database will be updated.

Flood insurance claims data will not be populated into the database. Flood insurance claims data is maintained in a secure file and accessible only to the Floodplain Administrator and CFM. Copies of this substantial damage plan will be made available to City Officials and FEMA as requested.

The substantial damage management plan will be updated after each major flood or other damaging event to re-evaluate the City of Corpus Christi's substantial damage management strategy and to update the substantial damage inventory and map. That update will occur within three weeks of the event.

Property Database

Property Database for Substantial Damage Repairs

The City of Corpus Christi has a building permit software preloaded with all properties within the city limits. The city also utilizes the FEMA Substantial Damage Estimator (SDE) software. All parcels located within a special flood hazard area (SFHA) are preloaded into SDE. When a permit is submitted for approval in a SFHA it will be flagged by the permitting software and flood permit required. If the structure was deemed Major or Destroyed during PDA & HMT assessments a damage repair form and cost estimate sheet will be required to verify cost of renovation. The City will utilize the notification letters and forms in the Appendix as part of the permitting process.

Compliance with the Federal Privacy Act

Flood insurance claims data will not be populated into the city's structural database. Flood insurance claims data is maintained in a secure file and accessible only to the Floodplain Administrator and Certified Floodplain Manager.

Property Database for Substantial damage Repairs

The City will build a property database for substantial damage repairs using the property list from the PDA collected and permits submitted during the post-event process. The building permit software is preloaded with each property within the jurisdiction. Documentation will also be maintained in spreadsheet form. The database will include the following information:

- Property Identification Number
- Building Address
- Building Legal Description
- Building status
- FIRM Date
- Panel Number
- Flood Zone
- BFE
- Required Floor Elevation
- Comments
- Link to building photos - documents
- Building type (res/non-res)
- Foundation type
- Square footage

Pre-event Action on Substantial Damage

Annual Outreach Activities

Corpus Christi is no stranger to rain and floods. Our climate and coastal location make us susceptible to flooding especially during extreme weather events. Therefore, pre-flood outreach efforts have become routine. When flooding is imminent, reverse alert notifications will be dispersed with important evacuation information. The city's Floodplain Management website includes information on property protection, construction requirements, and financial assistance programs.

In addition, as a class 8 CRS community, the city's outreach efforts include an annual newsletter, brochures and letters sent to owners of repetitive loss properties and all properties located within the special flood hazard area, and various other educational materials & special events.

Informing Community Leaders Regarding Substantial Damage

The Floodplain Administrator will provide the Assistant City Manager and EOC with an annual report in January for the preceding year. The report will include suggested updates to the plan based on information collected during actual events or changes to the floodplain code of ordinances that affect substantial damage or improvement. The Plan will be shared with elected officials, committees, media, and the public once recommended changes are implemented.

Populating FEMA’s SDE (SDP2)

Populating the Substantial Damage Estimator

Using the prepopulated SDE data and data gathered during the inspection phase of the Substantial Damage Plan will be uploaded into the FEMA Substantial Damage Estimator Tool (SDE). The database of at-risk properties will be reviewed and updated annually by the Floodplain Administrator and CFM. The database will also be updated after each flood event to remove mitigated or demolished structures.

Considering Mitigation Options (SDP3)

Consideration of Mitigation Alternatives & Funding

The City will review mitigation alternatives for properties within the SFHA and determine whether any property protection measures are feasible. Properties with active National Flood Insurance Program policies will be identified for ICC claims. Remaining properties or areas will be identified for federal or state mitigation programs such as relocation, acquisition, building elevation, and/or retrofitting. The City of Corpus Christi primarily utilizes three federal mitigation grant programs to develop and implement vulnerability and risk reduction actions:

- Flood Mitigation Assistance Program (FMA)- Pre-disaster grants.
- Hazard Mitigation Grant Program (HMGP)- Cost-effective post-disaster hazard mitigation projects that reduce the future potential of loss of life and property damage.
- Pre-Disaster Mitigation Program (PDM)- Fund pre-disaster hazard mitigation actions.

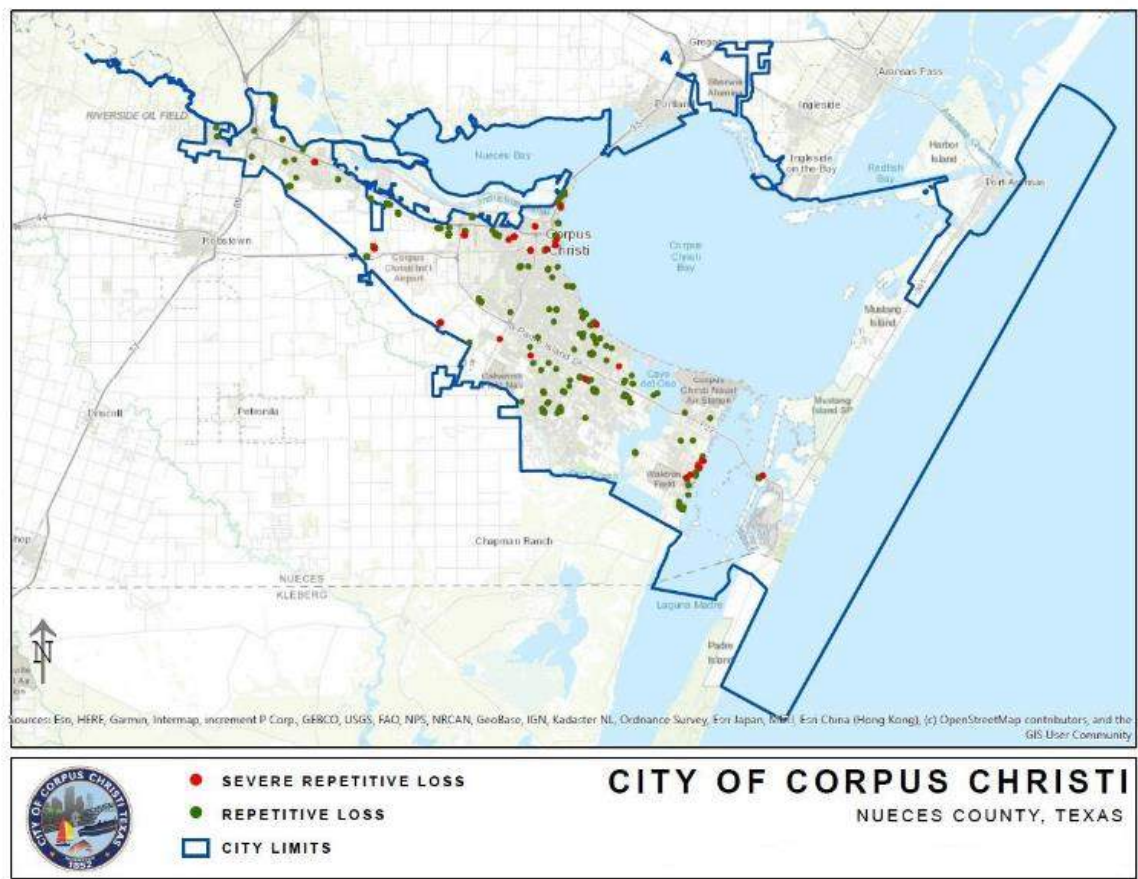
The City of Corpus Christi is also a part of the Nueces County Multi-Jurisdictional Hazard Mitigation Action Plan. Therefore, strong coordination exists between the mitigation plan and floodplain management activities. The Nueces County Multi-Jurisdictional Hazard Mitigation Action Plan (HMAP) is completed using a public forum. Residents are given the opportunity to review and comment on the draft plan. The plan is updated every 5 years. Property owners in Corpus Christi located within a SFHA are sent an annual informational letter and brochures. The City of Corpus Christi outlines potential mitigation projects and applies for funding for each and will invite these property owners to participate in mitigation programs as funding becomes available.

Appendix

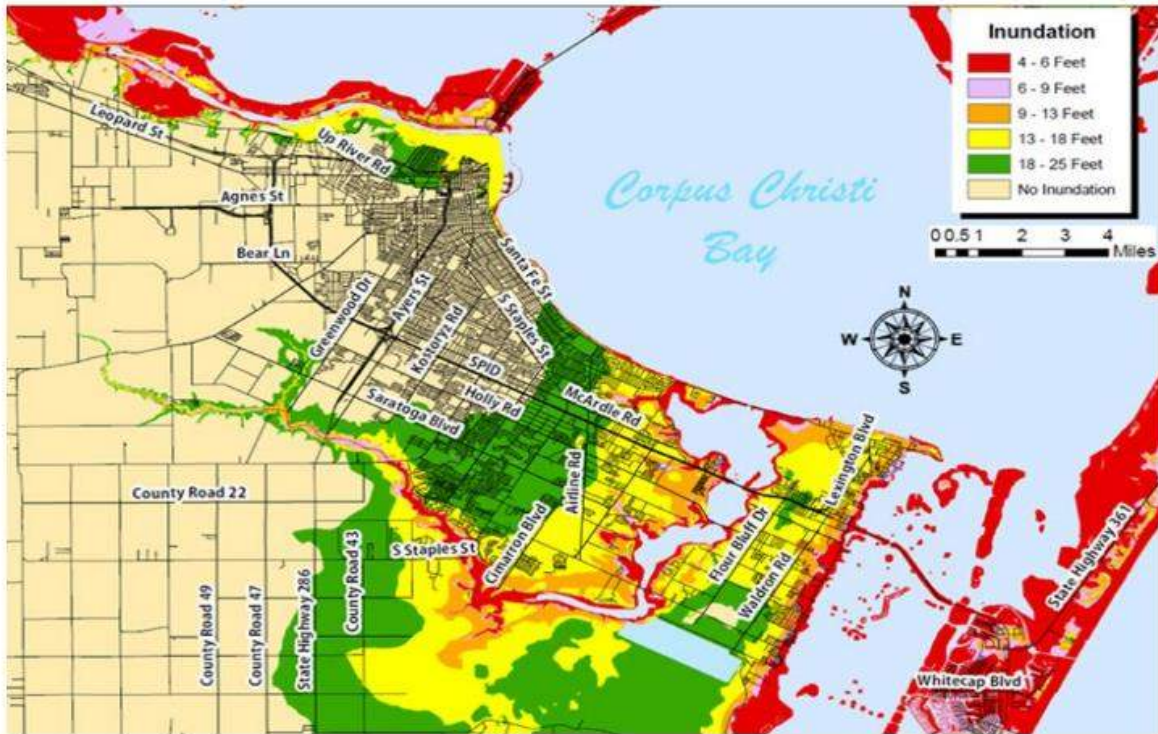
Areas of Flood Risk and Potential Substantial Damage in Corpus Christi

The repetitive loss data obtained from FEMA, areas most likely affected by storm surge, and areas adjacent to major creeks have been identified by the City of Corpus Christi as areas of potential substantial damage.

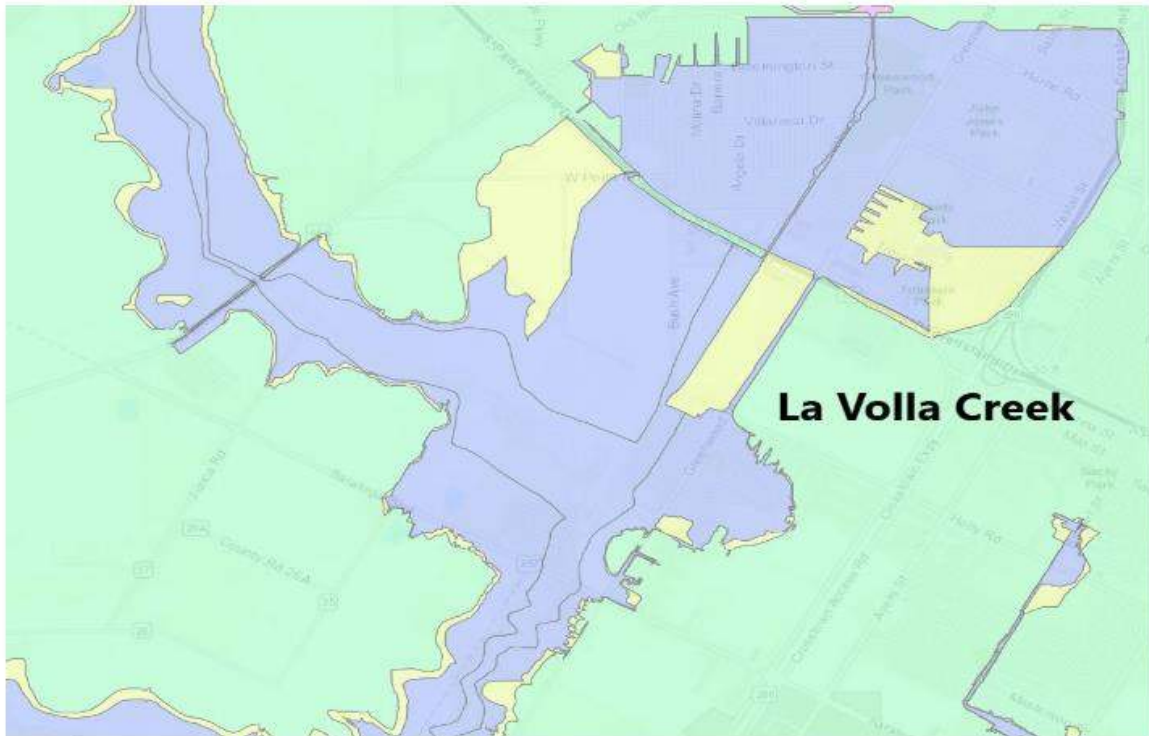
The maps below indicate the general location of these potential substantial damage areas.



Storm Surge



La Volla Creek



HAZARD MITIGATION TEAM

Multi-disciplined, long-range mitigation planning and disaster response requires a coordinated team of personnel with administrative, financial, and technical knowledge and expertise in a variety of functional areas. HMT supporting member agencies and organizations along with their functional areas of responsibility are listed in this appendix.

	Title/Agency
Hazard Mitigation Coordinator	Emergency Management Coordinator
Functional Responsibility	
Public Awareness/Education	Emergency Management
Emergency Preparedness and Response	Emergency Management
Disaster Recovery	
Floodplain Management	Floodplain Administrator / Floodplain Manager
Engineering Services	Director of Engineering
Damage Assessment	Code Enforcement/ Engineering Services/ Development Services
Volunteer Services	VOAD
Water Treatment	Water Department- Utilities
Wastewater Treatment	Wastewater Department – Utilities
Drainage/Flood Control	Storm Water- Utilities
Public Health	Health District
Legislative Representation/Liaison	Director of Intergovernmental Relations
Building Codes and Permits	Building Official
Zoning Regulations	Development Services
Legal Services	City Attorney
Development Planning	Development Services
Subdivision Regulations	Code Enforcement/ Development Services
Fiscal/Funding Resources	Management and Budget
Tax Assessment	Tax Assessor
Septic Tank/Sanitation Standards	Environment Services
Environmental Protection	Environment Services
Land Use Planning	Development Services
Property Condemnation	Code Enforcement/ Engineering Services
Land Acquisition	Engineering Services
Historical Preservation	Historical Preservation officer
Parks and Wildlife	Parks and Wildlife
River Authority	Nueces River Authority
Levee/Seawall Management	Strom Water Department
Dam Safety/Reservoir Management	Reservoir Supervisor
Coastal Zone Management	Floodplain Manager
Agricultural Recovery Programs	
Fire and Casualty Insurance	Risk Management
Flood Insurance	Risk Management
Wind Insurance	Risk Management
Drainage District	Storm Water – Utilities
Citizen Group(s)	CERT
Business/Industry	Local Emergency Planning Committee (LEPC)
Council of Government	Coastal Bend Council of Governments
Data Processing Services	Information Technology Department
Mapping Services	City Application Services
GIS Services	City GIS Analyst

Grant Writing/Management	Fire/ Grant Administrator
Urban/Regional Planning	Planning Department
Professional Group(s)	
Neighborhood Association(s)	
Chamber of Commerce	City of Corpus Christi Chamber of Commerce, Hispanic Chamber of Commerce, and Black Chamber of Commerce
Realtors	
Bankers/Lenders	



PUBLIC WORKS

Floodplain Management Division
2525 Hygeia St.
Corpus Christi, Texas 78415

«OWNER»
«ADDRESS»
«CITY» «STATE» «ZIP_CODE»

Dear Property Owner:

You have received this letter because your property is in a Special Flood Hazard Area (SFHA). As our community grows, so does strain on existing drainage systems, resulting in more frequent overloads of the storm water system. The city is concerned about repetitive flooding and is working to ensure our storm water systems can handle the heaviest storms, but it is important that residents also help prevent flood losses. Here are some ways you can protect yourself and your property from flood damage.

1. Check with the Floodplain Management division of the City Public Works Department, on the extent of past flooding in your area.

The Floodplain Management division (FMD) is responsible for administering the provisions of the City's Floodplain Ordinance and provides comprehensive floodplain information to residents, builders, contractors, and other groups. Our mission is to reduce the risk of flooding to life and property by managing our floodplains, regulating development, and providing public outreach and response. The Floodplain & Coastal Protection manager along with Public Works staff are ready to answer flood insurance questions, provide building advice, and perform field inspections to investigate flooding problem areas.

2. Prepare for flooding by doing the following:

- Know how to shut off the electricity & gas to your home when a flood comes.
- Make a list of emergency numbers and identify a safe place to go.
- Make a household inventory and put important papers in a safe place.
- Put cleaning supplies, camera, waterproof boots, etc. in a handy place.
- Create a disaster response plan- Visit redcross.org

3. Consider some permanent flood protection measures.

- Mark your fuse or breaker box to show the circuits to the floodable areas.
- Check your building for water entry points such as doorways or dryer vents. These can be protected with low walls or temporary shields.
- Consider elevating your home above flood levels.
- More information can be found in Homeowner's Guide to Retrofitting: Six ways to protect your house from flooding. Copies are available at Development Services or on the FEMA website.

4. Get a flood insurance policy.

- Homeowner's insurance policies do not cover damage from floods. Because Corpus Christi participates in the National Flood Insurance Program, you can purchase a separate flood insurance policy at a discounted rate.
- You may have purchased flood insurance because it was required by your lender, these policies usually only cover the building's structure, not the contents. During the kind of flooding that happens in your area, there can be damage to the contents in addition to the structure. Be sure you purchase contents coverage as well.
- Do not wait for the next flood to purchase insurance protection. There is a 30-day waiting period before the National Flood Insurance Program takes effect.

Regards,

Kathleen Chapa, MRFPS-20, TCEQ-OSSF D.R., C.F.M
Floodplain & Coastal Protection Manager

SAMPLE PRESS RELEASE

CITY OF CORPUS CHRISTI RESIDENTS WITH FLOOD DAMAGE REMINDED OF PERMIT REQUIREMENTS

As property owners in the City of Corpus Christi begin clean-up and repairs following recent flooding, the Floodplain Management Division of Public Works Department is reminding residents to obtain permits before repairing or rebuilding flood-damaged structures. Permits must be obtained for any construction or development activity in a floodplain area, including the repair or reconstruction of structures damaged by flooding.

Special conditions apply to buildings in which the total cost of repairs is 50% or more of the structure's pre-flood market value. If a building is found to be damaged 50% or more, regulations require that repairs not begin until compliance with the local floodplain ordinance is demonstrated. In some cases, that may require elevating or flood-proofing the structure to reduce the potential for future flood damage.

Repair costs must be calculated by assuming the building will be fully repaired to its pre-damaged condition, even if the owner decides to do less. The total cost calculation must include structural materials, finish materials and labor, even if the owner chooses to do his or her own repairs.

State and federal assistance may be available to property owners to reduce the chances of future flood damage. Mitigation assistance may cover costs of relocation, or for elevating or purchasing flood-damaged structures. Residents with a flood insurance policy may also be eligible to obtain up to \$30,000 to protect a structure from future flood damage.

Property owners and residents with flood-damaged buildings should contact the Floodplain Management Division of Public Works for more information on repair and reconstruction permits.

Floodplain Management Division
2525 Hygiea St.
Corpus Christi, TX
78415 361-826-3064
floodplainmanagement@cctexas.com

CORPUS CHRISTI CODE ENFORCEMENT



NOTICE



Address: _____

An investigation of this structure finds it to be unsafe; and/or unfit for human occupancy; and/or an unlawful structure; and/or deemed a threat to public health, safety or welfare.
(Corpus Christi Property Maintenance Code Section 108.1)

**OCCUPANCY OF THIS STRUCTURE IS PROHIBITED
(CCPMC Section 108.5)**

DEFAACEMENT OR REMOVAL of this placard without approval of the code official is subject to penalties provided by the CCPMC. (Section 108.4.1) Violation of the provisions of the CCPMC constitutes a misdemeanor offense punishable by a fine up to five hundred dollars (\$500.00). (Section 106.4)

**CONTACT CORPUS CHRISTI CODE ENFORCEMENT
REGARDING THIS NOTICE.
1201 LEOPARD STREET - PHONE (361) 826-3046**

City Staff will be glad to discuss any concerns you may have and explain how to achieve compliance on this matter. Please call between 8:00 a.m. and 5:00 p.m., weekdays at (361) 826-3046. For more information regarding this violation and other City Ordinances, please go to the City of Corpus Christi Code Enforcement webpage: www.cctexas.com/departments/code-enforcement

Date: _____ Compliance Officer: _____

Phone Number: _____

By order of:
CORPUS CHRISTI NEIGHBORHOOD SERVICES CODE ENFORCEMENT DIVISION

Sample Red Tag



September 27th, 2024

NOTICE OF SUBSTANTIAL DAMAGE DETERMINATION

Dear Property Owner

After completing a damage assessment for the residence located at, 1234 Faraway, City of Corpus Christi Floodplain Management Division has determined that the proposed repairs constitute **Substantial Damage** for the structure as the result of the flooding that occurred June 6th, 2019 and the structure is also considered a **Repetitive Loss Structure**.

Full Cost to Repair (Less Excludable Costs):
Actual Cash Value (ACV)*:
*As per FEMA P-758, Actual Cash Value is a reasonable approximation of market value.

In accordance with the current floodplain regulations of the City of Corpus Christi Code of Ordinances, Chapter 14, Article V, structures that receive damage of any origin, whereby the cost of restoring the structure would equal or exceed 50% of the pre-damage market value (excluding land value), must be brought into compliance with the current floodplain regulations.

There are several aspects that must be addressed to achieve compliance. The most significant requirement is that the lowest floor, as defined in the flood regulations/code, must be elevated to 1'(one) foot above the Base Flood Elevation (BFE). You may wish to contact your insurance agent to understand how raising the lowest floor higher than the minimum required elevation can reduce National Flood Insurance Program (NFIP) flood insurance premiums.

It has been determined that this structure is located within Zone AE on the Flood Insurance Rate Map (FIRM), Panel 22055C0160J, with an effective date of December 21, 2018

Under the National Flood Insurance Program, the Increased Cost of Compliance (ICC) program may provide additional financial assistance to either elevate or remove flood-damaged structures from the floodplain. ICC applies to flooded structures that are substantially damaged.

Be advised that all repairs, reconstruction and new construction will require a permit and are subject to the provisions of the City of Corpus Christi adopted Building Codes and Floodplain regulations. Construction activities that occur without a proper permit are considered to be non-compliant and may result in administrative fees and/or fines.

The City of Corpus Christi Floodplain Management Division is prepared to meet with you at our office to discuss the substantial damage determination process and to provide guidance for reconstruction or repair of your structure.

Gabriel Hinojosa, P.E., CFM
Assistant Director
Public Works Department



CITY OF CORPUS CHRISTI

Floodplain Management Division
Department of Public Works
2525 Hygeia Street, Corpus Christi, Texas 78415
(361) 826-1875
floodplainmanagement@cctexas.com

Substantial Damage Determination Appeal Request

Any property owner appealing a determination of Substantial Damage must submit this form along with the required documentation to Floodplain Management Division (FMD). FMD will send a written response to the owner's address.

Property Information

Street Address: _____
City & Zip Code: _____
CCAD Parcel No.: _____
Date of Damage: _____

Owner Information

Name of Owner(s): _____
Owner's Phone/Cell: _____
Owner's Address: _____
Owner's email: _____

Appeal Justification (check one, complete percentage of damage calculation, if applicable)

- Existing structure complies with the City's Floodplain Ordinance, City of Corpus Christi Municode, Chapter 14, Article V, elevation and performance standards.
- Structure has been modified or demolished to comply with Chapter 14, Article V elevation and performance standards post-damage.
- Based on provided documentation of total cost to repair the structure to pre-damage condition and market value of the structure, the structure is not substantially damaged.

Total cost to repair \$ _____ ÷ Market Value of Structure \$ _____ × 100
= Percentage of Damage _____%

FMD Use Only:
Received by: _____ Date: _____

Appeal Approved / Appeal Denied
(Not SD) (circle one above) (SD)

Reviewed by: _____ Date: _____

Response Date: _____



CITY OF CORPUS CHRISTI

Floodplain Management Division
 Department of Public Works
 2525 Hygeia Street, Corpus Christi, Texas 78415
 (361) 826-1875

floodplainmanagement@cctexas.com

Substantial Damage Determination Appeal

Documentation Attached (check appropriate items)

Option	Repair Cost	Value of Structure
1* <input type="checkbox"/>	Flood Damage Repair Form (see attached)	Flood Damage Repair Form (see attached) -OR- Nueces CAD Summary (www.nuecescad.net) – (FMD can provide this for you)
2 <input type="checkbox"/>	NFIP Proof of Loss or Final Report including attached detailed itemized cost estimate	NFIP Proof of Loss or Final Report- (formal document filed with insurance company that initiates the claim process after a property loss)
3* <input type="checkbox"/>	Project Cost Estimate Form (see attached)	Nueces CAD Summary (www.nuecescad.net) – (FMD can provide this for you) -OR- Private Appraisal of Pre-Damage Market Value of Structure Only (from an appraiser licensed in the State of Texas)
4 <input type="checkbox"/>	Elevation Certificate (from a Texas Registered Professional Land Surveyor, Engineer, or Licensed Architect) demonstrating that structure is compliant (meets requirement that lowest floor is 12" above based flood elevation and all other floodplain requirements). No cost or value information required.	

***FIELD VERIFICATION MAY BE REQUIRED**

Owner's Statement

I/We _____, affirm that any repair cost information above and on the attached documents reflects only the full cost of repair to restore the property at _____ to pre-damage condition.

Owner Signature: _____ Date: _____

Printed Name: _____



CITY OF CORPUS CHRISTI

Floodplain Management Division

Department of Public Works

2525 Hygeia Street, Corpus Christi, Texas 78415

(361) 826-1875 or floodplainmanagement@cctexas.com

Floodplain Flood Damage Repair Form – Single Family Residences

The City’s Floodplain Management Division (FMD) has introduced this form to make it easier for homeowners within a Special Flood Hazard Area (SFHA) to apply for a permit to repair their flood damage.

Along with a building permit application and the required information for a building permit, Homeowners can choose to fill out this form instead of submitting a cost estimate and appraisal or insurance claim information.

For many flood damaged homes, FMD can use the below information to complete a FEMA Substantial Damage Estimate in the office without physically inspecting the flood damaged home. However, some homes may require a field inspection or insurance cost estimate to be issued a Permit.

After reviewing this form, FMD will either:

- *Approve the documentation submitted*
-OR-
- *Reject the submitted information and request that the homeowner submit alternate information*
-OR-
- *Reject the submitted information and schedule an inspection of the damaged property.*

Please note that additional permit requirements shall apply to properties that are determined to be substantially damaged by FMD. It should also be noted that a building permit and other trade permits may also be required to repair flood damage. If improvements or modifications are planned, additional information will be required.

The homeowner is required to provide true and accurate information below to avoid floodplain violations and fines for completing repair work outside of the scope of work submitted for permit.

Property and Owner Contact Information:

Damaged Property Address: _____

Owner(s) Name(s): _____

Mailing Address: _____

Email Address: _____

Phone Number: () _____ - _____

Information about the damaged home:

- Type of Home:** One Story Two Story
- Exterior Finish:** Brick Veneer Siding Combination of Brick Veneer and Siding
- Has your home ever been rewired?** Yes No Unknown



CITY OF CORPUS CHRISTI

Floodplain Management Division
Department of Public Works
2525 Hygeia Street, Corpus Christi, Texas 78415
(361) 826-1875 or floodplainmanagement@cctexas.com

Floodplain Flood Damage Repair Form – Single Family Residences

Do you have central air conditioning? Yes No

Where is your water heater? Raised in garage/house On the floor In attic

Describe the damage to your home:

Date of Flood or other Damage: _____

Type of Damage: Flood Wind Flood and Wind

Flood water depth: How much water did you get in your home? _____ feet/inches (*circle one*)

(measure depth of water from your floor to the high water mark on an interior wall)

How long was your home flooded? 2 days or less More than 2 days

Do you have roof damage?: No Damage
 Minor Damage (up to 25% shingle replacement, repair of minor leaks)
 Major Damage

Do you have foundation damage? Yes No

What built-in appliances were damaged by floodwater?

Dishwasher Garbage Disposal Trash Compactor
 Microwave Vent Hood Wall Oven
 Cook Top Refrigerator (Built-in, Not Push-In)

Is your flooring damaged? Yes No

What percentage of your first floor is tile? _____%

Your repair plans:

Do you plan to replace your cabinets? Yes No

Do you plan to replace your tile flooring, if any? Yes No

Owner's Statement

I/We _____, affirm that the information above accurately reflects the condition of the property at _____.

Owner Signature: _____ Date: _____

Printed Name: _____

DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT
 AGENCY NATIONAL FLOOD INSURANCE
PROGRAM PROOF OF LOSS
 (See reverse side for Privacy Act Statement and
 Paperwork Burden Disclosure Notice)

O.M.B. No. 1660-0005
 Expires April 30, 2017

POLICY NO. FL _____

POLICY TERM _____

AMT OF BLDG COV AT TIME OF LOSS _____

AGENT _____

AMT OF CONTS COV AT TIME OF LOSS _____

AGENCY _____

TO THE NATION FLOOD INSURANCE PROGRAM:

AT _____

At time of loss, by above indicated policy of insurance, you insured the interest of _____

against loss by flood to the property described according to the terms and conditions of said policy and of all forms, endorsements, transfers and assignments attached thereto.

TIME AND ORIGIN. A _____ loss occurred about the hour of _____ M., on the _____ day of _____, 20____. The cause of said loss was: _____

OCCUPANCY The premises described, or containing the property described, was occupied at the time of the loss as follows, and for no other purpose whatever: _____

INTEREST No other person or persons had any interest therein or liability thereon except _____

1. FULL AMOUNT OF INSURANCE application to the property for which claim is presented is..... \$ _____
2. ACTUAL CASH VALUE of building structure..... \$ _____
3. ADD ACTUAL CASH VALUE OF CONTENTS (person or property insured)..... \$ _____
4. ACTUAL CASH VALUE OF ALL PROPERTY..... \$ _____
5. FULL COST OF REPAIR OR REPLACEMENT (Building and Contents)..... \$ _____
6. LESS APPLICABLE DEPRECIATION..... \$ _____
7. ACTUAL CASH VALUE LOSS..... \$ _____
8. LESS DEDUCTIBLES..... \$ _____
9. NET AMOUNT CLAIMED under above number policy..... \$ _____

The insured did not originate, by act, design or procurement on the part of your insured, nothing has been done by or with the privity or consent of insured to void the conditions of the policy, or render it void; no articles are mentioned herein or in annexed schedules but such as were destroyed or damaged at the time of said loss, no property saved, or in any manner been concealed, and no attempt to deceive the said insurer as to the extent of said loss, has in any manner been made. Any other information that may be required will be furnished and considered a part of this proof.

I understand and that this insurance policy was issued Pursuant to the National Flood Insurance Act of 1968, or Any Act Amendatory thereof, and Applicable Federal Regulations, and the United States Code, Federal Regulations, Subchapter B, and that knowingly and willfully making any false answers or misrepresentation may be punishable by fine of imprisonment under applicable United State Codes.

Assignment - To the extent of the payment made or advanced under this policy; the insured hereby assigns, transfers and sets over the insurer all rights, claims or interest that he has against any person, firm or corporation liable for the loss or damage to the property for which payment is made or advanced. He also hereby authorizes the insurer to settle with any such third party in his name.

The insured hereby warrants that no release has been given or will be given or settlement or compromise made or agreed upon with any third party who may be liable in damages to the insured with respect to the claim being made herein.

The furnishing of this blank or the preparation of proofs by a representative of the above insurer is not a waiver of any of its rights.

I declare under penalty of perjury that the information contained in the foregoing is true and correct to the best of my knowledge and belief.

Executed this _____ day of _____, 20____

Name _____



**Public Works Floodplain Management Division
Repair Cost Worksheet**

Permit # _____

Property address: _____

Owner name: _____ Phone number _____

Contractor: _____ Lic: _____

This cost estimate of repairs must be signed by the contractor or by the owner if the owner acts as the contractor. Owners who act as their own contractors must estimate their labor cost at current market value for the work to be performed including construction supervision cost.

	Sub-contractor bids Bid amounts	OR	
		Contractor or owner estimates Material costs	Labor costs
1. Masonry / Concrete			
2. Carpentry Material (rough)			
3. Carpentry Labor (rough)			
4. Roofing			
5. Insulation and Weather-strip			
6. Exterior Finish			
7. Doors, Windows & Shutters			
8. Finish / Trim Carpentry			
9. Hardware			
10. Drywall			
11. Cabinets & Countertops			
12. Floor Covering			
13. Plumbing			
14. Shower / Tub / Toilet			
15. Electrical & Light Fixtures			
16. Concrete			
17. Built-in Appliances			
18. HVAC			
19. Paint			
20. Demolition & Removal			
21. Overhead and Profit			
22. Other:			
Subtotal		Combined Total	

Structure Value = \$ _____ (Check one: CAD _____ Appraisal _____)
 Total Project Cost = \$ _____ Percentage of Structure Value = _____ %

OWNER IS DOING WORK WITHOUT CONTRACTOR

I/we certify that the attached cost estimate is an accurate and complete description of the improvements and associated costs scheduled for the property listed above.

Owner Signature Date

Owner Printed Name Date

Texas Driver's License or ID Number