ARANSAS COUNTY MULTI-JURISDICTIONAL FLOODPLAIN MANAGEMENT PLAN

2017

VOLUME I
MANAGEMENT & ADMINISTRATION

ARANSAS COUNTY MULTI-JURISDICTIONAL FLOODPLAIN MANAGEMENT PLAN

2017

INCLUDES:
Aransas County, Texas
City of Aransas Pass, Texas
Town of Fulton, Texas
City of Rockport, Texas

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Special thanks are given to the Texas General Land Office for funding, the Texas Sea Grant College Program for development, and Mission-Aransas National Estuarine Research Reserve and the Texas Coastal Watershed Program for their guidance and expertise given to this plan.

Jurisdictional Officials

County Judge C.H. "Burt" Mills, Jr., Aransas County
Mayor Adan Chapa, City of Aransas Pass
Mayor Jimmy Kendrick, Town of Fulton
Mayor Charles J. Wax, City of Rockport

Floodplain Management Plan Executive Committee

De McLallen
Charles J. Wax
Jimmy Kendrick
Randy Hunter
Malcolm Dieckow
Patrick McKelvey
David Reid
K.C. Kimbrough
Russel Cole
Dudley McDaniel
Matt Olenick
Amanda Torres
Fernando Quintanilla
Katherine Comeaux

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CHAPTER 1: INTRODUCTION

PROJECT OVERVIEW
This plan documents flood risk and mitigation alternatives in the following four jurisdictions:

- Aransas County, Texas
- The City of Aransas Pass, Texas
- The Town of Fulton, Texas
- The City of Rockport, Texas

In 2016, these governmental entities joined together to develop a multi-jurisdictional floodplain management plan to serve two purposes:

1. To minimize flood risk in their communities; and
2. To enable residents to receive the greatest reductions possible on flood insurance premiums through the National Flood Insurance Program's Community Rating System. (The City of Rockport and Aransas County are currently in the process of entering the Community Rating System. The City of Aransas Pass and the Town of Fulton have expressed interest in joining in the future.)

This plan was developed in cooperation with several stakeholders and support groups, including the Texas Sea Grant College Program, Texas A&M AgriLife Extension Service, the Texas Coastal Watershed Program, the University of Texas Marine Science Institute, and the Mission-Aransas National Estuarine Research Reserve.

This plan is guided by the Federal Emergency Management Agency's National Flood Insurance Program, Community Rating System Coordinator's Manual (2013). The manual suggests 10 steps for the Floodplain Management Planning process. These recommended steps are included in the following chapters of the Aransas County Multi-Jurisdictional Floodplain Management Plan:

Step 1: Organize to Prepare the Plan (Chapter 2)
Step 2: Involve the Public (Chapter 3)
Step 3: Coordinate (Chapter 4)
Step 4: Assess the Hazard (Chapter 5)
Step 5: Assess the Problem (Chapter 5)
Step 6: Set Goals (Chapter 6)
Step 7: Review Possible Activities (Chapter 6)
Step 8: Draft Action Plan (Chapter 7)
Step 9: Adopt Plan (Chapter 8)
Step 10: Implement, Evaluate, & Revise (Chapter 9)

The process to document and discuss the unique flood risks in these jurisdictions during plan development relied on a rigorous public participation process. The enclosed plan of action aims to minimize the associated risks from flooding in this area and bring relevant results and meaningful roadmaps to adaptation for these jurisdictions. This plan mobilized community leaders, stakeholders, and citizens to proactively plan for floodplain management.

This plan is the first floodplain management plan in this area, and as such this is a foundational document. What is included in the plan sets the groundwork for how floodplain management will be addressed in Aransas County in future years. There remains much to learn; however, this document provides essential guidance for the next five years, and will provide the base from which these communities can make informed decisions about how best to direct their time and resources in the future.

PLANNING AREA DESCRIPTION

Aransas County is located along the Texas Gulf of Mexico coastline, approximately 200 miles southwest of Houston, in part of a region known as the "Coastal Bend." Aransas County is predominately made up of peninsulas, islands, and bays. The terrain is primarily coastal prairie and marshes, with an elevation range from sea level to 50 feet. There are 252 square miles of land in the county, and 276 square miles of water.

Aransas County has three incorporated communities: the City of Aransas Pass, the Town of Fulton, and the City of Rockport. Much of the county is unincorporated, yet some 'unofficial' communities exist (e.g. Holiday Beach, Lamar, Estes, City-by-the-Sea, Bahia Bay, and Palm Harbor). Map 1.1 (see back of plan) shows the planning area.

Aransas Pass is named for the pass between Mustang and San Jose islands (Guthrie, 2010), and sits where Live Oak Peninsula meets the mainland. The City of Aransas Pass straddles three counties: Aransas County; San Patricio County, and Nueces County. Fulton sits at the northern tip of Live Oak Peninsula, and has coastline along the eastern side. The town was named for George Ware Fulton, a prominent developer in the 1800s. Fulton is the smallest incorporated community in Aransas County, both in size and population. Rockport, the county seat, stretches across the center of Live Oak Peninsula with coastline on both sides. Rockport has a reputation for its cultural arts district. To briefly demonstrate the socioeconomic makeup of these communities, Table 1.1 shows select demographic indicators for each of the jurisdictions.

Table 1.1: Select Demographic Indicators from 2010-2014 (United States Census Bureau [USCB], n.d.).

	Population	% 65 or older	% Ethnic Majority (Caucasian)	% Living in Poverty	Median Household Income
Aransas County (Unincorporated)	4,789	25.4	89.3	21.1	42,247
Aransas Pass	8,530	17.6	93	23.6	39,040
Fulton	1,541	31.8	83.1	7.4	41,464
Rockport	10,490	27.0	86.7	20.4	47,887
Planning Area Total	25,350	25.45	88.03	18.13	42,659.5

The communities of Rockport and Fulton were founded in the late 1800s and became important focal points in the regional cattle industry. In the early 1900s, fishing and shipbuilding turned prosperous and became part of the area's identity. Oil was discovered in Aransas County in 1936, bringing industrial changes and increased interest in general shipping activities, which peaked in the 1950s. In the 1990s, tourism began to grow as a leading industry in the county and maintains a critical economic base for the area today. Rockport and Fulton are generally known as bedroom, retiree communities, although both communities are widely diverse. Bird watching, sport-fishing, and recreational boating contribute significantly to the current economy.

Table 1.2 shows select flooding indicators for each of the jurisdictions included in this plan.

Table 1.2: Select General Flooding Indicators (Source: Federal Emergency Management Agency [FEMA], FEMA Flood Maps Service Center, n.d; FEMA, Policy & Claim Statistics for Flood Insurance, 2016).

	% Land in 100-year Flood zone	% Land in 500-year Flood zone	Repetitive Loss Properties	NFIP Policies in Force
Aransas County (Unincorporated)	36	16	27	4,338
Aransas Pass	31.66	7.47	45	863
Fulton	4.68	1.85	0	136
Rockport	16.62	10.25	22	2,407
Planning Area Total	--	--	94	7,744

CHAPTER 2: ORGANIZATION (STEP 1)

PROCESS COORDINATION (Step 1.a)
As a multi-jurisdictional plan, this process includes the involvement of four separate jurisdictional bodies. A team of representatives from the planning departments of each governmental entity was identified to lead the plan development process. This team ensures that the outcomes of this plan will seamlessly integrate with each of the community planning endeavors in their jurisdictions. Table 2.1 identifies the representatives coordinating the floodplain management planning process.

Table 2.1: Community Representatives Leading the Floodplain Management Planning Process.

Entity	Name
Aransas County	Diana Espinosa
City of Aransas Pass	Katherine Comeaux
Town of Fulton	Matt Olenick
City of Rockport	Amanda Torres

MULTI-JURISDICTIONAL EXECUTIVE PLANNING COMMITTEE (Step 1.b)
A Multi-Jurisdictional Executive Planning Committee was created to help assist in the development of this plan. The Aransas County Stormwater Management Advisory Committee serves as the core of the Multi-Jurisdictional Executive Planning Committee (see Box 2.1). In order to broaden the scope of the committee, the county officially added two additional public representatives to the Stormwater Management Advisory Committee. In addition, each municipality identified two staff members and a public representative to serve on the Multi-Jurisdictional Executive Planning Committee to ensure adequate local representation. These additional members were identified in the resolutions passed by each jurisdiction (see Table 2.2 for a listing of all representatives). It should be noted that some of the representatives identified by the municipalities to serve on the Multi-Jurisdictional Executive Planning Committee already serve on the Aransas County Stormwater Management Advisory Committee; as such, some names are listed twice.

The Committee has discussed the Aransas County Multi-Jurisdictional Floodplain Management Plan at every meeting since August 2016. Table 2.3 shows the date of each meeting, and what was discussed. The meeting agendas and minutes can be found in Volume II, Chapter 1.

Box 2.1: Aransas County Stormwater Management Advisory Committee.

In 2008, Aransas County formed the Stormwater Management Advisory Committee to manage the county efforts to develop a Stormwater Management Plan. The committee reports to the Commissioners Court, and was constituted pursuant to the Texas Open Meetings Act, with one representative from each of the political entities in the county, and two public representatives. Each political representative serves two-year terms, and the public representatives serve one-year terms. These terms are sequential until such time as the individual no longer serves the political entity, or resigns from their seat on the committee. Upon vacancy of any position, new appointments must be approved by the Aransas County Commissioners Court.

Table 2.2: Membership on the Multi-Jurisdictional Executive Planning Committee.

Member	Representation
De McLallen	Public Representative – County Stormwater Management Advisory Committee
Brian Olsen	Aransas County Commissioner – County Stormwater Management Advisory Committee
Charles J. Wax	Mayor, City of Rockport – County Stormwater Management Advisory Committee
Jimmy Kendrick	Mayor, Town of Fulton – County Stormwater Management Advisory Committee
Randy Hunter	City of Aransas Pass – County Stormwater Management Advisory Committee
Malcolm Dieckow	Aransas County Navigational District – County Stormwater Management Advisory Committee
Patrick McKelvey	Public Representative – County Stormwater Management Advisory Committee
David Reid	Aransas County Road & Bridge – County Stormwater Management Advisory Committee (Staff, non-voting member)
Aransas County Additions to the Stormwater Management Advisory Committee	
K.C. Kimbrough	Public Representative
Russel Cole	Public Representative
Aransas Pass Representatives on the Multi-Jurisdictional Executive Planning Committee	
Fernando Quintanilla	Director of Public Works
Katherine Comeaux	City Planner
Randy Hunter	Public Representative
Fulton Representatives on the Multi-Jurisdictional Executive Planning Committee	
Jimmy Kendrick	Mayor
Matt Olenick	Floodplain Manager
Russel Cole	Public Representative
Rockport Representatives on the Multi-Jurisdictional Executive Planning Committee	
Charles J. Wax	Mayor
Amanda Torres	Community Planner
Dudley McDaniel	Public Representative

Table 2.3: Multi-Jurisdictional Executive Planning Committee Meetings.

Date	Topic
August 1, 2016	Discussion regarding the development of the Multi-Jurisdictional Executive Planning Committee
September 12, 2016	Agreement to serve as the Multi-Jurisdictional Executive Planning Committee
October 3, 2016	Review of the Assessment the Hazards (Step 4)
November 7, 2016	Review of the Assessment of the Problem (Step 5)
December 5, 2016	Committee receives complete draft of chapters 1-5
January 9, 2017	Review of potential Goals (Step 6)
February 6, 2018	Review of possible Activities (Step 7)
March 5, 2019	Review of Draft Action Plan (Step 8)
April 3, 2017	Review of Draft Chapters 6-9 (Steps 6-10)
May 1, 2017	Review of final draft plan

SUB-COMMITTEES

Each of the municipalities formed a "Planning Sub-Committee" composed of city staff and public representatives to facilitate the planning process, those committees are listed below. A list of all Sub-Committee meetings can be found in Volume II, Chapter 2.

Aransas Pass Planning Sub-Committee (Planning & Zoning Commission)

- Katherine Comeaux, City Planner – Chair
- Randall Freeze, Public Representative – Vice-Chair
- Dale Wells, Building Official
- Fernando Quintanilla, Public Works Director
- Lynn Pearce, Emergency Management Coordinator
- Sylvia Carrillo, City Manager
- Richard (Sandy) Kubek, Public Representative
- Lisa Barker, Public Representative
- Elizabeth Dorris, Public Representative
- Pat Fenton, Public Representative
- Shirley Gallagher, Public Representative
- Carol Salinas, Public Representative
- Kathleen Sweatt, Public Representative
- Cynthia Vasquez, Public Representative

Fulton Planning Sub-Committee (Town Council)

- Rick McLester, Police Chief – Chair
- Bob Loflin – Vice-Chair
- Jan Hill, Secretary
- Matt Olenick, Floodplain Manger
- Fayenell Harrell, Planning & Zoning Board
- Tim Brown, Planning & Zoning Board
- Les Cole, Town Council
- Larry Pahmiyer, Town Council
- Carol Thompson, Town Council
- Russel Cole, Public Representative
- Rickey Mclester, Public Representative
- Jackie Mundine, Public Representative
- Larry Pearce, Public Representative
- Donna Townsend, Public Representative

Rockport Planning Sub-Committee (Planning & Zoning Commission)

- Amanda Torres, Community Planner – Chair
- Brian Olsen, Public Representative – Vice-Chair
- Mike Donoho, Director of Public Works & Building Development
- Art Smith, Assistant Public Works Director
- Frank Truitt, Building Official
- Mary Bellinger, Assistant to Building Director
- Kevin Carruth, City Manager
- Ruth Davis, Public Representative
- Diana Severino-Saxon, Public Representative
- Edward Bellion, Public Representative
- Kent Howard, Public Representative
- Graham Wilson, Public Representative
- Shawn Johnson, Public Representative

RESOLUTIONS (Step 1.c)

The governing bodies of each of the jurisdictions involved with the Aransas County Multi-Jurisdictional Floodplain Management Plan have adopted resolutions to formalize their commitment to this process. Table 2.4 provides a list of when the resolutions were passed. The actual resolutions can be seen in Volume II, Chapter 3.

Table 2.4: Formal Recognition of Planning Process.

Jurisdiction	Governing Body	Date of Resolution
Aransas County	Aransas County Commissioners Court	September 26, 2016
City of Aransas Pass	Aransas Pass City Council	October 3, 2016
Town of Fulton	Fulton Town Council	October 18, 2016
City of Rockport	Rockport City Council	October 25, 2016

CHAPTER 3: INVOLVING THE PUBLIC (STEP 2)

The public is a valuable asset to any planning process. Involving the public allows them to provide input and critical knowledge, discuss alternatives, and hopefully become champions of the resulting plan. When actively involved in the planning process, the public often gains a sense of "ownership" over the plan, and is therefore dedicated to its implementation. Examples of the public are: residents and business owners from the floodplain area, developers, major employers, non-profit organizations, academic institutions, and civic groups (Federal Emergency Management Agency [FEMA], 2013). Strategies for involving the public are: including them in the planning committee, holding public meetings, and providing various means for information gathering and dissemination, such as questionnaires, webcasts, and brochures (FEMA, 2013).

ARANSAS COUNTY MULTI-JURISDICTIONAL FLOODPLAIN MANAGEMENT PLAN PUBLIC WORKSHOPS (Step 2.b & 2.c)

Aransas County Multi-Jurisdictional Floodplain Management Plan Development Process Planning Kickoff Workshop

October 27, 2016 – Aransas Pass, Texas

The workshop began with presentations introducing the Community Rating System and the role of the Floodplain Management Plan, along with a description of the various steps in the planning process—including what has been accomplished, and what to expect in the upcoming steps. Participants then circulated among various stations designed to capture local knowledge for inclusion into the plan. Stations included labeling localized areas of flooding on paper maps, and discussing the intersection of flood risk with public health, the economy and tax base, and critical facilities and infrastructure. The flyer, agenda, and notes from this meeting can be found in Volume II, Chapter 4.

October Public Workshop (Photo: Annita West).

Aransas County Multi-Jurisdictional Floodplain Management Plan Draft Action Plan Development Public Workshop

January 19, 2017 – Fulton, Texas

The workshop started with a presentation that provided a brief overview of the first five chapters of the draft plan. This included a description of the public involvement and community coordination that had already taken place, and a summary of known flood hazards and non-flood related hazards that are relevant to Aransas County. The participants then broke into small groups (approximately 6-10 people) and visited four stations designed to spur discussion and collect information about possible flood mitigation strategies. These stations covered specific action items under each of the four goals approved by the Stormwater Management Advisory Committee. The flyer, agenda, and notes from this workshop can be found in Volume II, Chapter 4.

Aransas County Multi-Jurisdictional Floodplain Management Plan Final Draft Public Workshop
June 1, 2017 – Rockport, Texas
The workshop started with two brief presentations. The first presentation provided an overview of the purpose and scope of the Plan, and the process that has resulted in the Draft Plan. The second presentation included an overview of the Plan with an emphasis on the Draft Action Plan, which specifies how floodplain management will be addressed over the next five years. The participants were then able to free-float among six stations designed to spur discussion and collect comments on the Final Draft Plan. Four of these stations focused on the goals, objectives and actions laid out in the Draft Action Plan. The remaining stations concentrated on the maps from the Plan, and provided an opportunity to comment on any other topic within the Draft Plan. While visiting the various stations, individuals received handouts that summarized each of the goals and the associated objectives and actions and were able to have discussions, ask questions, and provide feedback via conversation, or by writing comments on notecards. The flyer, agenda, and notes from this workshop can be found in Volume II, Chapter 4.

OTHER PUBLIC ENGAGEMENT OPPORTUNITIES (Step 2.d)
The City of Rockport engaged in the following public engagement opportunities related to floodplain management prior to the involvement of other entities. These efforts became the cornerstone on which the plan was built.

City of Rockport Floodplain Management Planning Survey (Step 2.d)
Summer 2016
In July 2016, Texas Sea Grant partnered with the Mission-Aransas National Estuarine Research Reserve and the City of Rockport to create a survey regarding flooding issues and floodplain management for the City of Rockport. The survey was administered through the website "Survey Monkey," and the web-link was posted on the city's website and distributed through emails and flyers. The survey was live from July 1-31, 2016. The response rate for the survey was low; but the results were compiled in a Community Survey Synthesis report in August 2016, and discussed in the City of Rockport Floodplain Management Plan Development Process Planning Kickoff Workshop on September 1, 2016. The survey and the associated flyers can be found in Volume II, Chapter 5.

City of Rockport Floodplain Management Plan Development Process Planning Kickoff Workshop
(Step 2.b) September 1, 2016
This Kickoff Meeting was specific to the City of Rockport, as the information disseminated was mainly relevant to that municipality. The workshop began with a presentation about floodplain management plans, the process involved, and the benefits to a community. An additional presentation summarized data that was collected during the creation of a State of Community Report, the Community Survey Synthesis report, and an Alternative Scenarios Report during the summer of 2016. The rest of the workshop allowed the attendees to circulate among different tables and discuss alternative scenarios that helped to identify future opportunities for development in the area, and the possible impacts of that development. The flyer, agenda, and notes from this meeting can be found in Volume II, Chapter 5.

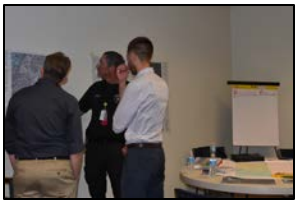
CHAPTER 4: COORDINATION (STEP 3)

REVIEW OF EXISTING STUDIES, PLANS, AND PLANNING MECHANISMS (Step 3.a)
Flooding, like any other natural hazard, is a topic of interest and concern for many governmental departments and agencies on a local, state, and federal level, as well as non-governmental organizations, non-profit organizations, academics, business owners, and residents. Part of the process and mission of a Floodplain Management Plan is to coordinate the different entities that study and contend with flooding events and floodplain management. Step 3 in the Community Rating System Floodplain Management Planning process focuses on this coordination. Several activities can result in the awarding of Community Rating System points to the jurisdictions involved in a multi-jurisdictional plan. However, one activity is required before any points are awarded—a review "of existing studies, reports, and technical information and of the community's needs, goals, and plans for the area" (FEMA, 2013).

Texas A&M University's Community Engagement and Risk Communication program has been helping Texas coastal communities to increase resiliency for several years. As a part of this effort they develop an Evaluative Framework for each community that documents, evaluates, and determines the overlap between a community's departments, capabilities, plans, and priorities, and the studies conducted in and around the community. In July 2016, the program created an Evaluative Framework for the City of Rockport and Aransas County. This document has been used as the review that the Community Rating System requires in Step 3 of the Floodplain Management Planning process to coordinate the different entities that study and contend with flooding events and floodplain management (Volume II, Chapter 6). Table 4.1 identifies the Studies, Plans, and Planning Mechanisms that may be referenced throughout the Floodplain Management Plan.

COORDINATION WITH OTHER COMMUNITIES AND AGENCIES (Step 3.b)
Other activities that are encouraged in Step 3 of the Floodplain Management Planning process involve "coordinating with agencies and organizations outside the community's governmental structure" (FEMA, 2013). Examples of agencies and organizations are: local homebuilder associations, local environmental groups, local water conservation districts, State National Flood Insurance Program Coordinator, State Emergency Management agency, National Weather Service, United States Fish and Wildlife Service, and National Oceanic and Atmospheric Administration. Activities include: detailed documentation of contact with agencies, asking for data, asking about agencies' endeavors that may affect the floodplain, and requesting that agencies be involved in the planning process (FEMA, 2013). Volume II, Chapter 7 provides a detailed documentation of agencies, individual contact names, dates, and general content given or received during the interactions. Most of the agencies and organizations contacted are identified in Table 4.2.

In total, 28 agencies and more than 50 people were contacted. The value of these in-person and virtual meetings and conversations clearly brings benefit to the project. Teamwork and continued networking allow for a cohesive approach to fulfilling the community vision of becoming more resilient and prepared. These contacts represent a small portion of the true number of side conversations, quick phone calls or emails, and demonstrate the project team's commitment to remaining connected and in touch with one another. Through these collaborative efforts we leverage and build our capacity and in turn develop a synergy that brings even greater value to the project.



October Public Workshop (Photo: Annita West).

Table 4.1: Studies, Plans, and Planning Mechanisms Reviewed.

Studies, Plans, and Planning Mechanisms	Date
Texas	
Statewide Long-Range Transportation Plan 2035. TxDOT	2015
Regional	
Coastal Bend COG Mitigation Action Plan	2011
Regional Public Transportation Plan 2011 for the Coastal Bend Region. CC MPO; Transportation Coordination Network of the Coastal Bend	2011
Aransas County	
FEMA Flood Insurance Study: Aransas County, Texas and Incorporated Areas	2016
Aransas County Floodplain Management & Watershed Protection Order	2016
Aransas County Stormwater Master Plan & Management Manual	2012
Capital Improvement Program	2011
Aransas County Subdivision Regulations	2009
Aransas County Emergency Management Plan	2016
Coastal Bend Mitigation Action Plan	n.d.
Aransas Pass	
Capital Improvements Program. City of Aransas Pass.	2016/2017
Code of Ordinances. Part II. Chapter 5 Buildings and Construction. Article VIII. Flood Damage. City of Aransas Pass.	n.d.
Code of Ordinances. Part II. Chapter 5.5 Landscaping. Sec. 5.5-4. Reduction of Landscaping. City of Aransas Pass.	2012
Code of Ordinances. Part II. Chapter 5 Buildings and Construction. Article VIII. Flood Damage. City of Aransas Pass.	n.d.
Zoning Map. City of Aransas Pass	2014
Aransas Pass Coastal Resilience Plan	2016
Fulton	
Flood Prevention Ordinance. Ordinance No. 270	2016
Planning and Capacity Building Study	2004
TCDP Drainage and Water Improvements Study	2004
City of Rockport Drainage Master Plan	2001
Storm Drainage Design Manual for the City of Rockport, Texas	2000
Rockport	
A Cultural Plan for the Rockport Cultural Arts District. City of Rockport	2015
A Vision for the Heritage District and Downtown Rockport. Halff Associates	2006
Annual Budget and Capital Improvements Program. City of Rockport	2015/2016
Comprehensive Plan. City of Rockport	1999
Floodplain Ordinance. Ordinance No. 1658. City of Rockport	n.d.
Future Land Use Plan w/ETJ. City of Rockport	n.d.
Heritage District Zoning Overlay Code. City of Rockport	2012
Master Drainage Plan. City of Rockport.	2016
Rockport Land Use Study. Texas Sea Grant	2012
Stormwater Ordinance. Ordinance No. 1663. City of Rockport	n.d.
Subdivision Ordinance. Ordinance No. 1663. City of Rockport	n.d.
Tree and Landscape Ordinance. Ordinance No. 1349. City of Rockport	n.d.

Studies, Plans, and Planning Mechanisms	Date
Rockport (continued)	
Zoning Map. City of Rockport	2014
Zoning Ordinance. Ordinance No. 1027. City of Rockport	n.d.

Table 4.2: Summary of Coordination between Planners, Jurisdictions, and Other Agencies.

Agency/Organization	Invited to Participate in the FMP Process	Phone or In-person Meeting	Other Information/Data Provided
Aransas County Navigation District	Yes	Email	N/A
Coastal Bend Council of Governments	Yes	In-person	Organized previous Hazard Mitigation Plan
APA – Texas Chapter – Coastal Bend Section	Yes	In-person	N/A
Environmental Committee for Water Issues (Rockport)	Yes	In-person	N/A
FEMA	No	Phone and Email	NFIP Claims Data / Misc. Guidance
ISO	No	Phone and Email	Misc. Guidance
Naismith Engineering	Yes	E-mail	N/A
LAN Consulting Group	Yes	In person	Contracted to Develop County HMP
National Weather Service	Yes	In-person	Past storms and possible future storms.
NOAA's Office for Coastal Management	No	Phone and In-person	Discussed FMP process, gained feedback, and tools
Port Aransas City Council	No	In-person	Possibilities discussed for future collaboration
Rockport-Fulton Chamber of Commerce	Yes	Email and In-person	Diane Probst attended Rockport Kickoff
Rockport Heritage District Board	Yes	Email	N/A
Rockport Planning & Zoning Commission	Yes	In-person	N/A
Santa Rosa County	No	Phone	Advice regarding the FMP process
Texas A&M AgriLife Extension	Yes	In-person	Ginger Easton-Smith attended Rockport Kickoff
Texas General Land Office (GLO)	Yes	In-person	Funding and GIS data
Texas Parks and Wildlife	Yes	In-person	Wildlife habitats
Texas Water Development Board	Yes	E-mail	N/A
University of Texas Marine Sciences Institute	Yes	In-person	Project Assistance
Texas Sea Grant	Yes	In-person	Project Assistance
Texas Coastal Watershed Program	Yes	In-person	Project Assistance
Urban Engineering	Yes	In-person	Flood control projects
US Army Corps of Engineers	Yes	Phone and E-mail	N/A

CHAPTER 5: ASSESSING THE HAZARDS AND THE PROBLEMS (STEPS 4 & 5)

INTRODUCTION

This chapter goes into depth assessing the hazards that face Aransas County, and identifying the potential challenges that may occur because of those hazards. The first section of the chapter profiles the three general types of flooding hazards that occur in the planning area. A description of each type of flooding is provided, along with information on historical events, and the likelihood of future effects. The last part of this section details the vulnerability of the county to flooding, types of impacts that can be expected from future flooding, and describes the benefits of the county's natural areas in offsetting these possible impacts. The second section of the chapter provides specific information about the Special Flood Hazard Areas (SFHA), the vulnerable critical facilities and infrastructure, historical flood insurance data, future development and land use initiatives, and other local knowledge of flood concerns for each jurisdictional area. The final section of the chapter details the natural hazards, other than flooding, which have the potential to impact Aransas County. Each hazard includes a description, a list of known historical occurrences (including magnitude and severity), and a statement of future probability.

KNOWN HIGH FLOODING HAZARDS (Step 4.a)

Flooding refers to a general and temporary condition of partial or complete inundation of normally dry land. Three types of flooding occur in the planning area: 1) Coastal Flooding; 2) Flash Flooding; and 3) Riverine Flooding. A description of each type of flooding is provided, along with information on historical events, and the likelihood of future effects. The end of this section will detail the vulnerability of the county to flooding, and the types of impacts that can be expected from future flooding.

Types of Flooding Hazards (Step 4.a.2)

Coastal Flooding (Storm Surge)

The principal type of flood posing the greatest risk in terms of potential impacts to the planning area, due to geographic location and topography, is coastal flooding. Coastal flooding refers to irregular tidal water and wave action that temporarily inundates areas near land-ocean boundaries.

The National Oceanic and Atmospheric Administration (NOAA) outlines the following causes for this type of coastal flooding (Storm Surge and Coastal Inundation, n.d.):

- Severe weather events create meteorological conditions that drive up the water level, creating a storm surge. These conditions include strong winds and low atmospheric pressure that can be caused by tropical cyclones (such as hurricanes), by mid-latitude extratropical storms (such as Nor'easters), or by any severe weather conditions.
- Large waves, whether driven by local winds or swell from distant storms, raise average coastal water levels and can cause large damaging waves to reach land.
- High tide levels are caused by normal variations in the astronomical tide cycle. When a severe storm hits during high tide, the risk of flooding increases significantly.
- Depending on the storm event, flooding from storm surge may be combined with river flooding from rain in the upland watershed, thus increasing the flood severity. It is important to note that coastal flooding is different from river flooding, which is generally caused by severe precipitation.
- Other larger scale regional and ocean scale variations, caused by seasonal heating and cooling and ocean dynamics, can contribute to high water levels.

Historical Events (Step 4.a.3)
Table 5.1 identifies the historic storm surge levels, for Aransas County, by storm. This list does not include all tropical cyclones to affect Aransas County; rather, it references the storms for which storm surge data in the area is available.

Table 5.1: Aransas County Storm Surge Events.

Storm Name	Date	Storm Surge Elevation in Aransas County (ft)
1919 Storm	(September 2 – 15, 1919)	11.1 – 16.0
1942 Storm	(August 21 – 31, 1942)	3.4
1945 Storm	(August 24 – 29, 1945)	3.7
Hurricane Carla	(September 11, 1961)	7.5 – 10.3
Hurricane Beulah	(September 5 – 22, 1967)	6.0 – 6.5
Hurricane Celia	(July 30 – August 5, 1970)	9.2 – 11.4
Hurricane Gilbert	(September 16 – 17,1988)	3.7

(FEMA, Flood Insurance Study: Aransas County, Texas, 2016)

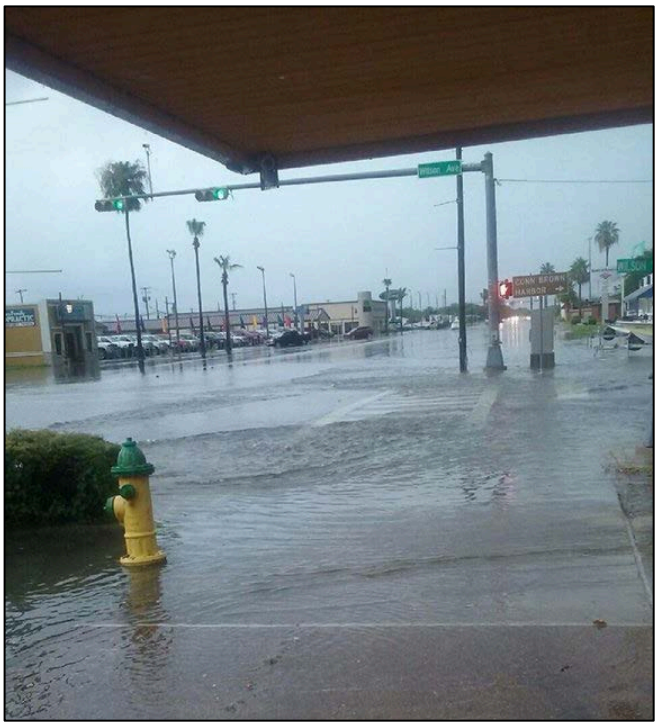
Frequency (Step 4.a.3)
With seven events causing storm surge damage in Aransas County over the past 97 years, the probability of storm surge damage occurring is approximately 7.2% per year.

Flash Flooding
Flash floods result from convective precipitation usually due to intense thunderstorms or sudden release from an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from a regular flood by a timescale less than six hours. Flooding from excessive rainfall in coastal Texas usually occurs between July and October.

Historical Events (Step 4.a.3)
Table 5.2 uses data mined from NOAA's National Centers for Environmental Information (NCEI) to identify the historic flash flooding events between January 1996 and August 1, 2015, for the planning area.

While the NCDI database does not contain flooding events prior to 1996, the State of Texas Hazard Mitigation Plan does reference a flash flood event on September 18-20, 1979, that impacted the area. This event reported 18 inches in 24 hours at Aransas Pass, and 13 inches at Rockport. One of the worst events in recent history was Tropical Storm Bill, which came through the area on June 16-17, 2015. This event resulted in 12 inches of rain in Aransas Pass, and the City of Rockport recorded 4 inches of rain in a two-hour period (D. Reid, personal communication, November 10, 2016).

Frequency (Step 4.a.3)
With 28 events reported by the NCEI over the past 19 years, the area can expect approximately 1.47 flash flood events per year.



Flash Flooding in Aransas Pass, June 2015 (Photo: Kristi)

Table 5.2: Aransas County Flash Flooding Events (National Oceanic and Atmospheric Administration, National Centers for Environmental Information [NOAA-NCEI], n.d.).

Start Date	Location	Property Damage	Local Rainfall Amount
04/03/1997	Rockport	N/A	8-12 in
10/09/1997	Countywide	$0	8-22 in
10/13/1997	Countywide	$0	8-22 in
09/16/1998	Rockport	$0	N/A
09/17/1998	Holiday Beach	$0	N/A
10/18/1997	Fulton	$0	N/A
10/18/1997	Rockport	$0	N/A
10/06/1997	Rockport	$0	N/A
08/23/1999	Rockport	$0	N/A
03/14/2000	Rockport	$0	7 in
11/04/2000	Rockport	$0	5.71 in
08/31/2001	Countywide	$0	N/A
10/28/2002	Countywide	$0	N/A
10/28/2002	South Central	$0	N/A
10/28/2002	Countywide	$0	N/A
05/08/2004	Countywide	$127,000	7 in
05/13/2005	Countywide	$0	4.81 in
03/06/2005	North Portion	$0	5.96 in
09/11/2005	Rockport	$0	2-3 in
05/29/2006	Rockport	$0	N/A
06/01/2006	Rockport	$0	4-6 in
07/05/2006	Rockport	$1,500,000	5-8 in
07/04/2007	Aransas Refuge	$0	4-10 in
11/19/2009	Airport	$0	4-8 in
01/15/2010	Rockport	$0	2-4 in
09/19/2010	Rockport	$0	7 in
09/20/2010	Rockport	$0	7 in
09/29/2013	Rockport	$0	2-3 in
03/21/2015	Rockport	$0	1.23 in
04/14/2015	Rockport	$0	2.65 in
09/11/2015	Rockport	$0	3.14 in
05/22/2015	Rockport	$0	.44 in
06/17/2015	Rockport	$100,000	4.36 in

Riverine Flooding

Riverine floods, slower in nature, occur when water from sustained rainfall or rapid snow melt overflows a waterway once the volume of water exceeds the capacity of the waterway.

Historical Events (Step 4.a.3)

Despite being located on Copono Bay, which is the confluence point of the Aransas River, Chiltipin Creek, Copano Creek, and Mission River, riverine flooding has not caused historical flood damage in the county. The National Weather Service (NWS) does not maintain stream gauges in the county, however there are two gauges just northwest of the county. The following tables indicate the historic crests for Copano Creek near the City of Refugio and the historic crests for the Mission River at Refugio. Each of these rivers have different flood categories or stages, which are indicated with corresponding separate tables.

Table 5.3: Flood Categories for Copano Creek near Refugio (National Weather Service [NWS], Advanced Hydrologic Prediction Service, 2016).

Major Flood Stage:	17 feet
Moderate Flood Stage:	14 feet
Flood Stage:	12 feet
Action Stage:	5 feet

Table 5.4: Historic Crests of Copano Creek near Refugio (NWS, Advanced Hydrologic Prediction Service, 2016).

Crest Rank	Feet	Date
1	21.00	09/12/1971
2	18.60	12/31/1996
3	17.26	07/08/2007
4	17.00	12/31/1997
5	14.75	05/17/2004
6	14.28	11/23/2009
7	14.14	09/22/2010
8	14.12	05/18/2016
9	14.02	07/04/2007
10	12.32	06/18/2015
11	12.27	04/10/2004
12	12.13	01/16/2010
13	12.00	12/31/1998

Table 5.5: Flood Categories for Mission River at Refugio (NWS, Advanced Hydrologic Prediction Service, 2016).

Major Flood Stage:	30 feet
Moderate Flood Stage:	26 feet
Flood Stage:	23 feet
Action Stage:	20 feet

Table 5.6: Historic Crests of Mission River at Refugio (NWS, Advanced Hydrologic Prediction Service, 2016).

Crest Rank	Feet	Date
1	38.25	09/12/1971
2	36.50	09/21/1967
3	34.85	07/01/1990
4	33.30	07/07/1942
5	32.30	05/17/1938
6	32.30	08/01/1914
7	30.80	10/19/1998
8	29.95	07/06/2007
9	29.10	12/23/1992
10	28.52	05/15/2004
11	28.38	04/08/2004
12	28.18	04/05/1997
13	27.61	05/07/1966
14	26.53	06/18/1981
15	25.89	06/14/1981
16	25.86	06/23/1993
17	25.33	05/05/1981
18	25.22	03/20/1997
19	25.07	09/21/2010
20	24.95	07/08/1981
21	24.93	02/11/1993
22	24.80	04/19/1992
23	24.16	04/12/1985

Frequency (Step 4.a.3)
Riverine flooding has caused minimal damage in Aransas County. However, riverine flooding has occurred just northwest of Aransas County several times in the past. While the chance of these events impacting Aransas County is minimal, it is best to be aware of all possible local impacts.

- For Copano Creek near Refugio, NWS reported 13 flood stage events or higher over a 45-year period. This indicates a 28% chance that a flood stage event will occur any given year.

- For Mission River near Refugio, NWS reported 23 flood stage events or higher over a 102-year period. This indicates a 23% chance that a flood stage event will occur any given year.

Risk and Warning Time
Warnings for coastal flooding are often made available to the public well in advance, as the development of storm systems are tracked for days before land fall. Flash flooding, caused predominantly by heavy rainfall, is also closely monitored by the NWS. Watches are issued by the NWS to officials and the public in a diligent manner, with projections coming, usually, more than a day before an event is expected to occur. These notices, when correctly used by the public, can reduce some of the risks associated with this type of flooding. As the advancing weather patterns get closer—usually within a 24-hour period—warnings are issued in those areas where there is a high confidence that a significant weather event will occur. These warnings allow people to further protect themselves, and to take action before the weather event occurs.

Vulnerability & Impacts (Step 5.a)
Flood vulnerability can be understood as "the extent to which a system is susceptible to floods due to exposure…in conjunction with its ability (or inability) to cope, recover, or basically adapt" (Balica, Stefania, & Nigel G. Wright, 2009). The planning area, given its low elevation and proximity to the Gulf Coast, is particularly susceptible to coastal flooding and flash flooding. A review of historical events, as discussed in the previous section of this plan, suggests that the area has a 7% annual chance of coastal flooding from storm surge and a 100% annual chance of flash flooding.

While flooding will occur in the future, the impacts of different flooding events may be highly variable. After a thorough analysis of historical events, and an assessment of current conditions, the planning team and local stakeholders identified the following local impacts that flooding could have in their communities.

Description of Potential Future Impacts (Step 5.b)
Life Safety & the Need for Warning & Evacuation (Step 5.b.1)
In a major coastal storm event, coastal flooding can critically impact evacuation routes exiting the Aransas County area (see Map 5.1, in back of plan). Of particular concern are FM 188—a major evacuation route—which crosses Port Bay in the center of the map. This area can be affected by storm surge and high tidal influence. Similarly, State Highway 35 Bypass and Business converge to cross Aransas and Copano Bays. The Texas Department of Transportation is currently constructing a new, taller bridge crossing for this corridor, but it is possible the bridge could be affected in a major hurricane or coastal storm event.

Other non-major transportation corridors that could be affected are:
- FM 136 near Egery Flats and Copano Bay along the Aransas County/Refugio County line
- State Highway 361 in Aransas Pass
- State Highway 35 Business

Both State Highway 361 and State Highway 35 Business in Aransas Pass, known in the municipality as Commercial Street and Wheeler Avenue respectively, are prone to flooding, particularly in heavy rain events. The portion of State Highway 35 Business that enters Aransas Pass from Gregory is located in a SFHA.

Aransas County uses a variety of methods to notify its residents of flooding hazards. Primarily, the county, the City of Rockport, and the City of Aransas Pass use Code Red, an emergency notification system that sends voice or text messages to residents about any issue of public concern. There is also an emergency notification radio station, 1610 AM, which sends out community emergency messages. HAMM radio usage has become popular in the area with Aransas Pass spearheading the movement. In severe emergency events, local police authorities typically drive around neighborhoods informing people of evacuations and other public safety concerns using public address systems.

The County Emergency Operations Center has a strategic partnership with the Rockport-Fulton Chamber of Commerce to release important emergency messages via email blasts and social media accounts. The county has two Public Information Officers who also release information to local media when the Emergency Operations Center is activated. In addition, the City of Aransas Pass has a designated Public Information Officer who releases information to the public. Finally, the City of Aransas Pass, the Aransas Pass Police Department, and the Aransas Pass Fire Departments have a very active social media presence through which they often notify residents of hazardous events.

Public Health (including mold) (Step 5.b.2)
While flooding can have severe impacts to life and safety during a severe weather event, the aftermath—once the waters recede—can be just as damaging. Flood waters pose a serious hazard to public health, and this can manifest in the following ways.

- Flood waters entering residences and businesses can cause costly damages such as ruining possessions and merchandise. Furthermore, the residual water in these places can cause the growth of mold and mildew.
- Flood waters can result in pools of standing water. These pools can become havens for mosquito larvae and other toxic parasites that can harm animals and humans.
- Powerful flood waters can cause downed power lines, and generally increase the chance of electrocution in flooded areas.
- Dead animal carcasses and general trash can accumulate, creating hazardous waste areas.
- Tanks holding oil and chemical contaminants can be damaged—resulting in oil spills, displaced tanks, and other increased chances of chemical pollution.
- Septic systems can be seriously impacted by the flooding of their drain fields. This can result in reduced efficiency of the septic system, as well as potential groundwater contamination.
- Shallow wells can be infiltrated by rising flood waters, impacting anyone who uses these wells as their primary, or only, source of drinking water.
- Waters can infiltrate large jurisdictional wastewater systems. The increase in water intake through wastewater lines can overwhelm wastewater treatment plants, resulting in potential sewage spillage.
- "Flash-flooding is the leading cause of weather-related deaths in the U.S." (Flood Safety, 2016). Texas leads nationally in flood-related fatalities with 76% of these deaths being vehicle-related (Flood Safety, 2016).

Economy and Major Employers/Tax Base (Step 5.b.4)
Table 5.7 identifies the top 10 major employers in Aransas County. Many of these employers are affiliated with governmental entities; therefore, their normal operations may not cease because of flooding. An additional large governmental entity—not listed in this table—is the City of Aransas Pass, which has approximately 120 employees. Two of the identified "top 10 employers," Wal-Mart and H.E.B., are major retailers that would provide assistance during an emergency event. Three employers—Care Regional Medical

Center, Gulf Pointe Plaza and Rockport Coastal Care Center—are in the health service industry, and will likely be evacuated in a severe flooding or storm event. Although none of these health services companies are located in the Federal Emergency Management Agency (FEMA) designated floodplain, the area around Rockport Coastal Care Center has been susceptible to localized flooding. Wood Group Production Services is a support company to the oilfield industry with ties beyond the boundaries of Aransas County; as such, the company would likely not be severely impacted by flooding, unless it was the result of a catastrophic storm.

Table 5.7: Major Employers in Aransas County (Rockport-Fulton Chamber of Commerce, n.d.).

Organization	Industry	# Employed
Aransas County Independent School District	Education	521
Wal-Mart	Retail	250
Care Regional Medical Center	Hospital	210
H.E.B.	Retail grocer	185
Wood Group Production Services	Oilfield & Industrial	181
Aransas County	Government	175
City of Rockport	Government	130
State of Texas	Government	107
Gulf Pointe Plaza	Health Service	93
Rockport Coastal Care Center	Health Service	75

There are a variety of other businesses in the county that would be impacted by flooding. Lexington Place Nursing Home in Aransas Pass and Oak Crest Nursing Home in Rockport would likely be affected. The Oak Crest Nursing home has been impacted by flooding multiple times. There are many large automobile dealerships in Aransas Pass, such as Aransas Autoplex, Commercial Motor Company, and Allen Samuels Chrysler Dodge Jeep, that could be severely impacted by damaged inventory and general loss of revenue. Home improvement stores, such as Lowe's, McCoy's, and Ace Hardware, may see increased revenues after a flooding event due to the need for supplies to repair and rehabilitate structures. Businesses connected to the marine industry, such as those located on Cove Harbor, would be adversely affected by coastal flooding. Furthermore, many Aransas County residents commute to industries located in Corpus Christi and its outer fringes. A large regional flooding event could shut down these industries, as well as the thoroughfares leading to them. These closures would negatively impact the incomes of hundreds of local residents.

According to the U.S. Census Bureau, the top two industries in Aransas County are "accommodation and food services" with 87 establishments and 1,099 employees, and "retail trade" with 83 establishments and 1,024 employees (United States Census Bureau, 2014). These sectors are reflective of the strong tourism-driven economy of the county. Sales tax revenues have steadily increased since 2010 with $1.2 million in revenue received in 2015 in Aransas County alone. In 2015, the Town of Fulton had $227,000 in sales tax revenue, the City of Aransas Pass had nearly $1.9 million in revenue, and the City of Rockport had nearly $2.4 million in revenue (State of Texas, n.d.). A serious flooding or storm event could cause devastating impact to this imperative revenue source by deterring tourists from visiting the area. Additionally, hotel occupancy tax revenues would also go down, reducing another important source of governmental income. A large amount of Aransas County, and its municipalities', ad valorem tax base is connected to residences along its coastline; as such, ad valorem tax revenues could potentially be devastated by large scale flooding events due to damaged properties and delays in future development.

Protection from Natural Areas (Step 5.d)

Aransas County is unique in that it is made up of mostly peninsulas, islands, and bays along the Gulf of Mexico. There are three peninsulas, Live Oak, Blackjack, and Lamar; and six bays, Aransas, Copano, Redfish, Mesquite, Port, and St. Charles. The largest island is the barrier island San Jose. Elevation spans from sea level to 50 feet, and the soil ranges from sand to silt, to loam, and to clay. The low elevation and soil types generally lead to high inundation and slow drainage from tides and storms. A variety of vegetation, wetlands,

and ecosystems also thrive in these conditions, which can provide natural, beneficial functions for stormwater and floodplain management.

NOAA developed a dataset specific to coastal area landcover through the Coastal Change Analysis Program. The Coastal Change Analysis Program landcover categories include, but are not limited to, urban developed areas, forested land, grasslands, palustrine areas, and estuarine areas. The numerous landcover categories within Aransas County can be seen in the Map 5.2 Series (see back of plan). When comparing this landcover map with the floodplain map (Map 5.3, see back of plan), one can see that much of the floodplains overlap with the palustrine and estuarine wetlands. This natural overlap is a great advantage to the county and its residents. Wetlands naturally mitigate flooding by absorbing stormwater and reducing its rate of flow. The soil and vegetation in wetlands give stormwater a place to infiltrate and be stored before it is released back into streams, rivers, and bays (Texas Parks and Wildlife Department, 2000). This slow, gradual process regulates the velocity of stormwater and flooding, and lessens the destructive force that would be discharged into developed communities.

Wetlands are not the only natural landscape in the area that provides flood mitigation. Although the forested land in Aransas County does not overlap much with the floodplain, it can prevent rainfall from turning into runoff in more elevated areas, which would then travel downstream to the floodplain. Forests provide a canopy of vegetation that intercepts and catches rainfall before it hits the ground. Trees also establish a dense root system that provides permeability to soil. The permeability allows more water to infiltrate the ground and keeps the soil from "crusting" (Aransas County, 2012). This allows more water to enter, and be stored, in the soil, thus reducing runoff and flooding.

The functions, advantages, and value of natural areas are recognized in the Aransas County Stormwater Master Plan and Management Manual (SMPMM) (2012). This document was created by four engineering firms under the oversight of the Aransas County Stormwater Management Advisory Council. The council included representatives from the Aransas County Commissioners' Court, the City of Rockport City Council, the Town of Fulton Town Council, the Aransas County Navigation District Commissioners, a representative appointed by the Aransas Pass City Council, and two private citizens. The SMPMM provides "an integrated approach to stormwater management including not only drainage and flood control but also integrating water quality and ecological considerations" (Aransas County, 2012, p.13). The manual goes into great depth regarding natural and ecological resources, habitats, and endangered species; explains the existing regulations and institutional agreements; and analyzes current projects, best management practices, and future recommendations.

The local areas named in the SMPMM that provide natural benefits to stormwater and flood management are: the Aransas National Wildlife Refuge, Goose Island State Park, Deadman Island/Long Reef, Tule Creek West, and several "Blue Corridors." Blue Corridors are characterized as interconnections between natural depressions, swales, marshes, and other drainage paths that bring water to receiving waterways and bays (Aransas County, 2012). These corridors do not always contain water, but naturally fill, infiltrate, and move water along during storms. Blue Corridors are not currently protected by any regulations or institutions, but the SMPMM strongly recommends that they be utilized as a best management practice.

Several legislative acts and local orders and ordinances are named in the SMPMM: the Clean Water Act, the Rivers and Harbors Act, the Coastal Zone Management Act, the Federal Endangered Species Act, the Migratory Bird Treaty Act, the Aransas County Floodplain Management and Watershed Protection Order, the City of Rockport Stormwater Ordinance, and the City of Rockport Tree Ordinance. These laws contribute to the protection of natural and ecological areas that exist in Aransas County. Several additional projects and programs also contribute to the protection of natural areas. These include, but are not limited to, the National Urban Runoff Program, Mission-Aransas National Estuary Research Reserve, Redfish Bay State Scientific Area, the Coastal Bend Bays Plan, Aransas Pathways, the Aransas County Site Development and

Construction Guidelines, Port Bay Mitigation Bank, The Aransas Project, Save Cedar Bayou, Inc., and the Little Bay Water Exchange Study.

Special Hazards Associated with Less Frequent Flooding

There are special hazards that can be related to local flooding that provide greater risks. Table 5.8 lists those special hazards, and identifies whether they are relevant in this planning area. The hazards which are relevant are addressed in section three of this chapter under "Non-Flood Related Hazards."

Table 5.8: Special Hazards Associated with Less Frequent Flooding.

Flood-related special hazards	Relevant to Planning Area
Uncertain flow paths	No
Closed basin	No
Ice jams	No
Land subsidence	Yes
Mudflow hazards	No
Coastal erosion	Yes
Tsunamis	No

JURISDICTION-SPECIFIC INFORMATION

This section provides specific information about the SFHA, the vulnerable critical facilities and infrastructure, historical flood insurance data, future development and land use initiatives, and other local knowledge of flood concerns for each jurisdictional area.

Aransas County

Special Flood Hazard Areas (100-year floodplain) (Step 4.a.1)

A SFHA is defined by FEMA as: "the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies" (FEMA, 2016). The SFHA is the same as the 100-year floodplain, which is known to have a 1% annual chance of flooding. This can also be interpreted that over the span of an average 30-year mortgage, the property will have a 26% chance of flooding. Map 5.3 (see back of plan) shows the SFHA for Aransas County.

Other Potential Flooding Hazards

500-year Floodplains (Step 4.b)

The 500-year floodplains are moderate flood hazard areas known to have a .2% annual chance of flooding. These areas are known to flood, only at a much less frequent rate of the 100-year floodplains (the SFHA). Map 5.4 (see back of plan) shows the location of areas in Aransas County that would be inundated during 100-year and 500-year flooding events.

Coastal Flood Zones (Step 4.b.d)

Coastal flooding is caused by irregular tidal water and wave action that temporarily inundates areas near land-ocean boundaries. According to FEMA, V Zones are "areas along coasts subject to inundation by the 1-percent-annual-chance flood event [100-year floodplain] with additional hazards associated with storm-induced waves" (FEMA, 2017). The coastal flood zones for Aransas County are shown on Map 5.5 (see back of plan). The zone identified as "AE" on this map is synonymous with the SFHA (the 100-year floodplain or the area with a 1% annual chance of flooding). This area is significant because the Food Insurance Rate Maps (FIRM) maps also include the Base Flood Elevations. The area marked as "VE" on this map are the areas which are exposed to additional hazards due to waves that would accompany a storm or large tidal event.

Localized Flooding (Step 4.a)
Map 5.6 (see back of plan) identifies areas in Aransas County that are specifically prone to flooding. These areas were identified by County Employees and local residents. Some of these areas are not located in the SFHA, and many of them are related to surface flooding.

Critical Facilities & Infrastructure (Step 5.b.3)
Critical facilities and infrastructure are the components of a community that enable modern amenities. These include, but are not limited to, things like roads, bridges, utilities, water, sewage, police and fire stations, medical services, post offices, and schools. These facilities are an integral component of emergency services, as well as the ability of a community to recover after a flood, or any disaster; and therefore, should not be located in high hazard (including flood) areas.

Table 5.9 identifies the critical governmental facilities in Aransas County. Out of seven facilities, three are in an area above the 500-year floodplain: the Aransas County Service Center located on FM 2165, the Aransas County Environmental Health office located on Airport Rd, and the Aransas County Airport located on John D. Wendell. The remaining four facilities are located in the 500-year floodplain. Most county critical facilities are located in higher elevations, decreasing the chance that they may be affected by flooding. The Map 5.7 series (see back of plan) shows the location of critical governmental facilities in Aransas County.

Table 5.9: Aransas County Governmental Critical Facilities.

Critical Facility	Location	In SFHA?
Aransas County Courthouse & Jail	301 N. Live Oak	No; 500-year floodplain
Aransas County Service Center (includes EOC)	1931 FM 2165	No
Aransas County Sheriff's Office	714 E. Concho	No; 500-year floodplain
Aransas County Tax Office	319 N. Church St	No; 500-year floodplain
Aransas County Appraisal District	601 S. Church St	No; 500-year floodplain
Aransas County Environmental Health	880 Airport	No
Aransas County Airport	421 John D. Wendell	No

Table 5.10 identifies the critical facilities for the Aransas County Independent School District. All of the facilities are located in areas above the 500-year floodplain; however, two facilities—the one located on Omonhundro, and the facility on N. Live Oak—are in close proximity to the 500-year floodplain boundary. Regardless, the location of these facilities decrease the likelihood that they will be affected by flooding. The Map 5.7 Series (see back of plan) shows the location of each of critical facilities for the Aransas County Independent School District.

Table 5.10: Aransas County Independent School District Critical Facilities.

Critical Facility	Location	In SFHA?
Administrative Office	1700 Omohundro, Rockport	No
Little Bay Primary School	2000 Hwy 35 N., Rockport	No
Live Oak Learning Center	31 Griffith Dr., Rockport	No
Fulton Learning Center	314 N. 6th St, Fulton	No
Rockport-Fulton Middle School	1701 Colorado Avenue, Rockport	No
Rockport-Fulton High School	1801 Omohundro, Rockport	No
Operations Office	619 N. Live Oak	No
Transportation Office	1502 Sonny Watkins	No

Table 5.11 identifies 23 additional critical facilities located within Aransas County or one of the associated jurisdictions (Aransas Pass, Fulton, or Rockport), that are not county buildings or schools. Seventeen of these facilities are in an area above the 500-year floodplain. Five facilities are located in the 100-year floodplain, and one facility was in the 500-year floodplain. Most of these critical facilities are located in higher elevations,

decreasing the chance that those places should be affected by flooding. The Map 5.8 Series (see back of plan) shows the location of each of critical facilities that are located within the Aransas County boundary but are not associated with any local governmental entities.

Table 5.11: Other Critical Facilities in the County; but Not Affiliated with any Local Governmental Entities.

Critical Facility	Location	In SFHA?
TxDOT Rockport Office	1401 FM 3036, Rockport	No
U.S. Post Office – Rockport	1550 FM 2165, Rockport	No
U.S. Post Office – Fulton	301 Cactus, Fulton	No
U.S. Post Office – Aransas Pass	634 S. Commercial, Aransas Pass	No
Lamar Volunteer Fire Department Substation	302 Bois D' Arc, Rockport	No
AEP Service Center	2120 Hwy 35, Aransas Pass	No
AEP Power Substation – Aransas Pass	State Highway 35 Business, Rockport	**Yes; 100-year Floodplain**
AEP Power Substation – Aransas Pass	510 S. Euclid, Aransas Pass	No
AEP Power Substation – Aransas Pass	2051 SH 188, Aransas Pass	No
AEP Power Substation – Rockport	1941 FM 2165, Aransas Pass	No
AEP Power Substation – Rockport	Eller Lane, Rockport	No
AEP Power Substation - Lamar	7561 Highway 35 N., Rockport	**Yes; 100-year Floodplain**
Care Regional Medical Center	1711 W. Wheeler, Aransas Pass	No
Allegiance Ambulance	400 Enterprise, Rockport	No
Coastal Care EMS	1121 W. Market St, Rockport	No
Rockport Harbor	911 Navigation Circle, Rockport	**Yes; 100-year Floodplain**
Cove Harbor	Cove Harbor Drive, Rockport	No; 500-year floodplain
Fulton Harbor	Fulton Beach Rd, Fulton	**Yes; 100-year Floodplain**
San Patricio County Navigation District Marina	426 East Ransom, Aransas Pass	**Yes; 100-year Floodplain**
Rockport Coastal Care Center	1004 Young Street, Rockport	No
Oak Crest Nursing Center	1902 FM 3036, Rockport	No
Gulf Pointe Plaza	1008 Enterprise Blvd, Rockport	No
Lexington Place Nursing Home	1661 W. Yoakum Ave, Aransas Pass	No

Review of Damaged Buildings/Flood Insurance Claims (Step 5.c)

Tables 5.12-5.14 show statistics about flood insurance policies and claims in Aransas County.

Table 5.12 shows the total number of flood insurance policies that existed in the county as of November 30, 2016. Policies in force indicates the number of policies that were being actively maintained, or were up to date on all payments. Premium indicates the amount of money paid by property owners in the county to maintain the policies in force. Insurance in force indicates the total amount that would have to be paid out if every policy in the county had to be paid out at full value at that time.

Table 5.12: Flood Insurance Policies in Aransas County, According to Location (as of November 30, 2016) (Source: FEMA, official communication, December 2016).

Location of Policies	Policies in Force	Premium	Insurance in Force
Special Flood Hazard Area (100-year Floodplain)	1,375	$1,032,171	$290,434,400
Within or above the 500-year Floodplain (Preferred Risk Policies)	2,098	$770,868	$591,067,000

Table 5.13 is similar to Table 5.12 in that it shows the total number of flood insurance policies that existed in the county as of December 15, 2016, but is categorized by the type of structures protected. This table includes the number of closed paid losses, which indicates the number of claims that have been paid and closed out by FEMA as of December 15, 2016. The following column indicates the total amount of money that was paid on those closed paid claims. Finally, adjustment expenses indicates the amount of money that the insurance companies incurred investigating and adjusting the claims that have been paid and closed.

Table 5.13: Flood Insurance Policies in Aransas County, According to Structure Type (as of December 15, 2016) (Source: FEMA, official communication, December 2016).

Type of Structure	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Single Family Home	3,448	$1,803,375	$968,119,300	564	$3,523,814.46	$224,800.18
Buildings with 2-4 Units	145	$61,964	$23,669,000	9	$55,928.07	$3,750.00
All Other Residential	462	$152,810	$57,723,500	36	$474,507.45	$22,560.98
Non-Residential	210	$260,553	$50,262,200	46	$372,362.70	$18,955.00
Total	**4,265**	**$2,278,702**	**$1,099,774,000**	**655**	**$4,426,611.00**	**$270,065.00**

Flood Insurance Rate Maps are an "Official map of a community on which FEMA has delineated the SFHAs, the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community" (FEMA, 2017). These maps are what determine NFIP premiums. Buildings that were "constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Maps of the community, whichever is later are considered Pre-FIRM" (FEMA, 2013). According to the FEMA Community Status Book Report (2017), all of the participating jurisdictions had initial FIRMs identified in 1971. Buildings that were constructed, or substantially improved, after this date are considered Post-FIRM. This is important because Pre-FIRM structures usually did not account for flood risks; however, Post-FIRM structures were required to meet all the NFIP minimum requirements. Table 5.14 shows the historical claim data (as of December 2016) for Aransas County according to whether the structures are Pre-FIRM or Post-FIRM.

Table 5.14: Flood Insurance Claims in Aransas County, According to Time of Construction (Pre-FIRM or Post-FIRM) (Source: FEMA, official communication, December 2016).

	Paid Claims	Paid Losses
Pre-FIRM	502	$3,405,546
Post-FIRM	151	$1,018,066

Development (Current & Future) (Step 5.e)

Aransas County staff identified seven areas of the unincorporated county that may experience development over the next five to ten years. These areas are described below.

- Holiday Beach Area, north of Northview Drive and East of Highway 35: This area is adjacent to the preexisting unincorporated community of Holiday Beach. Development could have an adverse impact on flood risk in these preexisting communities, and attention to this concern should be considered if this development materializes in the future.
- East of Goose Island State Park: Development in this area would place structures on the front line of future storm surge. Strong code enforcement and buildings standards could mitigate this risk, should development materialize. This area is also located at the bottom of a watershed. Upstream development adjacent to this area may exacerbate flood risk.
- Southwest of Rattlesnake Point Road: This area is one of the most vulnerable to flooding, and would be adjacent to existing development to its immediate northwest. If this development were to occur, alterations to the floodplain should be minimal, with limited risk increases for existing development. Code enforcement and building regulations for development in this area can greatly reduce flood risk for this development, provided they are stringent and enforced.

- Southwest of Rattlesnake Point Road and Carol Lane: This area is located on the fridge on the 500-year floodplain. If this development were to occur, existing development in the surrounding areas should not be significantly impacted in terms of floodplain alterations.
- Northwest of Road 1069 and Port Bay Road: This is an area that is highly vulnerable to flooding, but is located in a very rural area of the county.
- South of Road 1069 and Highway 188: This is in an area that is highly vulnerable to flooding, but is located in a very rural area of the county.
- Islands of Rockport, near Highway 35 and Highway 188: This area is highly vulnerable to storm surge, and is likely to see the development of luxury homes. Code enforcement and building regulations could greatly reduce flood risk for this area, provided they are stringent and enforced.

Repetitive Loss Areas (Step 4.a)
The Federal Emergency Management Agency tracks properties which flood regularly. These properties are termed "Repetitive Flood Loss Properties" and are defined as "any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978" (FEMA, 2005). As of November 23, 2016, there were 27 repetitive loss properties listed in the unincorporated areas of Aransas County (FEMA, personal communication, November 23, 2016). Severe repetitive losses include residential structures (single family homes and units with two to four units) that have flood insurance through the NFIP, and have "incurred flood damage for which: a.) 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or b) at least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss" (FEMA, 2017). The Severe Repetitive Loss Grant Program makes funding available to state and local governments to help mitigate future losses by buying out these properties for conversion to open space, or to help elevate these structures. Map 5.9 (see back of plan) shows areas of severe repetitive loss concentrations in Aransas County. The information about these properties has been generalized, in accordance with the protocols required to maintain the privacy of property owners.

Aransas Pass
Special Flood Hazard Areas (100-year floodplain) (Step 4.a.1)
A SFHA is are defined by FEMA as: "the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies" (FEMA, 2016). The SFHA is the same as the 100-year floodplain, which is known to have a 1% annual chance of flooding. This can also be interpreted that over the span of an average 30-year mortgage, the property will have a 26% chance of flooding. Map 5.10 (see back of plan) shows the SFHA for Aransas Pass.

Other Potential Flooding Hazards
500-year Floodplains (Step 4.b)
The 500-year floodplains are moderate flood hazard areas known to have a .2% annual chance of flooding. These areas are known to flood, only at a much less frequent rate of the 100-year floodplains (the SFHA). Map 5.11 (see back of plan) shows the location of areas in Aransas Pass that would be inundated during 100-year and 500-year flooding events.

Coastal Flood Zones (Step 4.b.d)
Coastal flooding is caused by irregular tidal water and wave action that temporarily inundates areas near land-ocean boundaries. According to FEMA, V Zones are "areas along coasts subject to inundation by the 1-percent-annual-chance flood event [100-year floodplain] with additional hazards associated with storm-

induced waves" (FEMA, 2017). The coastal flood zones for Aransas Pass are shown on Map 5.12 (see back of plan). The zone identified as "AE" on this map is synonymous with the SFHA (the 100-year floodplain or the area with a 1% annual chance of flooding). This area is significant because the FIRM maps also include the Base Flood Elevations. The area marked as "VE" on this map are the areas which are exposed to additional hazards due to waves that would accompany a storm or large tidal event.

Localized Flooding (Step 4.a)
Map 5.13 (see back of plan) identifies areas in Aransas Pass that are specifically prone to flooding. These areas were identified by county employees and local residents. Some of these areas are not located in the SFHA, and many of them are related to surface flooding.

Critical Facilities & Infrastructure (Step 5.b.3)
Critical facilities and infrastructure are the components of a community that enable modern amenities. These include, but are not limited to, things like roads, bridges, utilities, water, sewage, police and fire stations, medical services, post offices, and schools. These facilities are an integral component of emergency services, as well as the ability of a community to recover after a flood, or any disaster; and therefore, should not be located in high hazard (including flood) areas.

Table 5.15 identifies the seven critical governmental facilities in the City of Aransas Pass. Six facilities are in an area above the 500-year floodplain, while Conn Brown Harbor sits in the 100-year floodplain. Most city critical facilities are located in higher elevations, decreasing the chance that they may be affected by flooding. Map 5.14 (see back of plan) shows the location of the critical governmental facilities in the City of Aransas Pass.

Table 5.15: City of Aransas Pass Critical Facilities.

Critical Facility	Location	In SFHA?
City Hall/Fire Department/Police Department	600 W. Cleveland	No
Public Works Service Center	601 N. Avenue A	No
Wastewater Treatment Plant	1000 E. Ransom	No
Water Tower	1845 W Wheeler	No
Water Tower	1909 S Commercial	No
Water Tower	S Euclid & E Wilson	No
Conn Brown Harbor	Huff Street	**Yes; 100-year Floodplain**

The City of Aransas Pass manages 23 wastewater lift stations, nine of which are in the 100-year floodplain. There are also numerous privately owned and managed lift stations which the location of are unknown. As such, it is not known if these private lift stations are located within the floodplains.

Table 5.16 identifies eight critical facilities for the Aransas Pass Independent School District. All eight facilities are in an area above the 500-year floodplain. Since these facilities are located at higher elevations, the chance of them being affected by flooding is low. Map 5.15 (see back of plan) shows the location of the critical facilities for the Aransas Pass Independent School District.

Table 5.16: Aransas Pass Independent School District Critical Facilities.

Critical Facility	Location	In SFHA?
Administrative Office	2300 McMullen Lane	No
Faulk Early Childhood	430 S. 8th	No
Kieberger Elementary	748 W. Goodnight	No
Charlie Marshall Elementary	2300 McMullen Lane	No
AC Blunt Middle School	2103 Demory Ln	No
Aransas Pass High School	450 S Avenue A	No
Walter Noble Alternative School	701 W. Wheeler	No
Maintenance & Transportation Office	808 W. Yoakum	No

Review of Damaged Buildings/Flood Insurance Claims (Step 5.c)

Tables 5.17-5.19 show statistics about flood insurance policies and claims in Aransas Pass. Table 5.17 shows the total number of flood insurance policies that existed in the county as of November 30, 2016. Policies in force indicates the number of policies that were being actively maintained, or were up to date on all payments. Premium indicates the amount of money paid by property owners in the county to maintain the policies in force. Insurance in force indicates the total amount that would have to be paid out if every policy in the city had to be paid out at full value at that time.

Table 5.17: Flood Insurance Policies in Aransas Pass, According to Location (as of November 30, 2016) (Source: FEMA, official communication, December 2016).

Location of Policies	Policies in Force	Premium	Insurance in Force
Special Flood Hazard Area (100-year Floodplain)	122	$161,088	$31,732,100
Within or above the 500-year Floodplain (Preferred Risk Policies)	652	$246,344	$181,936,000

Table 5.18 is similar to Table 5.17 in that it shows the total number of flood insurance policies that existed in the city as of December 15, 2016, but is categorized by the type of structures protected. This table includes the number of closed paid losses, which indicates the number of claims that have been paid and closed out by FEMA as of December 15, 2016. The following column indicates to total amount of money that was paid on those closed paid claims. Finally, adjustment expenses indicates the amount of money that the insurance companies incurred investigating and adjusting the claims that have been paid and closed.

Table 5.18: Flood Insurance Policies in Aransas Pass, According to Structure Type (as of December 15, 2016) (Source: FEMA, official communication, December 2016).

Type of Structure	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Single Family	707	$360,228	$189,787,700	264	$2,946,179.89	$152,449.05
Buildings with 2-4 Units	43	$16,375	$10,861,600	7	$22,836.50	$1,815.00
All Other Residential	29	$12,130	$4,679,100	6	$15,923.13	$1,460.00
Non-Residential	49	$99,672	$15,850,500	138	$2,453,409.89	$82,936.49
Total	**828**	**$488,405**	**$221,178,900**	**415**	**$5,456,347.00**	**$238,660.00**

Flood Insurance Rate Maps are an "Official map of a community on which FEMA has delineated the SFHAs, the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community" (FEMA, 2017). These maps are what determine NFIP premiums. Buildings that were "constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Maps of the community, whichever is later are considered Pre-FIRM" (FEMA, 2013). According to the FEMA Community Status Book Report (2017), all of the participating jurisdictions had initial FIRMs identified in 1971. Buildings that were constructed, or substantially improved, after this date are considered Post-FIRM. This is important because Pre-FIRM structures usually did not account for flood risks; however, Post-FIRM structures were required to meet all the NFIP minimum requirements. Table 5.19 shows the historical claim data (as of December 2016) for Aransas Pass according to whether the structures are Pre-FIRM or Post-FIRM.

Table 5.19: Flood Insurance Claims in Aransas Pass, According to Time of Construction (Pre-FIRM or Post-FIRM) (Source: FEMA, official communication, December 2016).

	Paid Claims	Paid Losses
Pre-FIRM	366	$4,237,869
Post-FIRM	48	$1,187,363

Development (Current & Future) (Step 5.e)
Aransas Pass staff identified five areas of the city that may experience development over the next five to ten years. These areas are described below.

- South Avenue A, south of Hwy 35 Business/Wheeler Avenue: A large single-family residential subdivision is currently being developed along this corridor. Although this is outside of the SFHA, this area can be susceptible to localized flooding given small low-lying depressions in the land.
- North Avenue A and Hwy 35 Bypass, north of Wheeler Avenue: A business park and other commercial developments are slated for development in this area. This area has some of the highest elevations in the city and is outside of the SFHA. However, it can be susceptible to some localized flooding.
- Wheeler Avenue/Hwy 35 Business, west of Avenue A: This commercial corridor has several business developments planned along the thoroughfare. While it is outside of the SFHA, the area has had problems with localized flooding along intersections.
- South Saunders Street, north of Mooney Lane: Single-family residences are being developed in this area.
- Conn Brown Harbor, north of Hwy 361: This area has long been considered by developers for mixed-use commercial and residential development. Although most of the harbor has high elevation outside of the SFHA, the outer fringes are in both the 100-year and 500-year floodplain.

Repetitive Loss Areas (Step 4.a)
The Federal Emergency Management Agency tracks properties which flood regularly. These properties are termed "Repetitive Flood Loss Properties" and are defined as "any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978" (FEMA, 2005). As of November 23, 2016, there were 45 repetitive loss properties listed in Aransas Pass (FEMA, personal communication, November 23, 2016). Severe repetitive losses include residential structures (single family homes and units with two to four units) that have flood insurance through the NFIP, and have "incurred flood damage for which: a.) 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or b) at least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss" (FEMA, 2017). The Severe Repetitive Loss Grant Program makes funding available to state and local governments to help mitigate future losses by buying out these properties for conversion to open space, or to help elevate these structures. Map 5.16 (see back of plan) shows areas of severe repetitive loss concentrations in Aransas Pass. The information about these properties has been generalized, in accordance with the protocols required to maintain the privacy of property owners.

Fulton
Special Flood Hazard Areas (100-year floodplain) (Step 4.a.1)
A SFHA is defined by FEMA as: "the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood

insurance applies" (FEMA, 2016). The SFHA is the same as the 100-year floodplain, which is known to have a 1% annual chance of flooding. This can also be interpreted that over the span of an average 30-year mortgage, the property will have a 26% chance of flooding. Map 5.17 (see back of plan) shows the SFHA for Fulton.

Other Potential Flooding Hazards

500-year Floodplains (Step 4.b)

The 500-year floodplains are moderate flood hazard areas known to have a .2% annual chance of flooding. These areas are known to flood, only at a much less frequent rate of the 100-year floodplains (the SFHA). Map 5.18 (see back of plan) shows the location of areas in Fulton that would be inundated during 100-year and 500-year flooding events.

Coastal Flood Zones (Step 4.b.d)

Coastal flooding is caused by irregular tidal water and wave action that temporarily inundates areas near land-ocean boundaries. According to FEMA, V Zones are "areas along coasts subject to inundation by the 1-percent-annual-chance flood event [100-year floodplain] with additional hazards associated with storm-induced waves" (FEMA, 2017). The coastal flood zones for Fulton are shown on Map 5.19 (see back of plan). The zone identified as "AE" on this map is synonymous with the SFHA (the 100-year floodplain or the area with a 1% annual chance of flooding). This area is significant because the FIRM maps also include the Base Flood Elevations. The area marked as "VE" on this map are the areas which are exposed to additional hazards due to waves that would accompany a storm or large tidal event.

Localized Flooding (Step 4.a)

Map 5.20 (see back of plan) identifies areas in Fulton that are specifically prone to flooding. These areas were identified by county employees and local residents. Some of these areas are not located in the SFHA, and many of them are related to surface flooding.

Critical Facilities & Infrastructure (Step 5.b.3)

Critical facilities and infrastructure are the components of a community that enable modern amenities. These include, but are not limited to, things like roads, bridges, utilities, water, sewage, police and fire stations, medical services, post offices, and schools. These facilities are an integral component of emergency services, as well as the ability of a community to recover after a flood, or any disaster; and therefore, should not be located in high hazard (including flood) areas.

Table 5.20 identifies three governmental critical facilities in the Town of Fulton. All three facilities are in areas above the 500-year floodplain, and have low chances of being affected by flooding. Map 5.21 (see back of plan) shows the location of the governmental critical facilities for the Town of Fulton.

Table 5.20: Town of Fulton Critical Facilities.

Critical Facility	Location	In SFHA?
City Hall/ Police Department	209 N 7th	No
Fulton Volunteer Fire Department Central Station	701 Cactus	No
City Operations Office	301 N. 9th St	No

There are also four wastewater lift stations managed by the Town of Fulton, none of which are in the 100-year floodplain.

Review of Damaged Buildings/Flood Insurance Claims (Step 5.c)

Tables 5.21-5.23 show statistics about flood insurance policies and claims in Fulton. Table 5.21 shows the total number of flood insurance policies that existed in the county as of November 30, 2016. Policies in force indicates the number of policies that were being actively maintained, or were up to date on all payments. Premium indicates the amount of money paid by property owners in the county to maintain the policies in

force. Insurance in force indicates the total amount that would have to be paid out if every policy in the town had to be paid out at full value at that time.

Table 5.21: Flood Insurance Policies in Fulton, According to Location (as of November 30, 2016) (Source: FEMA, official communication, December 2016).

	Policies in Force	Premium	Insurance in Force
Special Flood Hazard Area (100-year Floodplain)	1	$4,890	$300,000
Within or above the 500-year Floodplain (Preferred Risk Policies)	176	$76,000	$50,952,000

Table 5.22 is similar to Table 5.21 in that it shows the total number of flood insurance policies that existed in the town as of December 15, 2016, but is categorized by the type of structures protected. This table includes the number of closed paid losses, which indicates the number of claims that have been paid and closed out by FEMA as of December 15, 2016. The following column indicates to total amount of money that was paid on those closed paid claims. Finally, adjustment expenses indicates the amount of money that the insurance companies incurred investigating and adjusting the claims that have been paid and closed.

Table 5.22: Flood Insurance Policies in Fulton, According to Structure Type (as of December 15, 2016) (Source: FEMA, official communication, December 2016).

Type of Structure	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Single Family	143	$48,458	$39,470,000	2	$2,734.40	$450.00
Buildings with 2-4 Units	0	$0	$0	0	$0.00	$0.00
All Other Residential	1	$155	$32,000	0	$0.00	$0.00
Non-Residential	16	$29,277	$6,689,500	0	$0.00	$0.00
Total	**160**	**$77,890**	**$46,191,500**	**2**	**$2,734.40**	**$450.00**

Flood Insurance Rate Maps are an "Official map of a community on which FEMA has delineated the SFHAs, the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community" (FEMA, 2017). These maps are what determine NFIP premiums. Buildings that were "constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Maps of the community, whichever is later are considered Pre-FIRM" (FEMA, 2013). According to the FEMA Community Status Book Report (2017), all of the participating jurisdictions had initial FIRMs identified in 1971. Buildings that were constructed, or substantially improved, after this date are considered Post-FIRM. This is important because Pre-FIRM structures usually did not account for flood risks; however, Post-FIRM structures were required to meet all the NFIP minimum requirements. Table 5.23 shows the historical claim data (as of December 2016) for Futon according to whether the structures are Pre-FIRM or Post-FIRM.

Table 5.23: Flood Insurance Claims in Fulton, According to Time of Construction (Pre-FIRM or Post-FIRM) (Source: FEMA, official communication, December 2016).

	Paid Claims	Paid Losses
Pre-FIRM	2	$2,734
Post-FIRM	0	$0

Development (Current & Future) (Step 5.e)
The Town of Fulton is almost fully developed. There is no room for expansion within the commercial areas, and only a few scattered lots throughout the community could be developed as single family residential units. None of these lots are in a SFHA.

Repetitive Loss Areas (Step 4.a)
The Federal Emergency Management Agency tracks properties which flood regularly. These properties are termed "Repetitive Flood Loss Properties" and are defined as "any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978" (FEMA, 2005). As of November 23, 2016, there were no repetitive loss properties listed in the Town of Fulton (FEMA, personal communication, November 23, 2016). Severe repetitive losses include residential structures (single family homes and units with two to four units) that have flood insurance through the NFIP, and have "incurred flood damage for which: a.) 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or b) at least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss" (FEMA, 2017). The Severe Repetitive Loss Grant Program makes funding available to state and local governments to help mitigate future losses by buying out these properties for conversion to open space, or to help elevate these structures. The Town of Fulton does not have any severe repetitive losses.

Rockport
Special Flood Hazard Areas (100-year floodplain) (Step 4.a.1)
A SFHA is defined by FEMA as: "the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies" (FEMA, 2016). The SFHA is the same as the 100-year floodplain, which is known to have a 1% annual chance of flooding. This can also be interpreted that over the span of an average 30-year mortgage, the property will have a 26% chance of flooding. Map 5.22 (see back of plan) shows the SFHA for Rockport.

Other Potential Flooding Hazards
500-year Floodplains (Step 4.b)
The 500-year floodplains are moderate flood hazard areas known to have a .2% annual chance of flooding. These areas are known to flood, only at a much less frequent rate of the 100-year floodplains (the SFHA). Map 5.23 (see back of plan) shows the location of areas in Rockport that would be inundated during 100-year and 500-year flooding events.

Coastal Flood Zones (Step 4.b.d)
Coastal flooding is caused by irregular tidal water and wave action that temporarily inundates areas near land-ocean boundaries. According to FEMA, V Zones are "areas along coasts subject to inundation by the 1-percent-annual-chance flood event [100-year floodplain] with additional hazards associated with storm-induced waves" (FEMA, 2017). The coastal flood zones for Rockport are shown on Map 5.24 (see back of plan). The zone identified as "AE" on this map is synonymous with the SFHA (the 100-year floodplain or the area with a 1% annual chance of flooding). This area is significant because the FIRM maps also include the Base Flood Elevations. The area marked as "VE" on this map are the areas which are exposed to additional hazards due to waves that would accompany a storm or large tidal event.

Localized Flooding (Step 4.a)
Map 5.25 (see back of plan) identifies areas in Rockport that are specifically prone to flooding. These areas were identified by county employees and local residents. Some of these areas are not located in the SFHA, and many of them are related to surface flooding.

Critical Facilities & Infrastructure (Step 5.b.3)
Critical facilities and infrastructure are the components of a community that enable modern amenities. These include, but are not limited to, things like roads, bridges, utilities, water, sewage, police and fire stations, medical services, post offices, and schools. These facilities are an integral component of emergency services, as well as the ability of a community to recover after a flood, or any disaster; and therefore, should not be located in high hazard (including flood) areas.

Table 5.24 identifies the critical governmental facilities in the City of Rockport. Out of twelve facilities, ten are in an area above the 500-year floodplain. Two of the facilities are located in, or within close proximity of, the 500-year floodplain: City Hall and the Fire Department substation at 119 Freeze Lane. Most of the city's critical facilities are located at higher elevations and thus should not be affected by flooding. Map 5.26 (see back of plan) shows the location of the governmental critical facilities in the City of Rockport.

Table 5.24: City of Rockport Critical Facilities.

Critical Facility	Location	In SFHA?
City Hall	622 E. Market	0.2% Annual Chance
Public Works Service Center	2751 S.H. 35 Bypass	No
Wastewater Treatment Plant	1401 N. Pearl	No
Information Technology/ Public Works Annex	402 E Laurel	No
Rockport Volunteer Fire Department Substation	119 Freeze Lane	0.2% Annual Chance
Rockport Volunteer Fire Department Substation	1608 West Terrace Blvd	No
Rockport Volunteer Fire Department Substation	902 Henderson	No
Rockport Volunteer Fire Department Central Station	212 Gagon	No
Water Tower	2751 S.H. 35 Bypass	No
Water Tower	901 Palmetto	No
Water Tower	1303 S Kossuth	No
Compressed Natural Gas Station	1995 Stadium Drive	No

There are also over 40 wastewater lift stations managed by the City of Rockport, 17 of which are in the 100-year floodplain. There are also many privately owned and managed lift stations that may or may not be in the floodplain.

Review of Damaged Buildings/Flood Insurance Claims (Step 5.c)
Tables 5.25-5.27 show statistics about flood insurance policies and claims in Rockport. Table 5.25 shows the total number of flood insurance policies that existed in the county as of November 30, 2016. Policies in force indicates the number of policies that were being actively maintained, or were up to date on all payments. Premium indicates the amount of money paid by property owners in the county to maintain the policies in force. Insurance in force indicates the total amount that would have to be paid out if every policy in the city had to be paid out at full value at that time.

Table 5.25: Flood Insurance Policies in Rockport, According to Location (as of November 30, 2016) (Source: FEMA, official communication, December 2016).

	Policies in Force	Premium	Insurance in Force
Special Flood Hazard Area (100-year Floodplain)	560	$448,205	$117,851,900
Within or above the 500-year Floodplain (Preferred Risk Policies)	1,497	$617,151	$449,018,000

Table 5.26 is similar to Table 5.25 in that it shows the total number of flood insurance policies that existed in the city as of December 15, 2016, but is categorized by the type of structures protected. This table includes the number of closed paid losses, which indicates the number of claims that have been paid and closed out by FEMA as of December 15, 2016. The following column indicates to total amount of money that was paid on those closed paid claims. Finally, adjustment expenses indicates the amount of money that the insurance companies incurred investigating and adjusting the claims that have been paid and closed.

Table 5.26: Flood Insurance Policies in Rockport, According to Structure Type (as of December 15, 2016) (Source: FEMA, official communication, December 2016).

Type of Structure	Policies in Force	Premium	Insurance in Force	Number of Closed Paid Losses	$ of Closed Paid Losses	Adjustment Expense
Single Family	1,771	$791,333	$503,062,000	195	$1,665,981.58	$96,286.33
Buildings with 2-4 Units	60	$30,949	$10,518,500	7	$29,594.98	$3,710.00
All Other Residential	455	$149,966	$79,762,600	14	$37,508.01	$3,255.00
Non-Residential	165	$340,029	$66,455,000	133	$884,839.00	$51,622.83
Total	**2,451**	**$1,312,277**	**$659,798,100**	**349**	**$2,617,922.00**	**$154,873.00**

Flood Insurance Rate Maps are an "Official map of a community on which FEMA has delineated the SFHAs, the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community" (FEMA, 2017). These maps are what determine NFIP premiums. Buildings that were "constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Maps of the community, whichever is later are considered Pre-FIRM" (FEMA, 2013). According to the FEMA Community Status Book Report (2017), all of the participating jurisdictions had initial FIRMs identified in 1971. Buildings that were constructed, or substantially improved, after this date are considered Post-FIRM. This is important because Pre-FIRM structures usually did not account for flood risks; however, Post-FIRM structures were required to meet all the NFIP minimum requirements. Table 5.27 shows the historical claim data (as of December 2016) for Rockport according to whether the structures are Pre-FIRM or Post-FIRM.

Table 5.27: Flood Insurance Claims in Rockport, According to Time of Construction (Pre-FIRM or Post-FIRM) (Source: FEMA, official communication, December 2016).

	Paid Claims	Paid Losses
Pre-FIRM	295	$1,991,576
Post-FIRM	52	$648,342

Development (Current & Future) (Step 5.e)

Rockport staff identified three areas of the city that may experience development over the next five to ten years. These areas are described below.

- South Rockport, south of FM 1069/Market Street and east of State Highway 35 Business: This area has become increasingly popular for single-family residence development. However, given its proximity to the bay and location in the SFHA, this area is also very prone to flooding.
- Salt Lake, east of Loop 1781: This area adjacent to a privately-owned lake and access to Copano Bay has current and future development for recreational vehicle parks. While most of the area is outside of the SFHA, the land most adjacent to the lake is in the 100-year floodplain. Furthermore, a large portion of the area's drainage channels flow in this direction, which makes the area more susceptible to localized flooding.

- Highway 35 Bypass: There has been interest in developing both residential and commercial developments along this corridor. This area is not located in the SFHA but can be susceptible to local flooding due to various scattered depressions in the land.

Repetitive Loss Areas (Step 4.a)
The Federal Emergency Management Agency tracks properties which flood regularly. These properties are termed "Repetitive Flood Loss Properties" and are defined as "any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978" (FEMA, 2005). As of November 23, 2016, there were 22 repetitive loss properties listed in the City of Rockport (FEMA, personal communication, November 23, 2016). Severe repetitive losses include residential structures (single family homes and units with two to four units) that have flood insurance through the NFIP, and have "incurred flood damage for which: a.) 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or b) at least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss" (FEMA, 2017). The Severe Repetitive Loss Grant Program makes funding available to state and local governments to help mitigate future losses by buying out these properties for conversion to open space, or to help elevate these structures. Map 5.27 (see back of plan) shows areas of severe repetitive loss concentrations in Rockport. The information about these properties has been generalized, in accordance with the protocols required to maintain the privacy of property owners.

NON-FLOOD RELATED HAZARDS (Step 4.d; with 5.a. & 5.b woven in)
In addition to flooding, the Texas State Hazard Mitigation Plan (Texas Division of Emergency Management, 2010) identifies a variety of other natural hazards that impact the State of Texas. This section describes those hazards which have the potential to impact Aransas County. Due to the county's location on the coast, Sea Level Rise has been added. Each hazard includes a description, a list of known historical occurrences (including magnitude and severity), and a statement of future probability.

Coastal Erosion (Step 4.d & 4.b.1.c)
Coastal erosion refers to the movement of sediments such as those on beaches or shorelines by forces involving wave or wind action. The effects of coastal erosion can include a less stable shoreline and can wear away or remove large portions of land over time. Tidal movement and wave action due to wind are nearly constant along the coastline and can compromise shoreline stability. Water moving at higher speeds has the capacity to carry and move much greater sizes and amounts of sediment; therefore, more active locations when considering the movement of water have the potential to influence the coastline to a greater degree. Boat wakes are another source of water movement that should be considered when examining how to stabilize shoreline or shoreline structures.

Historical Occurrences
Coastal erosion is a serious issue that has affected Aransas County. Recently, a county task force was formed to address coastal resiliency issues and gather project information for six projects impacted by erosion (Aransas County, 2016). One project of immediate concern is shoreline stabilization along Bay Shore Drive in Key Allegro. Existing erosion control infrastructure has failed along the perimeter of the subdivision, and work has been in process to mitigate the issue by constructing rock revetments along the shoreline (Aransas County, 2016). Shell Ridge Road and Fulton Beach Road are also in need of shoreline stabilization (Aransas County, 2016).

Other areas affected by coastal erosion are Copano Bay, Cedar Bayou, Cove Harbor, and Little Bay (Aransas County, 2016). The ecosystems of the local bay systems are being affected by continuous sedimentation, which has greatly impacted the bird habitats supported by those ecosystems. In 2016, Aransas County submitted applications for RESTORE Act funding to dredge and stabilize these areas in order to preserve these vital habitats (Aransas County, 2016).

Probability
The aforementioned erosion occurrences have been an ongoing issue for many years. While difficult to quantify, there is likely to be a very high probability that coastal erosion will continue to be a hazard of concern to Aransas County.

Vulnerability and Impacts (Step 5.b)
The most vulnerable areas include Copano Bay, Cedar Bayou, Cove Harbor, Key Allegro, and Little Bay. Homes in these areas also have a disproportionately higher property value than most other homes in the planning area.

Summary of Hazard (Step 5.a)
Local governments, stakeholders, and various state agencies have identified this hazard as one of concern for Aransas County. These groups will continue to study the problem, and identify mitigation actions to reduce the impact of coastal erosion in the area. While erosion will likely continue on a stable, incremental basis, immediate risk to persons and property are limited.

Dam or Levee Failure (Step 4.d, 4.b.1.a, & 4.b.1.b)
Dam failure, as a hazard, is described as a structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which include but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area

The US Army Corps of Engineers National Inventory of Dams lists one dam in Aransas County (identified in Table 5.28); however, since this dam is not classified as a high hazard dam, the dam does not have an emergency action plan. (Step 4.b.1.b)

Table 5.28: Inventory of Dams in Aransas County.

Name	Tailing Ponds Dam 1
Owner	Sherwin Alumina LP
Year Completed	1971
Inspection Date	10/12/2010
Storage	6,400 acre-feet

Additional dams in this database which are located near Aransas County are identified in Table 5.29. (Step 4.b.1.b)

Table 5.29: Inventory of Dams near Aransas County.

Name	Tailing Ponds Dam 2	Facility 204 #3 Bed	Mission River Oaks Lake Dam
Owner	Sherwin alumina lP	Reynolds Metals Co.	C Marshall
County	San Patricio	San Patricio	Refugio
State	Texas	Texas	Texas
River	Off chart-Port Bay	N/A	Off chart-Mission River
Year Completed	1971	N/A	1981
Inspection Date	10/12/2010	N/A	9/8/1981
Storage	6,400	14,646	88

Local officials have confirmed that should these dams fail, people and property in the planning area would not be at risk.

Historical Occurrences
There have been no known occurrences of dam or levee failure impacts to people and property in the planning area.

Probability
Given no historical records of failure, the probability of this event occurring any given year is less than 1%.

Vulnerability and Impacts (Step 5.b)
Should dams or levees in the surrounding area fail, no impact to people and property would be sustained.

Summary of Hazard (Step 4.b.1.a & 5.a)
With no high hazard dams being located in the Aransas County, risk is limited. While high hazard dams do exist northwest of the county, their failure should pose little to limited impacts within the county itself. While there are no FEMA certified levees in the planning area, a berm located in Aransas Pass is a point of concern. Development has actually occurred on the berm, potentially reducing the berm's structural integrity. Local officials have identified that flooding coming from the western side of the peninsula could cause the berm to actually prevent water from draining out of the city. Further studies are needed to address the full risk potential of this structure in Aransas Pass.

Drought (Step 4.d)
Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. Drought conditions can also be defined in terms of meteorological, hydrological, agricultural, and socioeconomic factors. Prolonged lack of precipitation within a watershed depletes water bodies that have the potential to negatively affect downstream ecosystems such as estuaries.
Historical Occurrences
Six intense droughts have occurred in the area between 1959 and 2015, as indicated by the Palmer Drought Severity Index (National Drought Mitigation Center, 2016). On average, each drought lasted for approximately 22 months. The shortest drought period occurred in 2006 for one month, and the longest drought period occurred from 1986 to 1991 for 63 months (National Drought Mitigation Center, 2016).

Table 5.30: Coastal Bend Historical Drought Periods, 1959-2015
(National Drought Mitigation Center, 2016).

Drought Start Date	Drought End Date	Duration (months)
6/1/2011	4/1/2012	10
1/1/2009	11/1/2009	10
4/1/2006	5/1/2006	1
5/1/1996	3/1/1997	10
3/1/1986	6/1/1991	63
6/1/1964	8/1/1967	38

Probability

There have been 132 recorded months of drought in the Coastal Bend area for the time period between 1959 and 2016 (672 months). This suggests that for any given month, there is a 20% chance of drought occurring in the Coastal Bend area.

Vulnerability and Impacts (Step 5.b)

Negative impacts of drought are primarily economic and environmental. With Aransas County lacking a significant crop and livestock presence, the planning area has a low exposure to this hazard. Aside from agricultural impacts, other losses related to drought include increased costs of fire suppression and damage to roads and structural foundations due to the shrink dynamic of expansive soils during excessively dry conditions.

Summary of Hazard (Step 5.a)

While drought is a significant concern in terms of regional economic impacts due to agricultural impacts, drought poses little risk to the planning area. While there are agricultural areas in the western and northern unincorporated areas of the county, the industry is relatively small compared to surrounding counties.

Earthquakes (Step 4.d)

An earthquake is the result of a sudden release of energy in the Earth's tectonic plates that creates seismic waves. The seismic activity of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Earthquakes are measured by magnitude and intensity. Magnitude is measured by the Richter Scale, a base-10 logarithmic scale, which uses seismographs around the world to measure the amount of energy released by an earthquake. Intensity is measured by the Modified Mercalli Intensity Scale, which determines the intensity of an earthquake by comparing actual damage against damage patterns of earthquakes with known intensities. Figure 5.1 shows the fault lines in the region.

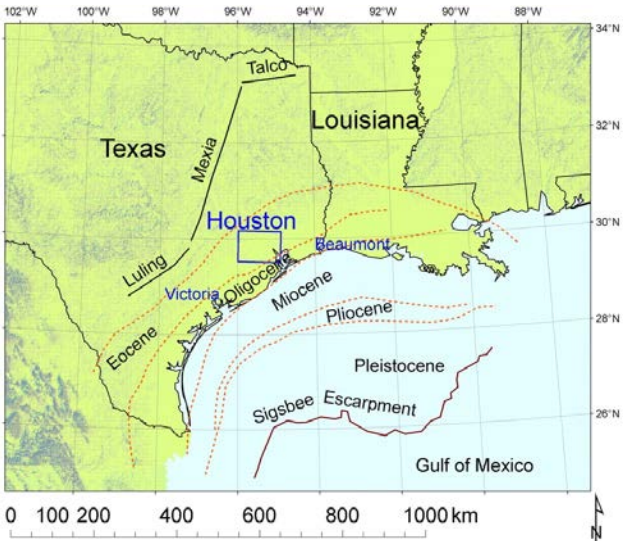


Figure 5.1: Regional Fault Lines (Image: USGS).

Historical Occurrences

For the time period between 1950 and 2016, the USGS reported no record of earthquakes having occurred within a 50-mile radius around Aransas County

Probability
Given no reported events between 1950 and 2016, the annual probability of an earthquake occurring is less than 1%.

Vulnerability and Impacts (Step 5.b)
A damaging earthquake event is unlikely; therefore, most structures in the county are not built to earthquake standards. As such, should a significant earthquake occur, existing and future development could sustain damage.

Summary of Hazard (Step 5.a)
While there is a lack of recorded historical occurrences, the planning area is located near the Oligocene and Miocene fault lines. As such, this hazard does pose some risk to the entire Texas Gulf Coast; therefore, the unstudied and undefined impact potential should be studied further.

Expansive Soils and Land Subsidence (Step 4.d)
Geologic hazards along the Texas coast can include expansion and contraction of soils (termed 'expansive soils") and the ongoing threat of land subsidence. Both geologic hazards can result in property and infrastructure damage, and can even include large-scale loss of land over time. Expansive soils are defined as "soils and soft rock that tend to swell or shrink due to changes in moisture content" that can decrease the stability of the land and in turn affect structures or surfaces covering the land (FEMA, n.d., pg. 22). Temperature and water levels also influence how soils expand or contract. Land subsidence can be described as "the loss of surface elevation due to the removal of subsurface support, [which] ranges from broad, regional lowering of the land surface to localized collapse" (FEMA, n.d., pg. 8). Subsidence is an issue along many low-lying regions of the coast. Subsidence can occur in wetland habitats from the gradual erosion and lack of sediment input into a system.

Historical Occurrences
There is no historical data regarding expansive soils or land subsidence in Aransas County.

Probability
Since there is no historical record of the occurrence of expansive soil or land subsidence, the probability for these hazards occurring is less than 1%.

Vulnerability and Impacts (Step 5.b)
The entire planning area is theoretically vulnerable to structural damage as a result of shrinking and expanding soils and land subsidence; however, there is no data available to determine damage estimates for this hazard. It is advised that a licensed professional be consulted for a full analysis of soil conditions so that proper precautions can be taken prior to any construction being performed in the county.

Summary of Hazard (Step 5.a)
While a number of studies profile soil types and conditions in the area, a lack of historical recorded occurrences of expansive soils and land subsidence make the area's risk to these hazards difficult to assess. Soil profiles suggest that Aransas County does have characteristics conducive to expansion and subsidence. Attention to this hazard and the impacts on local infrastructure and floodplain modification should be observed over time.

Extreme Heat (Step 4.d)
Extreme heat is often associated with periods of drought, but can also be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks arise when a

person is overexposed to heat. Extreme heat can also cause people to overuse air conditioners, which can lead to power failures. For the planning area, the months with the highest temperatures are May, June, July, August, and September. The NWS is responsible for issuing Heat Advisories and Excessive Heat Warnings. Heat Advisories are issued when heat index values are greater than, or equal to, 110 degrees Fahrenheit. Excessive Heat Warnings are issued when heat index values are greater than, or equal to, 115 degrees Fahrenheit.

Historical Occurrences
According to the Corpus Christi office of the NWS, "approximately three heat advisories for temperatures over 110 degrees Fahrenheit are issued a year in the Corpus Christi area or 34 in a ten-year period of 2005-2015" (P. Zabel, personal communication, December 21, 2015). However, there is some variability in the number of advisories actually issued each year. For example, in 2007 and 2008, there were no advisories issued in the area, while in 2014, nine advisories were issued (P. Zabel, personal communication, December 21, 2015).

Probability
Considering 34 heat advisories over a 10-year period, annual extreme heat events are a near certainty in Aransas County.

Vulnerability and Impacts (Step 5.b)
Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations that may be more vulnerable to extreme heat, demographic data was obtained from the 2010 Census on numbers of people in each jurisdiction under age 5 and over age 65. Data was not available for the under age 4 demographic, overweight individuals, and those on certain medications.

Heat-related illness or death is generally the greatest concern resulting from extreme heat events. Although historically no heat-related deaths are known, the potential exists. Area elder care facilities, senior housing facilities, and childcare facilities are vulnerable to extreme temperatures. Most notably, power failure during an extreme heat event could shut down these facilities' HVAC systems if back-up power capabilities were not available.

Another type of infrastructure damage that can occur as a result of extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

Summary of Hazard (Step 5.a)
While the geographic location of the planning area does predispose residents and infrastructure to extreme heat events, historical impacts have been limited. Local energy providers maintain emergency operations plans to address power outages, which are critical mitigation actions to maintain the area's air conditioning.

Hailstorms (Step 4.d)

Hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere, causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water, which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow. (NOAA, Severe Weather 101 – Hail, n.d)

Hailstorms in Texas cause damage to property, crops, and the environment and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants 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, occasionally fatal injury.

Historical Occurrences

Data collected from NOAA's, NCEI shows that there were 13 hail storm events that occurred between 1996 and 2015 (NOAA-NCEI, n.d.). These events are summarized in Table 5.31. The total cost of damages was $15,000, which were all incurred during the May 15, 2012, hail storm event. In this event, scattered thunderstorms in the Coastal Bend region resulted in golf-ball sized hail which impacted southwest Rockport.

Table 5.31: Aransas County Historical Hail Events, 1996-2015 (NOAA-NCEI, n.d.).

Hail Event Date	Location	Size of Hail (inches)	Cost of Damages
1/31/1998	Rockport	0.75	$0
1/31/1998	Rockport	0.75	$0
3/7/1998	Rockport	1.00	$0
3/18/2000	Rockport	1.00	$0
3/18/2000	Rockport	0.75	$0
3/26/2003	Rockport	1.00	$0
5/8/2005	Rockport	0.75	$0
5/8/2005	Rockport	0.75	$0
3/13/2007	Rockport	1.00	$0
6/3/2009	Cardwell	1.75	$0
5/15/2012	Rockport	1.75	$10,000
5/15/2012	Rockport	1.00	$5,000
12/4/2012	Cardwell	0.88	$0

Probability

With 13 historical hail events occurring over the 20-year period between 1996 and 2015, the annual probability of this event occurring in Aransas County is 65%.

Vulnerability and Impacts (Step 5.b)

In general, assets in the planning area that are vulnerable to hail damage include people, crops, vehicles, and built structures. Most buildings are privately insured, which supports most property owners in recovering from hail damage.

Summary of Hazard (Step 5.a)

While hail does pose a risk to the planning area, principally in terms of damage to property and infrastructure, insurance and building standards have historically proved to be important mitigation actions to address this hazard.

Hurricanes and Tropical Storms (Step 4.d)

According to NOAA's NWS, hurricanes are storms that reach a sustained surface wind speed of 64 knots or more (equivalent to 74 miles per hour or greater). Hurricane season in the Gulf of Mexico runs from June 1 to November 30. Warmer Gulf waters provide more favorable conditions for hurricane development, therefore later summer storms are often stronger than early season hurricanes. Atmospheric conditions,

including moisture in the air and wind movement, can help strengthen or decrease the intensity of a storm. Wind shear or dry air, for example, can cause a storm to weaken as it moves through the Gulf.

Historical Occurrences

Since 1850, NOAA has recorded 38 hurricanes and tropical storms within a 65-nautical mile radius of Aransas County (Source: NOAA, Historical Hurricane Tracks, 2016). Figure 5.2 shows a map of these events.

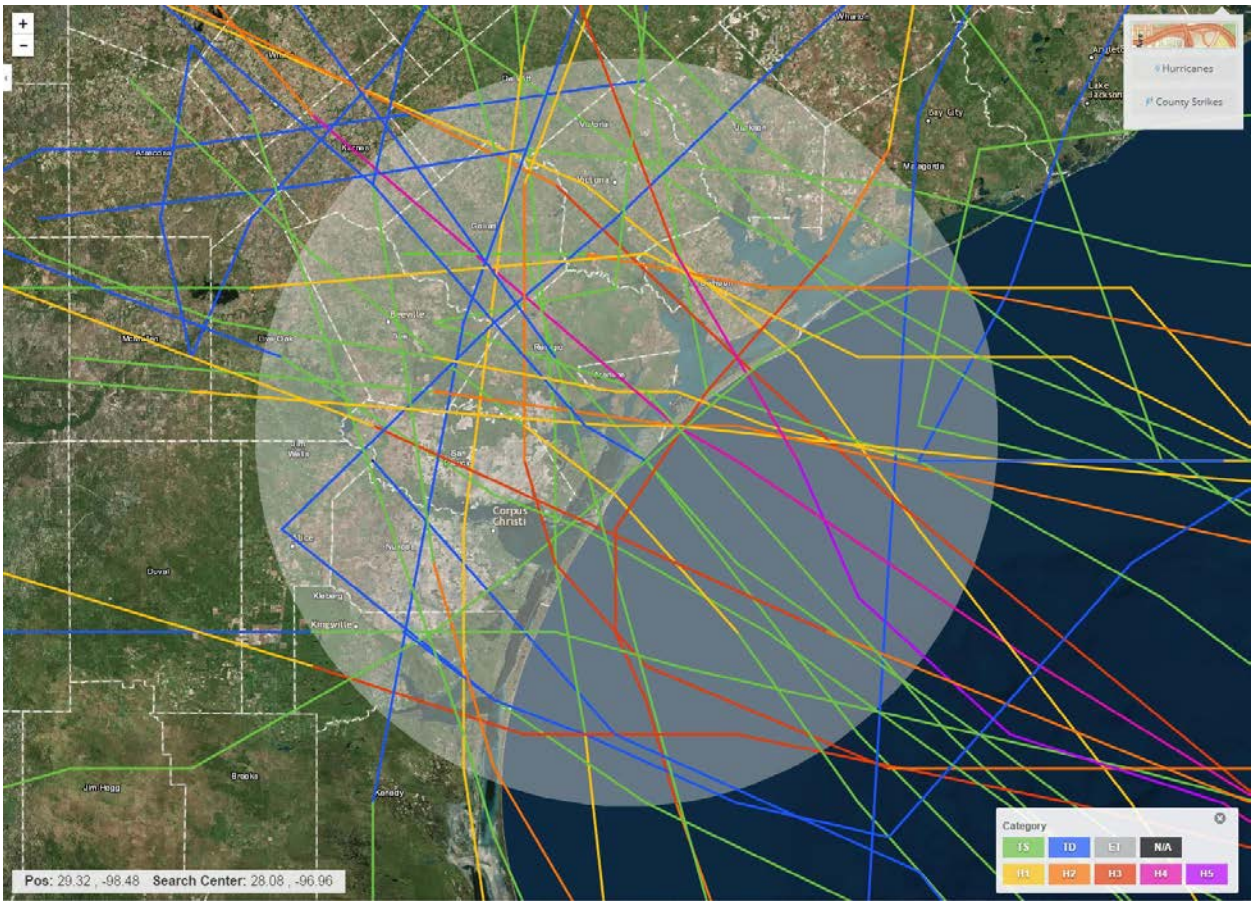


Figure 5.2: Historic Hurricane and Tropical Storm Paths, 1850-2016
(Source: NOAA, Historical Hurricane Tracks, 2016).

The following narratives about significant tropical storms and hurricanes that have impacted the Aransas County area were pulled directly from the FEMA Flood Insurance Study: Aransas County, Texas and Incorporated Areas (2016).

> *1919 Storm (September 2 – 15, 1919*
> Prior to Hurricane Carla (1961), the 1919 Storm was considered the largest known hurricane to strike the Texas Coast. Maximum sustained wind velocity recorded at the City of Corpus Christi was 80 miles per hour. Surge elevations of up to 16 feet were recorded as the storm surge swept across the barrier islands and through the passes, piling water upon the landward shores of Corpus Christi and Nueces Bays. Highest recorded surge elevations along the coast were approximately 11.1 feet. Surges of 6.6 feet or greater were experienced along almost the entire Texas Coast. The City of Port Aransas on the north end of Mustang Island was entirely destroyed. The Corpus Christi Beach, or North Beach as it was known, was swept clean of all but three badly battered buildings. The storm left 350 people dead, and the damages exceeded $20 million.

1942 Storm (August 21 – 31, 1942)
The eye of the storm moved across Matagorda Island on August 30 and passed over the City of Seadrift as it moved inland. The peak hurricane surges recorded on the open coast were 11.8 feet at the City of Freeport, 6.2 feet at the City of Galveston, 5.0 feet at the Town of High Island, 3.4 feet at the City of Port Aransas, and 5.5 feet at the Town of Sabine. Corpus Christi Bay had maximum tides of about 2 feet and a depressed tide of -1.4 feet as the winds shifted and blew gulfward across the bay. This big storm killed eight people, resulted in approximately $11.5 million in property damages, and caused an additional $15 million in crop damage (Reference 10).

1945 Storm (August 24 – 29, 1945)
The storm the eye passed just north of the Village of Port O'Connor, across Matagorda Bay, and struck the City of Palacios on the morning of August 27 as it moved inland towards the City of Bay City. The storm was unusual in the coastal path it maintained, thereby raking essentially the entire Texas Coast, and also because of its slow forward movement, traveling at less than 5 miles per hour. The area between the City of Port Aransas and the mouth of the Colorado River received the maximum force of the hurricane. The maximum storm surge varied considerably along the coast with about 3.2 feet at the City of Corpus Christi, 6.6 feet at the Town of Olivia, 7 feet at the City of Palacios, 3.7 feet at the City of Port Aransas, 3 feet recorded at the City of Port Isabel, 14.5 feet at the City of Port Lavaca, and 8 feet at the Village of Port O'Connor. Maximum wind velocities were estimated at 85 miles per hour at the City of Palacios, 100 to 125 miles per hour at the City of Port Aransas, 76 miles per hour at the City of Port Isabel, and 135 miles per hour at the Town of Olivia, the City of Port Lavaca, the Village of Port O'Connor, and the City of Seadrift. The storm caused extensive beach erosion throughout the affected area and severely eroded the western Matagorda Bay shores. Several miles of the shore receded 50 feet as a result of the storm. The storm killed three people, injured 25, and caused damages exceeding $20 million.

Hurricane Carla (September 11, 1961)
Carla moved inland over the Village of Port O'Connor northward through the Cities of Port Lavaca and Point Comfort. Maximum sustained wind velocities at the City of Port Lavaca were estimated at 115 miles per hour with gusts estimated at more than 170 miles per hour. High-water marks indicate surge heights reached elevations of up to 22 feet at the City of Port Lavaca, 7.5 feet at the City of Rockport, and 10.3 feet along the eastern Aransas County line near the Aransas County National Wildlife Refuge, as the storm swept across the barrier islands and piled water upon the landward shores of Matagorda Bay. Highest recorded surge elevations along the open coast were approximately 12.3 feet. This hurricane also spawned a rash of 26 tornadoes which took several lives in Texas and caused extensive damage. Although rainfall accompanying the hurricane was heavy in several local areas, the total volume of precipitation was not unusually high. Approximately 1,700,000 acres of Texas coastal land, including entire communities, were inundated, 32 people were killed, and damage from wind and surge was estimated at $408 million. Normal activities were disrupted for several weeks. Damages from hurricane flooding were estimated to be $78.7 million, and total damages were $149.3 million for the five county Matagorda Bay study area.

Hurricane Beulah (September 5 – 22, 1967)
Beulah moved inland just east of the City of Brownsville. Torrential rains fell on south Texas and northeastern Mexico. Storm rainfall amounts ranged from 10 to 20 inches over much of the area. The total rainfall exceeded 30 inches in some areas. The storm surge reached 20 feet along lower sections of Padre Island, 6.0 to 6.5 feet in the City of Rockport and the Town of Fulton. An amazing 115 tornadoes were spawned by the system, the most ever

known to be generated by a tropical system. Most of the tornadoes were confined to the entire coast of Texas. Although considerable damage resulted from strong wind and high tides, the majority of the destruction was due to torrential rains and resultant flooding. Some damage was also caused by hurricane connected tornadoes.

Hurricane Fern (September 9 – 13, 1971)
Fern slowly paralleled the Texas Coast while a hurricane and made landfall as a tropical storm on September 11. Large amounts of rain fell primarily along the Coastal Bend causing the worst flooding since Hurricane Beulah, especially near the City of Beeville which experienced 26 inches of rain. Amounts in excess of 15 inches deluged Bee, Refugio, and San Patricio counties. Hurricane Fern brought tides about 2 to 3 feet above normal to the area.

Hurricane Celia (July 30 – August 5, 1970)
When Celia was located about 30 miles east-southeast of the City of Corpus Christi, the storm had regained strength with highest winds estimated at 115 miles per hour. The storm continued to intensify as it moved inland across Mustang Island and into Corpus Christi Bay at a forward speed of 17 miles per hour. The anemometer at the weather station in the City of Aransas Pass was blown away after measuring wind gusts of 150 miles per hour. Subsequent peak gusts were estimated to have reached 180 miles per hour. Maximum gusts of 160 miles per hour were recorded at the City of Corpus Christi National Weather Service Office. The metropolitan area of the City of Corpus Christi; the Cities of Robstown, Port Aransas, and Aransas Pass; and the small towns along Corpus Christi Bay suffered the most damage. Although considerable damage resulted from storm surge, the majority of the destruction resulted from high winds. A surge of 9.2 feet was recorded on the Gulf Beach at the City of Port Aransas, and a surge of 11.4 feet was recorded on the south side of the City of Aransas Pass. At the City of Corpus Christi, the stillwater surge elevation ranged from 3.9 to 5.6 feet. Celia's flood waters rose to 4.3 feet at the Town of Lamar, 5.2 feet at the Town of Fulton, and 8.4 feet south of the City of Rockport. Hurricane surge waters eroded beaches and roads and stalled communications and utility systems over much of the coastal communities. Celia was among the costliest storm in the state's history, having caused an estimated total damage of $470 million. Wind damage accounted for $440 million of this total. There were 13 people killed and over 450 injured. More than 9,000 homes were destroyed, while 14,000 other homes were damaged. In addition, 250 businesses and 300 farm buildings were damaged or destroyed.

Hurricane Gilbert (September 16 – 17, 1988)
Even though Gilbert struck south of the border in northeast Mexico, gusty winds and 29 tornadoes were seen with the system in Texas. Gusts to 83 mph were measured near the City of Brownsville. Heavy rains fell along the Texas Coast causing flooding and damage to the area. South Padre Island was flooded by its storm surge. This hurricane had high-water marks at approximately 3.7 feet near the City of Port Aransas. Damages totaled $50 million and 3 people perished due to tornadoes.

Probability
NOAA has recorded 38 hurricanes and tropical storms within a 65-nautical mile radius of Aransas County during the 166-year period between 1850 and 2016. As such, the probability of a hurricane or tropical storm occurring in this area any given year is 23%.

Vulnerability and Impacts (Step 5.b)
The effects of a hurricane would greatly impact various sectors of the community in a catastrophic way. Depending on the intensity of the storm, storm surge flooding could envelope the entire county. Utility

infrastructure will be inundated as in times past. Both residential and commercial structures could be severely damaged or destroyed. Vulnerable populations such as elderly, handicapped or low-income people could have difficulty evacuating the community. Local harbors, beaches, and other popular water-sport destinations could be inundated with storm debris or damaged.

Summary of Hazard (Step 5.a)
Hurricanes are a principal hazard of concern to the area. Given a remarkably high annual probability of 23%, a particular hurricane and associated storm surge could be catastrophic. Many of the flood mitigation actions identified during this planning process, if implemented, could greatly reduce the risk of hurricane and storm surge impacts in the county.

Severe Winter Storms (Step 4.d)
Winter storms in South Texas are generally either associated with cold fronts moving through the area, or with hard freezes related with precipitation events during the winter months. In general, the number of annual freeze events in the region is decreasing, but winter storms can still have harmful effects. According to the NWS, freezing precipitation occurs every three to four years in nearby Corpus Christi, although only nine were termed "significant ice storms" since 1924 (NWS, Significant Corpus Christi Ice Storms, n.d.).

Historical Occurrences
For the time period between 1996 and 2015, the NWS Station in Corpus Christi has recorded seven winter-related hazard events. These events occurred in 1996, 1997, 2004, 2007, 2010, 2011, and 2014 (J. Metz, personal communication, March 24, 2017). Three of the most notable events are profiled below.

South Texas Snowfall (December 24-25, 2004)

> Christmas 2004 will be remembered for the historic snow event that blanketed a large portion of South Texas. Total snowfall accumulations of 4 inches or more occurred over many areas of South Texas during this period. Heavier amounts from 6 to 12 inches were quite common further inland stretching from Duval County northeastward into Victoria and Calhoun Counties. Officially, 4.4 inches of snow were reported at the Corpus Christi International Airport. This broke the previous 24-hour snowfall record of 4.3 inches set back on February 14, 1895. … This was the second white Christmas ever recorded in Corpus Christi. The other white Christmas occurred back in 1918 when 0.1 inch was reported. (NWS, South Texas White Christmas 2004, n.d.)

South Texas Ice Storm (February 3-4, 2011)

> South Texas experienced frigid temperatures and prolonged hard freezes between Tuesday morning February 1st and Saturday morning February 5th, 2011. A large dome of arctic air plunged southward across South Texas on Tuesday morning February 1st behind a strong cold front. Arctic high pressure continued to push further south across South Texas between Wednesday February 2nd and Friday February 4th. As a result, widespread record low temperatures occurred between February 2nd and 5th. Most areas averaged between the middle 20s to middle 30s during this entire period. The duration of freezing temperatures for this event was quite remarkable. … Ice accumulations … were significant across much of South Texas. … This amount of ice produced very dangerous driving conditions. As a result, state and local officials closed many of the main roads, highways and bridges across South Texas. Numerous accidents along with multiple injuries were reported…Corpus Christi Fire Department units responded to 75 incidents in a three hour period. (NWS, South Texas Ice Storm, n.d.)

South Texas Icing Event (January 23-44, 2014)

> During the afternoon on January 23rd, 2014, a strong Arctic cold front moved through South Texas. Temperatures ahead of the front were in the 60s and 70s. Temperatures dropped around 20 degrees in 3 hours and around 30 degrees in 6 hours after the front had passed. Maximum wind gusts behind the front across most of South Texas averaged between 35 and 40 mph. Bob Hall Pier recorded a peak wind gust of 49 mph … during the evening of the 23rd.Overrunning moisture along with an upper level disturbance aided in the development of precipitation behind the cold front. As temperatures plummeted into the 30s, a wintry mix of precipitation began to develop as early as 800 PM CST on the 23rd across the northern Brush Country. As the Arctic air mass became more entrenched across South Texas during the late evening and overnight hours, freezing rain and freezing drizzle sometimes mixed with sleet became the more dominant precipitation type across much of South Texas. The wintry precipitation ended around 900 AM CST on the 24th along the coast. Ice accumulations averaged from less than 1⁄10" to ~ 1⁄8" for most of South Texas except for portions along the Middle Texas Coast where no ice accumulation occurred since the temperatures within this area remained just above freezing. (NWS, South Texas Icing Event, n.d.)

Probability

Seven events have occurred in the last 20-year period (35% of the time); however, according to the historical record at Corpus Christi, winter events occur during 30% of winters (J. Metz, personal communication, March 24, 2017).

Vulnerability and Impacts (Step 5.b)

Winter storms tend to make driving more treacherous and can impact the response of emergency vehicles. The probability of utility and infrastructure failure increases during winter storms due to freezing rain accumulation on utility poles and power lines. Secondary effects from loss of power could include burst water pipes in homes. Public safety hazards also include the risk of electrocution from downed power lines. Elderly populations and small children are considered particularly vulnerable to the impacts of winter storms and extreme cold events.

Summary of Hazard (Step 5.a)

While rare, severe winter storms do have the ability to cripple areas of south Texas. This risk is increased by the unfamiliarity of residents with the events, and the lack of local capacity to respond and address hazardous road conditions.

Sea Level Rise (Step 4.d & 4.c)

Sea level rise is the result of relatively small and gradual change; however, it can have great impacts on the low-lying areas along our coastline. It becomes very important when looking at marsh migration and the changes in habitat types along shorelines, as small increases in water level can change the composition of coastal habitats. This process has implications for shoreline stability and can negatively impact properties located in low-lying areas. Small increases in sea level can exacerbate flood risk, as drainage becomes more difficult with higher average sea levels. As average temperatures become warmer, water expands—on a global scale this small change can have large-scale impacts. Given the topography and proximity of this area to the Gulf of Mexico, sea level rise should be taken into consideration in future planning efforts.

Historical Occurrences

For the purposes of this report, historical patterns and trends utilize data collected as mean sea level readings from the Rockport, Texas, tide gauge. NOAA maintains tide gauges at 37 different locations along the coast of Texas, but the Rockport gauge is the only one located on Live Oak Peninsula.

Figure 5.3 shows the monthly mean sea level trends for Rockport from 1900 to 2020. The graph shows an increase from -0.58 meters per year in 1900 to a projected 0.06 meters per year for 2020 (NOAA, Tides and Currents, n.d.). The monthly mean sea level with the average seasonal cycle removed is overlaid upon the linear trend lines. This trend line also models the upward increase of sea levels with more fluctuation. Most recent data shows that relative sea levels have reached above 0.15 meters with the highest fluctuations nearing 0.30 meters in 2010 (NOAA, Tides and Currents, n.d.).

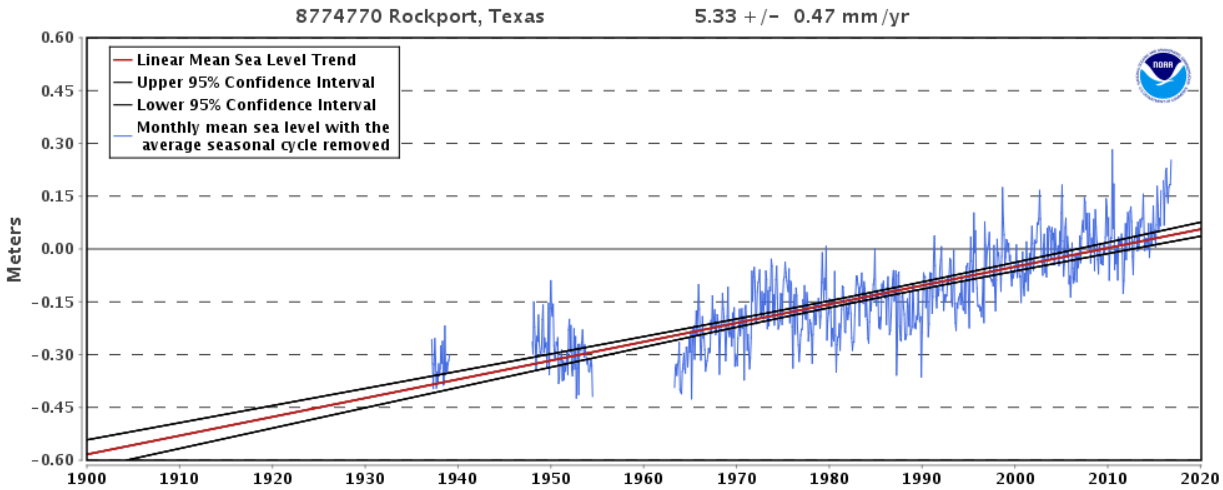


Figure 5.3: Mean Sea Level Trend for Rockport, Texas, 1900-2020 (NOAA, Tides and Currents, n.d.).

Probability

Unlike the other hazards profiled in this risk assessment, the probability for sea level rise is not measured by specific events but by the assessment of relative sea level at numerous locations. A steady increase in the relative sea level trend indicates a very high probability of occurrence.

Vulnerability and Impacts (Step 5.b)

Vulnerability and impacts will be similar to those of coastal flooding. Property owners along the coastline are highly susceptible to property loss due to rising sea levels. Populations that are low-income and living in the affected areas may have difficulty finding new residences and thus become displaced. The local economy, which is highly dependent on water-related tourism, would be impacted by receding shorelines. Infrastructure located in this area will most likely be inundated by new sea levels and thus require costly relocation.

Summary of Hazard (Step 5.a)

While studies suggest sea level rise will continue in the area at a slow, gradual rate, local officials and residents are already exploring the potential impacts this hazard could have in the community, and possible mitigation actions. Modeling suggests that should sea level rise between 1 and 3 feet in the planning area, there would be limited land inundation impacts. Secondary impacts of sea level rise, such as the impacts to the local fishing and shipping industries, as well as exacerbating hurricane storm surge risk, are important risk factors associated with this hazard.

Tornado (Step 4.d)

NOAA defines a tornado as "a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground" (NOAA, Severe Weather 101 – Tornado Basics, n.d.). Tornados are typically associated with a supercell thunderstorm. (High winds not associated with tornados—windstorms—are discussed later in this section.)

Historical Occurrences:
According to NOAA's NCEI 15 tornado or funnel cloud events were recorded from 1967 to 2015 (NOAA-NCEI, n.d.) (See Table 5.32). Most of these tornados were related to tropical disturbances from the Gulf of Mexico.

Table 5.32: Tornado/Funnel Cloud Events Affecting Aransas County, 1967-2015 (NOAA-NCEI, n.d.).

Event Date	Location	Cost of Property Damage	Cost of Crop Damage
9/20/1967	Aransas County	$250,000	$0
5/11/1968	Aransas County	$2,500	$0
4/15/1973	Aransas County	$0	$0
6/13/1973	Aransas County	$2,500	$0
9/11/1978	Aransas County	$0	$0
8/22/1999	Rockport	$0	$0
9/11/2007	Rockport	$0	$0
8/30/2009	Rockport	$10,000	$0
6/2/2010	Rockport	$250,000	$0
6/30/2010	Lamar	$0	$0
7/1/2010	Rockport	$5,000	$0
7/8/2010	Holiday Beach	$0	$0
5/10/2012	Near Holiday Beach	$2,000	$0

Two of these tornado incidents (September 20, 1967, and June 2, 2010) caused damages of $250,000 (NOAA-NCEI, n.d.). The event on September 20, 1967, also resulted in three injuries. The June 2, 2010, event was the result of a thunderstorm system that produced both tornadoes and hailstorms; one tornado was rated as an EF-2, and impacted southwest Rockport, damaging homes, vehicles, and trees (NOAA-NCEI, n.d.).

Probability:
Fifteen tornado or funnel cloud events occurred within a 48-year time span, indicating a 31% percent chance of a tornado in any given year. Therefore, there is a high probability that Aransas County will experience another tornado event in the next five years.

Vulnerability and Impacts (Step 5.b)
Any tornado rated an EF2, or greater is considered "significant" (Edwards, 2016). Based on information from the NOAA Storm Prediction Center, an EF2 tornado would tear roofs off well-constructed houses, foundations of frame homes would shift, mobile homes would be completely destroyed, large trees would snap or be uprooted, light objects would become missiles, and cars would be lifted off the ground. In addition, several factors impact the severity of damage done by a tornado (including: wind speed, time on the ground, length/width of the cell, population density, building density, age and construction of buildings, and time of day).

Summary of Hazard (Step 5.a)
While relatively rare events, tornados have occurred in Aransas County, and will likely occur in the future. The participating government entities in this plan all maintain warning sirens, which are tested and activated for tornado protection. Safe rooms and basements are virtually non-existent in the planning area. Given the wide range of impact potential, tornado damage can vary from minimal to catastrophic.

Wildfires (Step 4.d)
Wildfires, caused by both natural and anthropogenic sources, can have negative impacts on the natural environment, as well as property and infrastructure. Natural causes of fires are generally lightning strikes; however, the potential list for anthropogenic ignitions is quite long. Human-caused fires can be intentional or accidental, and include campfires, smoking, vehicle- or machine-based—including railroad sparks and chains dragged from moving vehicles—and the burning of debris or trash, to name a few. Prescribed burns, used in management of open lands and spaces, is an example of beneficial and intentional burning that can help control invasive species and maintain grassland ecosystem health.

Historical Occurrences:
According to the Texas A&M Forest Service, Wildfire Risk Assessment Portal (2017), 272 wildfires were ignited in Aransas County from 2005 to 2015, see Figure 5.4. These fires burned a total 6,229 acres. 2011 had the largest number of fires (89 ignitions), followed by 2014 (58 ignitions); however, 2009 had the largest amount of land burned (5,017 acres). After 2009, 2008 had the most land burned (326 acres) (Texas A&M Forest Service, 2017).

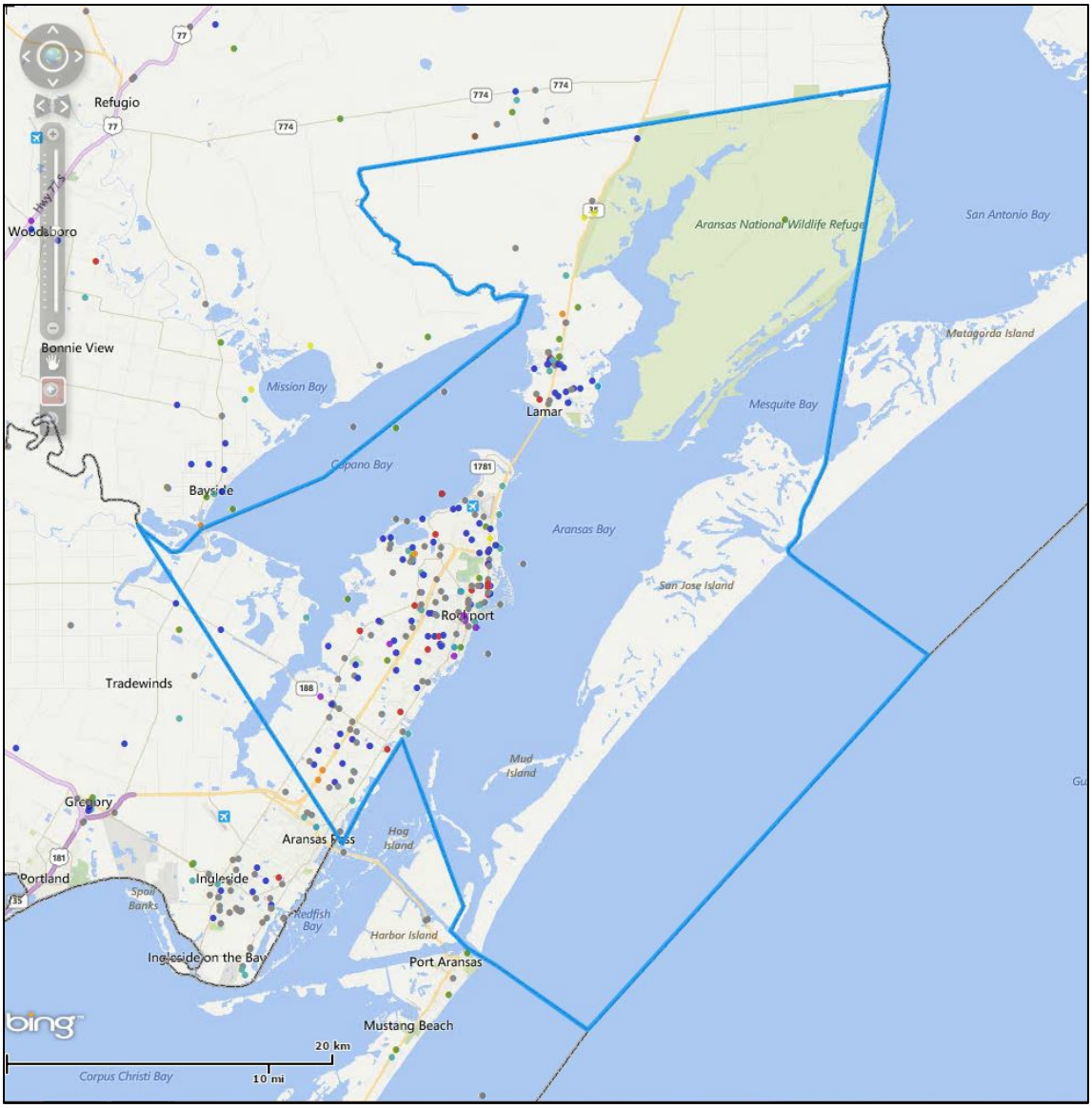


Figure 5.4: Aransas County Wildfires, 2005-2015 (Texas A&M Forest Service, 2017).

The area burned in 2009 included a fire on April 5, 2009, which caused $200,000 in property damage in the county. According to reports, "one commercial building, one unoccupied mobile home, one barn, one garage, five goose neck trailers, and seven vehicles were destroyed" (Texas A&M Forest Service, 2016).

Probability
Over an 11-year timeframe, 272 wildfires were ignited (2005 to 2015); therefore, it is likely that a wildfire event will occur in any given year, with a recurrence interval of 24.7 events per year.

Vulnerability and Impacts (Step 5.b)
Areas that are most vulnerable to wildfire are agricultural areas where land is burned, rural areas where trash and debris are burned, and the wildland urban interface areas. The wildland urban interface is defined by the Texas A&M Forest Service (2017) as "the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels." The Texas A&M Forest Service further estimates that 63% of the population of Aransas County lives within the wildland urban interface.

Summary of Hazard (Step 5.a)
Wildfire poses the largest threat to the unincorporated communities in the county. Planning and development regulations can and should be utilized to reduce the potential impact of this hazard.

Windstorms (Step 4.d)
Along the Texas coast, winds are common and have seasonal patterns due to prevailing wind directions. Wind is caused by a simple pressure difference, and moves from high to low pressure. The speeds of these winds are dictated by the magnitude of those pressure differences. The effects from the heating and cooling of land versus water has an impact on our seasonal wind patterns, as the land heating more rapidly than water during a warm summer day brings south winds from the Gulf of Mexico. Windstorms however, are characterized by high winds that have the potential for extensive damage, and are generally associated with thunderstorm activity. Storm cells that develop along fronts or during other weather events favorable for storm formation can be sources of these windstorms that can damage property, uproot large trees, or impact powerlines.

Historical Occurrences
Table 5.33 identifies 30 thunderstorm wind events on record for Aransas County between 1956 and 2015 (NOAA-NCEI, n.d.). The costliest wind event occurred on January 9, 2011, when a severe storm system resulted in wind damage throughout south Texas. At least three homes were damaged in Rockport during this event, and several trees were uprooted (NOAA-NCEI, n.d.).

Probability:
Thirty thunderstorm wind events occurred within a 59-year time span, indicating a 51% percent chance of a future occurrence in any given year.

Vulnerability and Impacts (Step 5.b)
Windstorms are primarily a public safety and economic concern. Windstorms can cause damage to structures and power lines, which in turn create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles, and can harm people that are not adequately sheltered.

Campers, construction trailers, mobile homes, barns, and sheds—and their occupants—are particularly vulnerable. Additionally, older homes which have not been maintained may be more susceptible to damage during windstorms.

Table 5.33: Thunderstorm Wind Events affecting Aransas County, 1956-2015 (NOAA-NCEI, n.d.).

Event Date	Location	Cost of Property Damage	Cost of Crop Damage
8/20/1956	Not Specified	$0	$0
5/10/1968	Not Specified	$0	$0
5/13/1980	Not Specified	$0	$0
10/31/1981	Not Specified	$0	$0
3/23/1983	Not Specified	$0	$0
5/20/1985	Not Specified	$0	$0
5/20/1985	Not Specified	$0	$0
5/17/1986	Not Specified	$0	$0
8/21/1986	Not Specified	$0	$0
8/21/1986	Not Specified	$0	$0
6/29/1991	Rockport	$0	$0
1/31/1998	Rockport	$0	$0
10/6/1998	Rockport	$0	$0
5/18/1999	Rockport	$0	$0
5/18/1999	Lamar	$0	$0
3/14/2000	Rockport	$0	$0
9/19/2002	Central Portion	$0	$0
10/28/2002	Rockport	$0	$0
6/13/2003	Rockport	$0	$0
5/8/2005	Rockport	$0	$0
3/13/2007	Rockport	$10,000	$0
10/25/2009	Rockport	$20,000	$0
6/21/2010	Rockport	$20,000	$0
1/9/2011	Rockport	$400,000	$0
5/10/2012	Fulton	$100,000	$0
5/10/2012	Holiday Beach	$250,000	$0
12/4/2012	Aransas National Wildlife Refuge	$0	$0
4/17/2015	Rockport	$100,000	$0
5/24/2015	Rockport	$5,000	$0

Summary of Hazard (Step 5.a)
Severe wind events pose a risk to property damage, both directly and as a result of flying debris, in the planning area. Tree maintenance ordinances, and programs such as Tree City USA, can provide assistance in mitigating the impacts of high winds in the planning area. Rockport is the only jurisdiction currently participating in Tree City USA (Arbor Day Foundation, 2016).

CHAPTER 6: GOALS AND REVIEW OF POSSIBLE ACTIVITIES (STEPS 6 & 7)

PURPOSE

In 2016, the jurisdictions committed to the development of this plan to serve two purposes:

1. To minimize flood risk in their communities; and
2. To enable residents to receive the greatest reductions possible on flood insurance premiums through the National Flood Insurance Program's Community Rating System. (The City of Rockport and Aransas County are currently in the process of entering the Community Rating System. The City of Aransas Pass and the Town of Fulton have expressed interest in joining in the future.)

GOALS

The development of goals provides direction and context of how these communities will go about minimizing flood risk. The following goals and objectives were developed through research on possible activities, which resulted in a list of more than 50 possible actions that could be implemented to reduce flood risk. Those actions were then grouped into four categories, which lead to the creation of the four goals. Extensive outreach, including a public workshop, multiple meetings with staff, the Multi-Jurisdictional Executive Planning Committee, and various Sub-Committees, and specific feedback from more than 30 individuals provided vital information about each possible action, and how it might be utilized to achieve each goal (see Volume II, Chapter 4, for the public workshop notes, and Volume II, Chapter 8, for a complete summary of all the information compiled regarding possible Floodplain Management Plan (FMP) actions). This information provided direction that enabled the staff and the Multi-Jurisdictional Executive Planning Committee to identify the objectives that were achievable, and could create the largest possible impact on flood risk in the next 5 years. Each of these possible actions are summarized in the next section.

Goals are overriding statements of what the jurisdictions plan to do in the future. Objectives are specific targets that will contribute to the attainment of each goal. The Action Plan, presented in the next chapter, will provide details/specific information regarding how the objectives will be met.

The following goals and objectives were approved by the Multi-Jurisdictional Executive Planning Committee and set the context for the Action Plan, as well as for the future review and revisions of this plan.

Goal 1: Protect existing resources through regulatory standards.
- Objective 1.1: Investigate the adoption of any further floodplain regulations that would strengthen floodplain management in each of the entities.
- Objective 1.2: Research "low impact development."
- Objective 1.3: Utilize the Community Rating System (CRS) to incentivize higher floodplain management standards.

Goal 2: Protect property through mitigative measures.
- Objective 2.1: Develop a prioritized list of natural areas and repetitive loss properties that would be best suited for purchase, in order to create and preserve natural areas to mitigate future flooding.

Goal 3: Create a coordinated flood preparedness and response strategy.
- Objective 3.1: Create a comprehensive Public Information Plan.
- Objective 3.2: Assess the needs for floodproofing of critical facilities located in the Special Flood Hazard Areas (SFHA).

Goal 4: Create a coordinated infrastructure plan for all jurisdictions.
- Objective 4.1: Create a county-wide, prioritized, master plan of all flood related projects.

POSSIBLE ACTIVITIES

The CRS coordinator's manual identifies six categories of floodplain management activities. Table 6.1 identifies these categories and the goal under which they are included.

Table 6.1: CRS Categories and Associated Goals.

CRS Categories	Goal
Preventative	1
Property Protection	2
Natural Resource Protection	2
Emergency Services	3
Structural Projects	4
Public Information	3

The remainder of this section summarizes the information collected regarding the identified possible actions. For a complete summary, please see Volume II, Chapter 4, for the public workshop notes from the January 19, 2017, goal-setting workshop, and Volume II, Chapter 8, for the Summary of Information Complied Regarding Possible FMP Actions document.

Goal 1: Protect existing resources through regulatory standards.

Preventative Activities

When it comes to preventative activities, the county and the associated municipalities have made significant improvements over the past several years. Each jurisdiction participates, and has committed to continue participation, in the National Flood Insurance Program. An important component of this is the recent update to the Flood Insurance Rate Maps for the area. The City of Rockport and the City of Aransas Pass each have comprehensive plans that have not been updated in over twenty years. The Aransas County Stormwater Management Advisory Committee—which serves as the basis for the Multi-Jurisdictional Executive Planning Committee for this plan—has existed for nine years, and provides significant intergovernmental communication between the jurisdictions and different governmental departments. This committee has overseen the analysis of drainage in 26 watersheds that impact the county. The committee has identified the need to integrate all of the data they have collected into one county-wide, prioritized, master plan of needed flood-related projects. This group has also initiated efforts for the county to enter into the National Flood Insurance Program's Community Rating System. The City of Rockport is already in the process of joining the Community Rating System. The City of Aransas Pass and Town of Fulton are interested in joining the Community Rating System in the future. One challenge that the county faces in addressing flood risk is the inability to implement higher building standards and zoning regulations within its jurisdiction. Zoning, as defined by *A Guide to Urban Planning in Texas Communities*, consists of regulations that govern the use of land, and the location, size, and height of buildings. It divides a jurisdiction into multiple districts, with each district containing a distinct set of regulations that are uniformly applied to all property within the district (American Planning Association Texas Chapter, 2013). In Texas, municipalities are given zoning authority to regulate land uses within its jurisdictions. However, counties do not have that same authority. The Texas Local Government Code, Title 7, only allows county zoning authority in specific recreation areas specifically outlined in Subtitle B. The county does have the authority to regulate subdivision platting, housing, businesses and occupations, explosives and weapons, alarm systems and other miscellaneous areas. Municipalities in Texas have the authority to regulate zoning, subdivisions, comprehensive plans, housing, businesses, signs, nuisances, and other miscellaneous items (as per Subtitle A of Title 7).

Goal 2: Protect property through mitigative measures.

Property Protection

One of the most effective ways to address properties that are prone to flooding is to buy the property from the residents and convert them into natural areas that can accommodate flooding, thereby removing any buildings or facilities that could be impacted by a flood event. There have not been any such buyouts in Aransas County; however, the potential value of this type of activity is understood. As such, further investigation into repetitive loss properties, and possible funding options will be investigated. Additional actions can be taken by individual property owners, including elevating their buildings and retrofitting their property to higher standards; however, the county cannot require property owners to take any of these actions.

Natural Resource Protection

The long-term preservation of natural lands to safeguard the beneficial flood defense functions they provide is an important and vital way of protecting against flood risks. However, this option must be weighed against the cultural and economic needs of a community. People are drawn to Aransas County because of the coastal character of the area. People come to Aransas County because they want to be on and near the water. This has resulted in the development of many natural areas along the coast. However, the citizens and visitors value nature, and the community has succeeded in preserving large swaths of natural habitat where individuals can walk, paddle, and passively enjoy the environment. Local land trusts, such as Aransas First, have been essential in the protection of critical natural areas. In 2010, Aransas County approved a venue tax to fund Aransas Pathways, a project devoted to preserving areas of natural and historic value in the community. This project has led to the creation of several birding spots, kayak launches, and hike/bike trails throughout the county. Efforts like these are important to the community, and attempts will be made to identify other critical areas that should be protected, and to locate funding opportunities to support those actions.

Goal 3: Create a coordinated flood preparedness and response strategy.

Emergency Services

Many of the potential activities included in this category are also identified in the existing Aransas County Emergency Management Plan. This plan (available by contacting the county) is updated every five years. As a part of this plan, the county has an established Emergency Operations Center, and a secondary, more secure location is also identified. The county has a contract with Gardner Environmental; that specifies that upon activation, Gardner would pre-stage the needed post disaster supplies in areas close to, but outside the perimeters of the potential area of impact. This then allows those supplies to be delivered as soon as possible after an event. This includes all the necessary emergency response supplies (including, but not limited to: generators, fuel, chainsaws, ATV's trucks, water tanks, etc.) needed for the continuity of critical community services. If local resources prove to be inadequate, assistance will be requested from the Mutual Aid Coordinator, who can identify if any regional resources are available for support. If regional resources are inadequate, assistance will be requested from the State via the Disaster District Committee Chairperson in Corpus Christi. Due to the location and elevation of the county, there is no sheltering in Aransas County; all residents must leave the area. As such, when the National Weather Service warns of impending storms, the Emergency Management Plan specifies how citizens and vulnerable populations are to be notified and assisted in evacuation.

Public Information

The Aransas County Emergency Management Plan includes how citizens will be notified and assisted, before, during, and after emergencies—this includes evacuation. One area identified for improvement is the overall provision of information about natural hazards and risks to the public. The development of a Public Information Plan that integrates general public awareness and education about hazards and risks with the existing process for notifying citizens about specific emergencies has been identified as a priority action in this plan (see Chapter 7).

Goal 4: Create a coordinated infrastructure plan for all jurisdictions.

Structural Projects

Structural projects are often built as a way to keep water out of, or away from, particular areas. This is often done via the construction of fortified levees or dams, by diverting or channelizing water, or through the development or building of structures like bridges. Most of these types of projects are designed and built by engineers, and are often maintained by public works departments. Aransas County does not have any dams or levees, and there are no rivers or streams in the county. However, there are eight bridges in the county, and three of those will need to be replaced in approximately 10 to 12 years. (Aransas Pass has one additional bridge that is not located within Aransas County, the Dale Miller Bridge.) In an effort to direct water flow, the county and the included municipalities use drainage canals and ditches to move water away from homes and developed areas, towards the local bays. Most of these drainage ways, and other flood related structural projects, have been engineered not only to move water in times of flooding, but to also facilitate as much infiltration as possible when flooding is not a concern. It is recommended that as the communities work to develop a county-wide, prioritized, master plan of needed flood-related projects, they also include a section for a drainage maintenance plan, which would document all the annual maintenance needs for the drainage ways and other flood-related structural projects, and prioritize future infrastructural improvements.

CHAPTER 7: DRAFT ACTION PLAN (STEP 8)

The Multi-Jurisdictional Executive Planning Committee recommends the following activities to maximize the reduction in flood risks in the next five years. These activities have been identified due to their ability to provide vital information about how the county and the associated municipalities can best expend staff time and finite resources in order to provide the largest decrease in risk to county residents.

Most of these projects require the collection of additional information that will be vital in directing future floodplain management actions. The collection and analysis of this information will allow the community leaders to make more informed, long-term decisions on how to best direct the use of funds and resources in the future, and identify possible funding opportunities.

The actions are proposed given current staffing levels and workloads, while also considering the operating budgets and the funds that can be leveraged by each entity. In some actions, grants have previously been awarded to complete the work. Assuming consistent local representation and funding, and no major disasters, the following actions should be able to be achieved within the next five years—or prior to the next full update of this plan.

Proposed actions are also prioritized given the amount of financial and labor resources available to complete the project. High priority is given to actions that already have a funding source, staff capability to complete, and community support. Medium priority is given to actions that have staff capability to complete and community support, but are subject to annual operating fund or grant availability. Low priority is given to actions that have community support, but are subject to staff and fund availability. A summary of the Draft Action Plan can be seen in the Actions Table at the end of this document (pg. 112)

GOAL 1: PROTECT EXISTING RESOURCES THROUGH REGULATORY STANDARDS

Objective 1.1: Investigate the adoption of any further floodplain regulations that would strengthen floodplain management in each of the plan jurisdictions. Aransas County and the participating municipalities already have standards that exceed National Flood Insurance Program (NFIP) standards. Maintaining the regulatory and long-term planning tools at the jurisdictions' disposal, and strengthening these tools where appropriate, will help keep flood insurance premiums as low as possible and residents safe.

Action 1.1.a: Evaluate current floodplain management regulations in other coastal towns, cities, and counties in order to identify potential areas of improvement for Aransas County jurisdictions.

Timeframe: Years 1-2
Deliverable: Summary report that identifies floodplain standards used in other locations (as deemed appropriate), and assesses the potential opportunities for improvement in Aransas County (and associated municipalities) over time.
Office(s) of Primary Responsibility: Aransas County, Floodplain Administrator; City of Rockport, Community Planner; City of Aransas Pass, Floodplain Manager and Director of Public Works; and Town of Fulton, Supervisor of Sewer and Streets
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Preventive

Action 1.1.b: Using the information collected in Action 1.1.a, create a plan for how, and when, to integrate potential improvements into existing county and municipality regulations.

Timeframe: Years 3-5
Deliverable: A recommended plan of action for the county and each municipality that identifies potential improvements that can be made to local regulations to strengthen floodplain management in the area. This plan will provide the best possible assessment for when and how these improvements might be made.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass Floodplain Manager and Director of Public Works; and Town of Fulton Supervisor of Sewer and Streets
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Preventive

Action 1.1.c: Create a coordinated development flow-chart for Aransas County, the Town of Fulton, and the City of Rockport floodplain managers. This document will provide information about who to contact for questions regarding development within the Fulton and Rockport extraterritorial jurisdictions (ETJ).

Timeframe: Year 1
Deliverable: A flowchart that clearly identifies the appropriate positions—within the town, city, and county—to contact for information about development questions.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; and Town of Fulton Supervisor of Building Codes and Facilities
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Preventive; with possible application in Property Protection, Structural Projects, and Public Information

Action 1.1.d: Incorporate higher floodplain management standards into City of Aransas Pass comprehensive plan update.

Timeframe: Years 2-3
Deliverable: A completed comprehensive plan update for Aransas Pass, which incorporates higher floodplain management standards.
Office(s) of Primary Responsibility: City of Aransas Pass City Planner; and Aransas Pass Comprehensive Plan consultant (GrantWorks)
Budget: Staff time (operating funds); Texas Department of Agriculture Community Development Block Grant funds ($55,000 has been awarded and the city will provide $21,745 in matching funds, for a total of $76,754)
Priority: High
CRS Categories Addressed: Preventive; with possible application in Property Protection, Structural Projects, and Public Information

Action 1.1.e: Incorporate higher floodplain management standards into City of Rockport comprehensive plan update.

Timeframe: Years 2-3
Deliverable: A completed comprehensive plan update for Rockport, which incorporates higher floodplain management standards.
Office(s) of Primary Responsibility: City of Rockport Public Works Director; Plan consultant (not yet identified)
Budget: Staff time (operating funds); potential grant funding
Priority: High
CRS Categories Addressed: Preventive; with possible application in Property Protection, Structural Projects, and Public Information

Action 1.1.f: Incorporate higher floodplain management standards into Aransas County Hazard Mitigation Action Plan update.

Timeframe: Years 2-3
Deliverable: A completed Hazard Mitigation Action Plan update for the county, which incorporates higher floodplain management standards.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Public Works Director; Town of Fulton Supervisor of Sewer and Streets and Supervisor of Building Codes and Facilities; City of Aransas Pass Emergency Management Coordinator and City Planner; and Plan consultant (Lockwood, Andrews & Newnam, Inc.)
Budget: FEMA Flood Mitigation Assistance Funds (grant pending FEMA release of funds)
Priority: High
CRS Categories Addressed: Preventive; with possible application in Property Protection, Structural Projects, and Public Information

Objective 1.2: Research low impact development. Collect information about low impact development, including how it has been used, implemented, promoted, and regulated, so that the community can analyze this style of development as a possible educational or development tool in the future.

Action 1.2.a: Collect best practices methods on low impact development from towns, cities, and counties of similar characteristics.

Timeframe: Years 3-5
Deliverable: A summary document that explains low impact development; gives details and options about how it has been used, implemented, promoted, and regulated; and provides specific, comparable examples where each of these things has been done well.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass City Planner and Building Official; and Town of Fulton Mayor
Budget: Staff time (operating funds)
Priority: Low
CRS Categories Addressed: Preventive; with possible application in Property Protection, Natural Resource Protection, Structural Projects, and Public Information

Action 1.2.b: Partner with Mission-Aransas National Estuarine Research Reserve to host a low impact development workshop. This workshop will be based on the data compiled in action 1.2.a, and will be designed to educate decision-makers and citizens about low impact development and possible options regarding how it could be used in Aransas County.

Timeframe: Years 2-3
Deliverable: In coordination with Mission-Aransas National Estuarine Research Reserve, prepare for and host at least one workshop to educate local decision-makers and concerned citizens about low impact development, and possible options regarding how it could be utilized in Aransas County.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Environmental Specialist; City of Aransas Pass City Planner; and Town of Fulton Mayor; Mission-Aransas National Estuarine Research Reserve Coastal Training Coordinator
Budget: Staff time (operating funds)
Priority: Low
CRS Categories Addressed: Preventive and Public Information; with possible application in Property Protection and Structural Projects

Objective 1.3: Utilize the Community Rating System (CRS) to incentivize higher floodplain management standards. FEMA's CRS allows participating communities to earn a class rating by implementing standards higher that those outlined by the NFIP, which then leads to discounted flood insurance premiums for residents.

Action 1.3.a: Complete process of entry into CRS for the City of Rockport.

Timeframe: Year 1
Deliverable: Final notification from Insurance Services Organization (ISO)/FEMA regarding entry into the CRS, and determination of Rockport's CRS Classification.
Office(s) of Primary Responsibility: City of Rockport Mayor
Budget: $60,000 (funds committed)
Priority: High
CRS Categories Addressed: Preventive; with possible application in Property Protection and Public Information

Action 1.3.b: Complete process of entry into CRS for Aransas County.

Timeframe: Years 1-2
Deliverable: Final notification from ISO/FEMA regarding entry into the CRS, and determination of Aransas County's CRS Classification.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator
Budget: $45,000 from Gulf of Mexico Alliance grant
Priority: High
CRS Categories Addressed: Preventive; with possible application in Property Protection and Public Information

Action 1.3.c: Investigate whether CRS is viable for the City of Aransas Pass and the Town of Fulton.

Timeframe: Years 2-4
Deliverable: Letters of intent from Aransas Pass and Fulton that detail if and when each municipality intends to initiate the process of joining the CRS.
Office(s) of Primary Responsibility: City of Aransas Pass City Planner and City Manager; and Town of Fulton Mayor
Budget: Staff time (operating funds)
Priority: Low
CRS Categories Addressed: Preventive; with possible application in Property Protection, Structural Projects, and Public Information

GOAL 2: PROTECTING PROPERTY THROUGH MITIGATIVE MEASURES

Objective 2.1: Develop a prioritized list of natural areas and repetitive loss properties that would be best suited for purchase, in order to create and preserve natural areas to mitigate future flooding. This initiative would also require an investigation of potential funding opportunities to support the purchase of private lands for restoration and protection.

Action 2.1.a: Evaluate list of repetitive loss properties for opportunities to partner with property owners regarding potential mitigation actions.

Timeframe: Years 1-2
Deliverable: A summary document that identifies and prioritizes the repetitive loss properties within the county for possible buyout or other mitigation actions.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Public Works Director; City of Aransas Pass Floodplain Manager
Budget: Staff time (operating funds)

Priority: Medium
CRS Categories Addressed: Property Protection and Natural Resource Protection

Action 2.1.b: Evaluate areas in the floodplain viable for open space preservation.

Timeframe: Years 3-5
Deliverable: A summary document that identifies and prioritizes the undeveloped areas in the county for possible preservation or other mitigation actions.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass City Planner; and Town of Fulton Mayor
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Property Protection and Natural Resource Protection

Action 2.1.c: Investigate grant opportunities for property buyouts, open space preservation, or other flood mitigation measures. Using the information gained in actions 2.1.a and 2.1.b, investigate possible funding opportunities to pursue the highest priority projects.

Timeframe: Years 3-5
Deliverable: A summary document that summarizes grant opportunities to support the purchase of repetitive loss properties and undeveloped land in order to provide restoration, preservation, and possibly other mitigative actions.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass City Planner and Floodplain Manager; and Town of Fulton Mayor
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Property Protection and Natural Resource Protection

Action 2.1.d: Investigate potential partnerships with local non-profit organizations to purchase high-priority areas for public parkland/open space preservation (organizations include, but are not limited to: Aransas Pathways, Aransas First, Coastal Bend Bays & Estuaries, and The Nature Conservancy). Using the information gained in action 2.1.b, network with local non-profit organizations to investigate possible partnerships to facilitate the purchase of undeveloped land for preservation.

Timeframe: Years 3-5
Deliverable: A summary document that records the attempts to network with local non-profit organizations. This document will also provide a plan for future work that will guide future efforts to purchase and preserve the agreed upon undeveloped areas.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner and Parks and Leisure Director; City of Aransas Pass City Planner; Town of Fulton Mayor
Budget: Staff time (operating funds)
Priority: Low
CRS Categories Addressed: Property Protection and Natural Resource Protection

GOAL 3: CREATE A COORDINATED FLOOD PREPAREDNESS AND RESPONSE STRATEGY
Objective 3.1: Create a comprehensive Public Information Plan. This process will involve developing a public flood awareness and education campaign, creating a flood response plan for local building departments, communicating flood risk to susceptible areas, and promoting the State of Texas Emergency Assistance Registry to vulnerable populations. (The City of Rockport received a $45,000 "Small Communities Grant" from the Gulf of Mexico Alliance (GOMA) to produce a multi-jurisdictional Public Information Plan by August 2018.)

Action 3.1.a: Attend public events to promote and sign up vulnerable populations to the State of Texas Emergency Assistance Registry.

Timeframe: Years 1-5 (throughout entire plan timeframe)
Deliverable: A summary spreadsheet that identifies the events attended and tallies the number of people registered per event, quarterly, and annually.
Office(s) of Primary Responsibility: Aransas County Emergency Management Coordinator; City of Rockport Mayor and City Manager; City of Aransas Pass City Planner; Town of Fulton Chief of Police
Budget: Staff time (operating funds) and $5,000 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.b: Develop a joint floodplain management and awareness website with all jurisdictions.

Timeframe: Years 1-2
Deliverable: A final, live website that provides educational information about floodplain management and awareness to local residents, businesses, and visitors.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass Floodplain Manager; Town of Fulton Chief of Police and Supervisor of Building Codes and Facilities; Website consultant (not yet selected)
Budget: Staff time (operating funds) and $8,000 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.c: Publish informational flood articles in city and county newsletters.

Timeframe: Years 1-5 (throughout plan timeframe)
Deliverable: Copies of all articles published, along with a summary document that identifies the articles published, location of publication, and dates.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Relations; City of Aransas Pass Floodplain Manager and City Planner; Town of Fulton Town Secretary
Budget: Staff time (operating funds) and $2,500 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.d: Partner with local media outlets to publish and distribute flood literature. This will most likely take the form of brochures, flyers, etc.

Timeframe: Years 1-2 (Products will be completed in years 1-2, then distributed throughout the plan timeframe)
Deliverable: Copies of all materials created, along with a summary document that identifies each item and the locations where it was distributed.
Office(s) of Primary Responsibility: Aransas County Emergency Management Coordinator; City of Rockport Community Relations and Community Planner; City of Aransas Pass City Planner and Emergency Management Coordinator; Town of Fulton Town Secretary; local media outlets (e.g. the Rockport Pilot, the Wonderful Women's Network, etc.)
Budget: Staff time (operating funds) and $2,500 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.e: Develop and install educational signage regarding flood safety to be located along low areas of roadways likely to flood.

Timeframe: Years 1-2
Deliverable: A summary document that provides image(s) of the signs and identifies each location where the signs were installed.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Public Works Director; City of Aransas Pass Public Works Director; Town of Fulton Supervisor of Sewer and Streets
Budget: Staff time (operating funds) and $7,000 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.f: Create a flood response plan that develops public information projects to be disseminated before, during, and after a flood event.

Timeframe: Years 1-2
Deliverable: A flood response plan identifying outreach projects that can be utilized to give the public information on flood protection, rebuilding after a flood event, grant information, etc.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass Building Official and Floodplain Manager; Town of Fulton Supervisor of Building Codes and Facilities
Budget: Staff time (operating funds)
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.g: Host workshops with property owners concerned about flooding to discuss flood risk and possible mitigation actions.

Timeframe: Years 1-2
Deliverable: Summary report that describes a minimum of two public workshops designed for local property owners to learn about and discuss flood risk and possible mitigation actions that they can take to minimize the risks to their property. This document will include, at a minimum, information about the location of the meeting, the number of attendees, the agenda, a copy of any PowerPoint presentations made, and any key results or outcomes.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport City Manager and Community Planner; City of Aransas Pass City Planner; Town of Fulton Supervisor of Sewer and Streets
Budget: Staff time (operating funds) and $5,000 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information

Action 3.1.h: Send informational mailers to repetitive loss property owners about buyouts and other mitigation options.

Timeframe: Years 1-2
Deliverable: A copy of the information sent, and a summary of any responses received.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass City Planner
Budget: Staff time (operating funds) and $5,000 of the GOMA award
Priority: High
CRS Categories Addressed: Public Information, Property Protection, and Natural Resource Protection

Objective 3.2: Assess the needs for floodproofing of critical facilities located in the SFHA. This would include a detailed assessment of needs, options, and funding opportunities available to support any identified needed improvements.

Action 3.2.a: Determine whether any lift stations and pump stations need generators.

Timeframe: Year 1
Deliverable: A summary document that identifies the lift and pump stations within the county, identifies the number, condition, location, and possible range of transport of existing generators, and details any additional needs for generators.
Office(s) of Primary Responsibility: City of Rockport Public Works Director and Utilities Director; City of Aransas Pass Public Works Director; Town of Fulton Supervisor of Sewer and Streets and Supervisor of Building Codes and Facilities
Budget: Staff time (operating funds)
Priority: Low
CRS Categories Addressed: Emergency Services

Action 3.2.b: Establish best management practices for floodproofing and mitigating historic buildings in Aransas County.

Timeframe: Years 3-5
Deliverable: A final report that documents recommendations for the best management practices for floodproofing and mitigating historic buildings in Aransas County, and for how those recommendations should be formalized within the municipalities.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Community Planner; City of Aransas Pass City Planner; Town of Fulton Mayor; and the Aransas County Historical Commission
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Property Protection

GOAL 4: CREATE A COORDINATED INFRASTRUCTURE PLAN FOR ALL JURISDICTIONS
Objective 4.1: Create a county-wide, prioritized, master plan of all flood related projects. This master plan will include a list of all projects currently underway, and all needed projects. In addition, the plan would include a section on maintenance that will document and prioritize all ongoing and expected maintenance needs for the existing drainage improvements.

Action 4.1.a: Work across jurisdictions to coordinate drainage/stormwater projects that impact the same watershed or sub-watersheds while working to create a county-wide, prioritized, master plan of all flood related projects.

Timeframe: Years 1-5 (throughout plan timeframe)
Deliverable: A flood management master plan for Aransas County that identifies, prioritizes, and coordinates all flood related projects among the participating jurisdictions, and is adopted by the Aransas County Stormwater Management Advisory Committee.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Mayor; City of Aransas Pass Public Works Director; Town of Fulton Mayor
Budget: Operating and capital improvement funds
Priority: Medium
CRS Categories Addressed: Preventive and Structural Projects

Action 4.1.b: Each jurisdiction will continue ongoing maintenance of drainage pipes, culverts, and swales until the county-wide master plan is approved and implementation can begin.

Timeframe: Years 1-5 (throughout plan timeframe)
Deliverable: Annual report that summarizes the maintenance activities over the previous year for each jurisdiction.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Public Works Director; City of Aransas Pass Public Works Director; Town of Fulton Mayor
Budget: Operating and capital improvement funds
Priority: High
CRS Categories Addressed: Preventive, and Structural Projects

Action 4.1.c: Continue to use county resiliency group to investigate potential funding options for erosion protection and habitat restoration.

Timeframe: Years 1-5 (throughout plan timeframe)
Deliverable: Annual report that summarizes the activities of the county resiliency group over the previous year.
Office(s) of Primary Responsibility: Aransas County Floodplain Administrator; City of Rockport Mayor; City of Aransas Pass Public Works Director and City Planner; Town of Fulton Mayor; Resiliency consultant (Aaron Horine, Mott MacDonald)
Budget: Staff time (operating funds)
Priority: Medium
CRS Categories Addressed: Preventive, Natural Resource Protection, and Structural Projects

CHAPTER 8: ADOPT THE PLAN (STEP 9)

Because this is a multi-jurisdictional plan, the plan will be adopted by each of the participating communities. The Aransas County Multi-Jurisdictional Floodplain Management Plan Committee will first review the plan and, if approved, make a motion to recommend that each jurisdiction adopt the plan.

Upon this recommendation, the plan will be brought before each jurisdictional sub-committee for approval. In Aransas County and the Town of Fulton, the designated sub-committee is also the final authority for approving such master plans. Therefore, in those cases, the plan will only need the review and approval of the Aransas County Commissioners' Court and the Town of Fulton Town Council.

However, in the cases of the City of Rockport and the City of Aransas Pass, the jurisdictional sub-committees are their Planning & Zoning Commissions. For these cities, the plan will need the review of their Planning & Zoning Commissions and then will be recommended for approval by each entities' City Councils.

An item recommending adoption of the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the Aransas County Stormwater and Floodplain Management Committee agenda at its <insert date> meeting. A copy of those meeting minutes is located in Volume II, Chapter 9.

An item adopting the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the Aransas County Commissioners' Court agenda at its <insert date> meeting. A copy of Resolution XX-XX adopting the plan is located in Volume II, Chapter 9.

An item adopting the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the Town of Fulton Town Council agenda at its <insert date> meeting. A copy of Resolution XX-XX adopting the plan is located in Volume II, Chapter 9.

An item recommending adoption of the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the City of Aransas Pass Planning & Zoning Commission agenda at its <insert date> meeting. A copy of those meeting minutes is located in Volume II, Chapter 9.

An item adopting the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the City of Aransas Pass City Council agenda at its <insert date> meeting. A copy of Ordinance XX-XX adopting the plan is located in Volume II, Chapter 9.

An item recommending adoption of the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the City of Rockport Planning & Zoning Commission agenda at its <insert date> meeting. A copy of those meeting minutes is located in Volume II, Chapter 9.

An item adopting the Aransas County Multi-Jurisdictional Floodplain Management Plan was placed on the City of Rockport City Council agenda at its <insert date> meeting. A copy of Ordinance XX-XX adopting the plan is located in Volume II, Chapter 9.

CHAPTER 9: IMPLEMENT, EVALUATE, & REVISE (STEP 10)

The Aransas County Stormwater Management Committee will continue to be charged with the annual evaluation and five-year revision of this Multi-Jurisdictional Floodplain Management Plan. Each jurisdiction has identified one position that is responsible for reporting to the Aransas County Stormwater Management Committee (see Table 9.1). Reporting will occur quarterly, and include and annual summary, regarding progress on the implementation of each action item. This group will also prepare an annual evaluation report for presentation to the Committee in June, prior to annual Community Rating System recertification in October. This report will consist of the following elements:

- A review of each action item in the plan,
- A description of the items implemented and not implemented in the evaluation period, and
- Recommended changes to the action plan.

Once these elements are approved by the Aransas County Stormwater Management Committee, the report will be submitted to the governing bodies of each participating jurisdiction, as well as released to the media and made available to the public. These items, including minutes of the committee meeting, will be included in the CRS recertification submittal.

Table 9.1: Community Representatives Responsible for Reporting to the Aransas County Stormwater Management Committee Regarding the Implementation of Action Items.

Entity	Name
Aransas County	Floodplain Administrator
City of Aransas Pass	City Planner
Town of Fulton	Mayor
City of Rockport	Mayor

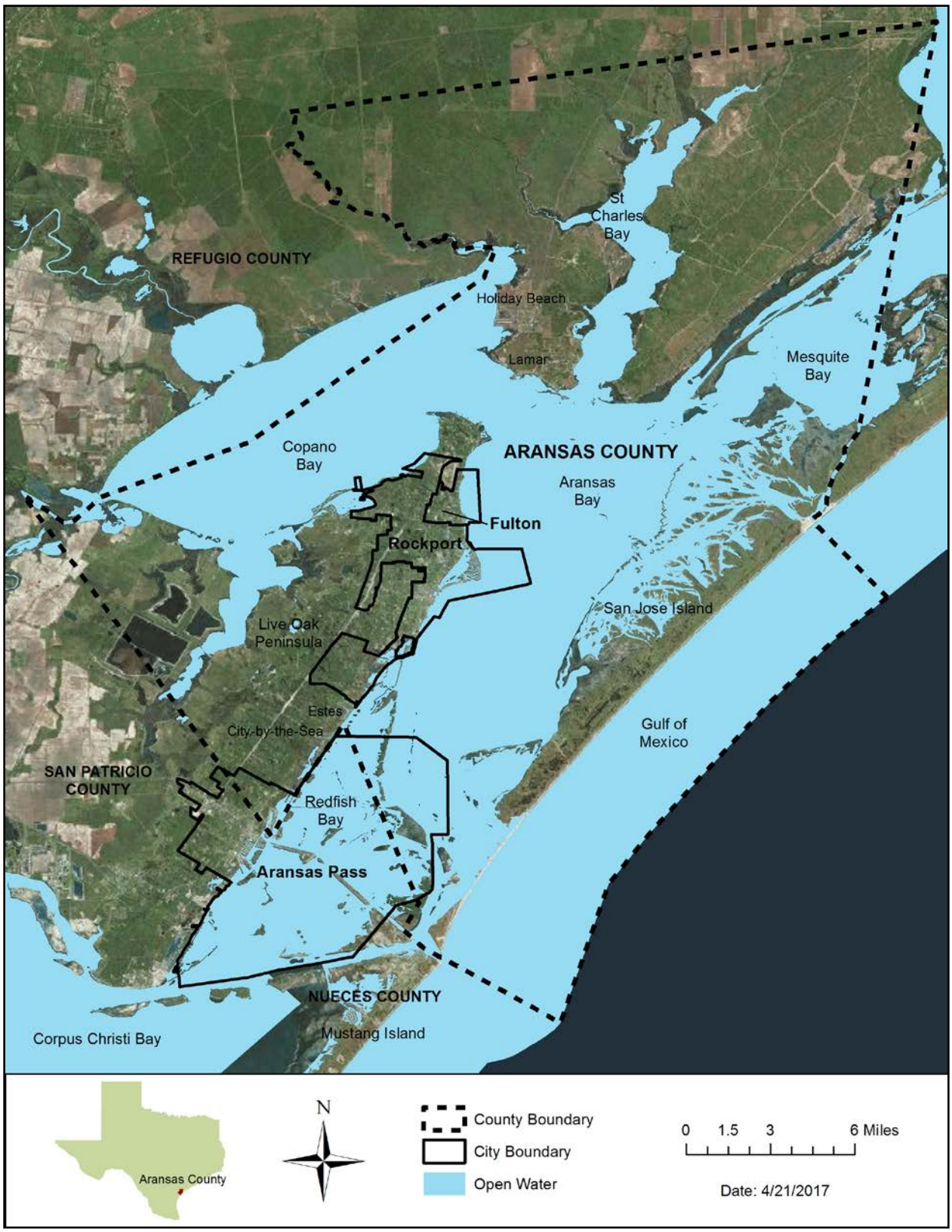
In year three, jurisdictional staff will begin the process for the plan's five-year update. This update will reevaluate the goals of the plan, to ensure they still represent the needs of the community, and will analyze potential future actions in order to develop a new action plan for the next five years. The five-year update will account for the accomplishments achieved through the implementation of this plan, and for any changes to flooding patterns, hazards, land use changes, or development during this time.

The five-year update of the plan will follow the procedure as outlined in the CRS Coordinator's Manual. A copy of the plan update will be submitted prior to October of the fifth year of implementation.

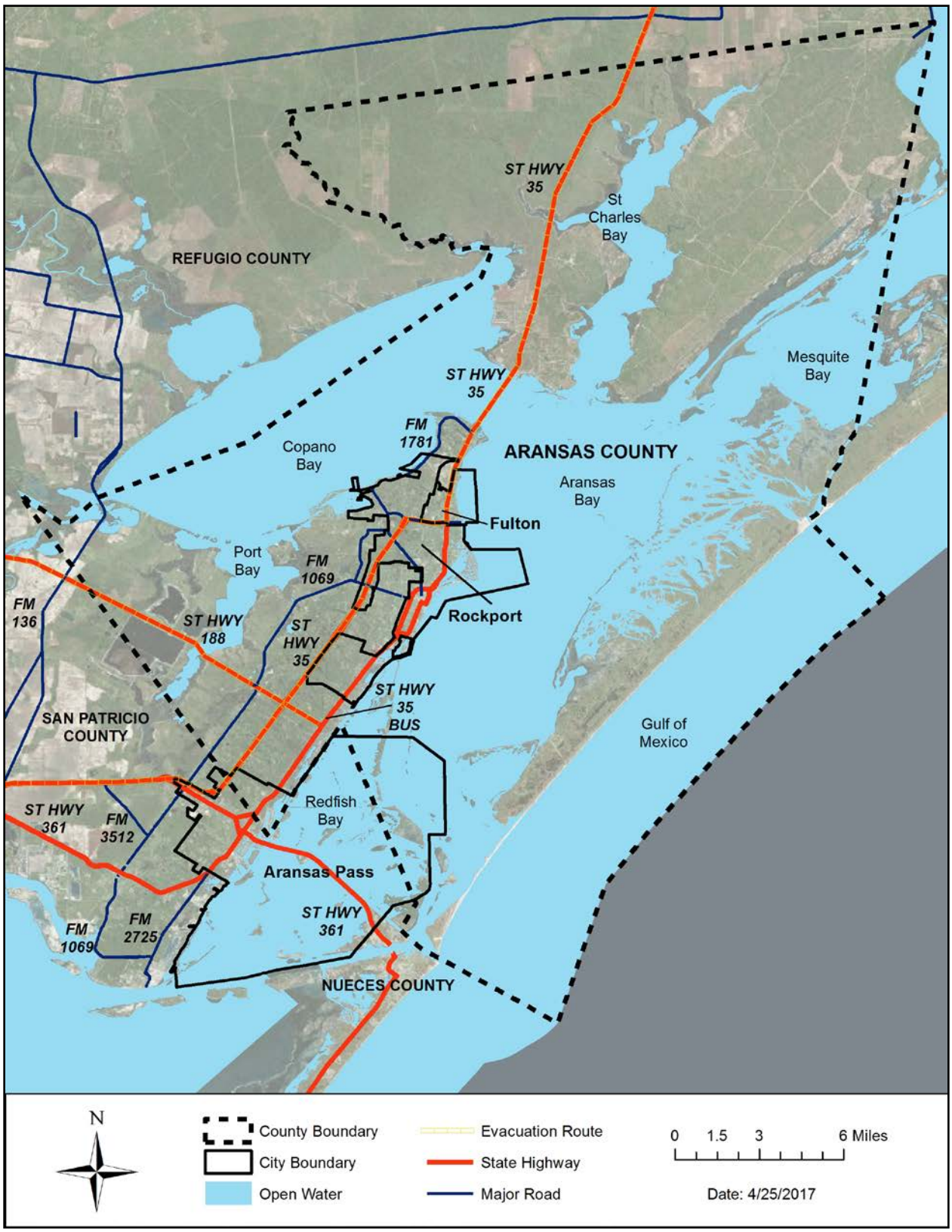
LIST OF ACRONYMS

COG	Council of Government
CRS	Community Rating System
EOC	Emergency Operations Center
ETJ	Extra Territorial Jurisdiction
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FMP	Floodplain Management Plan
GLO	General Land Office
GOMA	Gulf of Mexico Alliance
ISO	Stormwater Master Plan and Management Manual
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
SFHA	Special Flood Hazard Area
SMPMM	Stormwater Master Plan and Management Manual
TxDOT	Texas Department of Transportation

MAPS

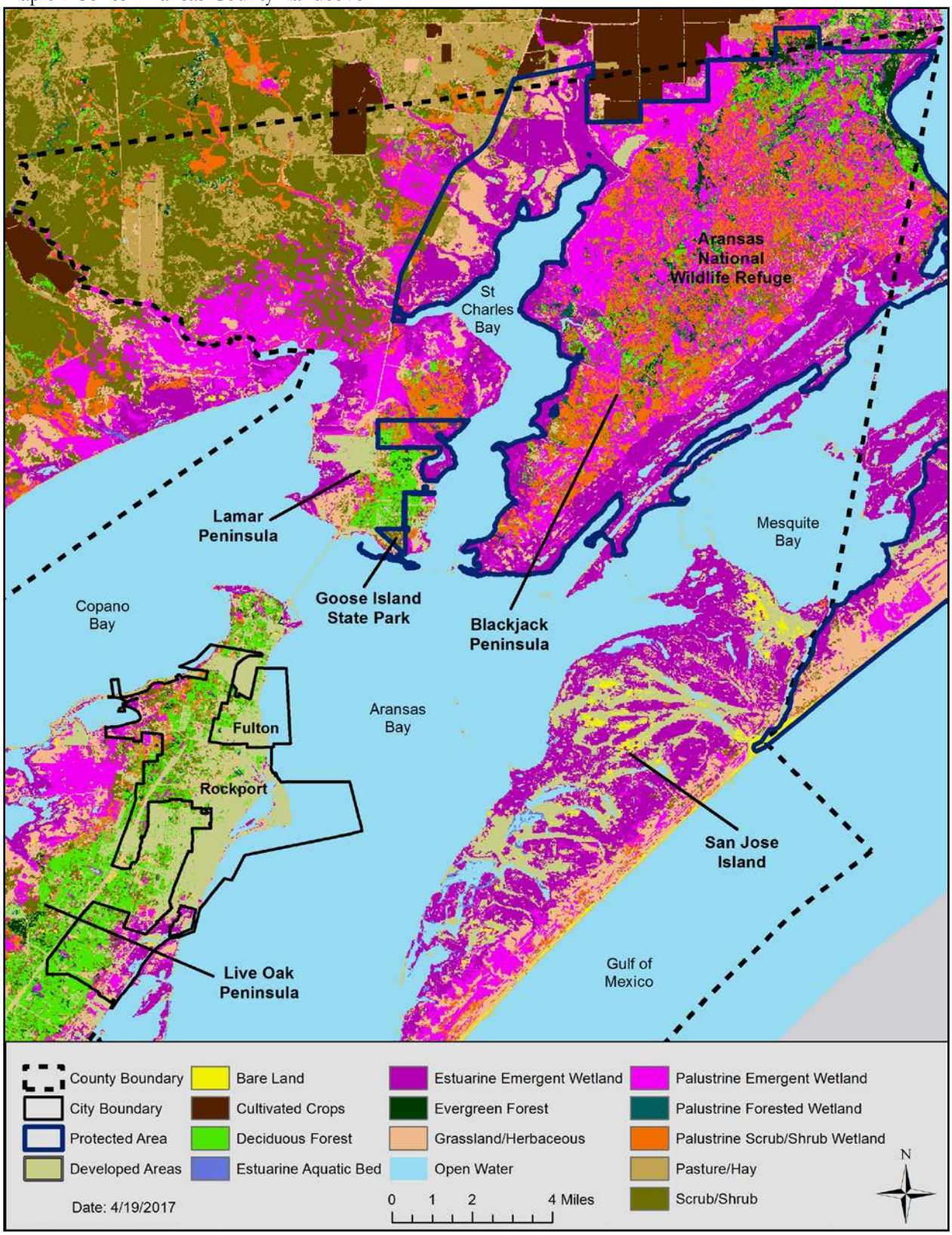


Map 1.1: Planning Area (see text pg. 10).

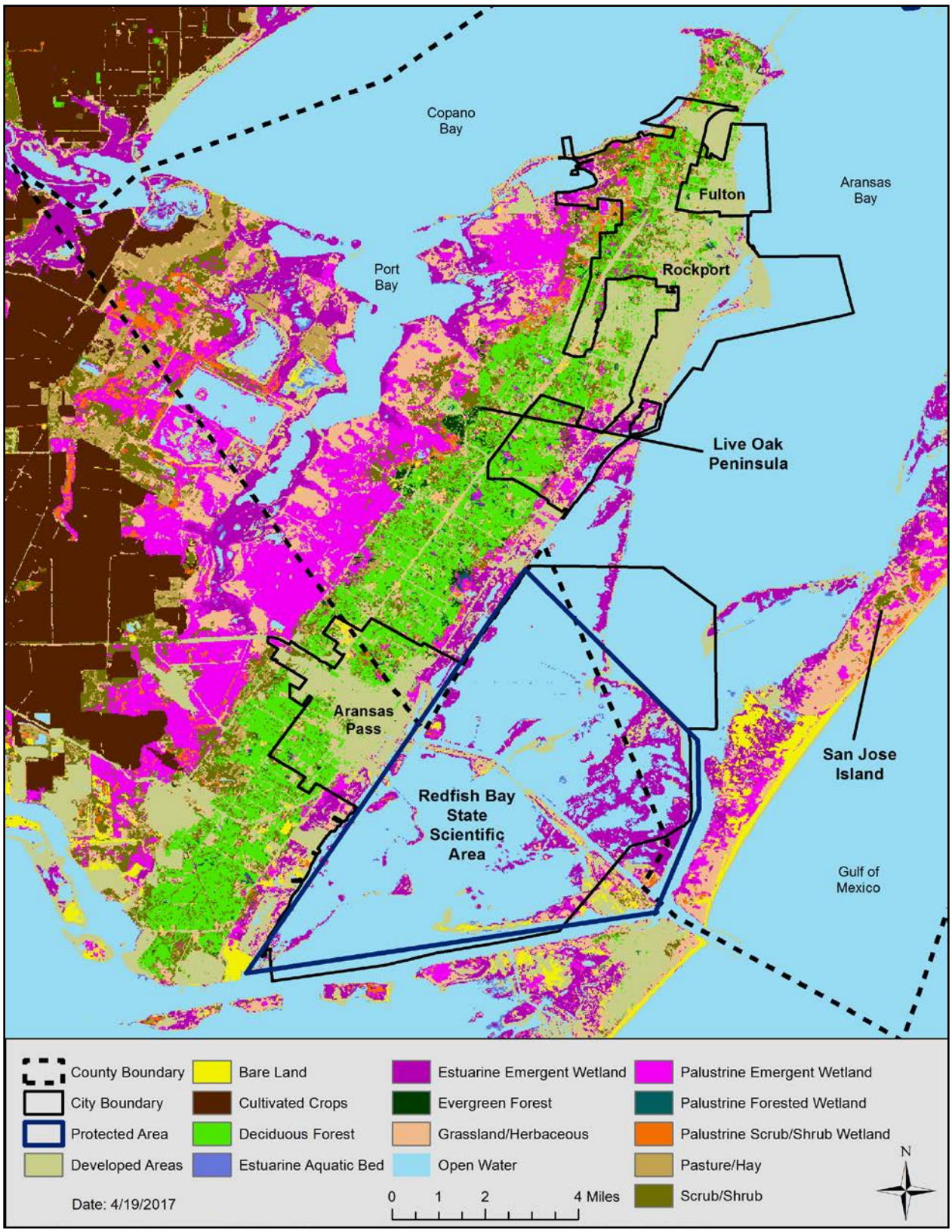


Map 5.1: Texas Department of Transportation, Evacuation Routes (see text pg. 23).

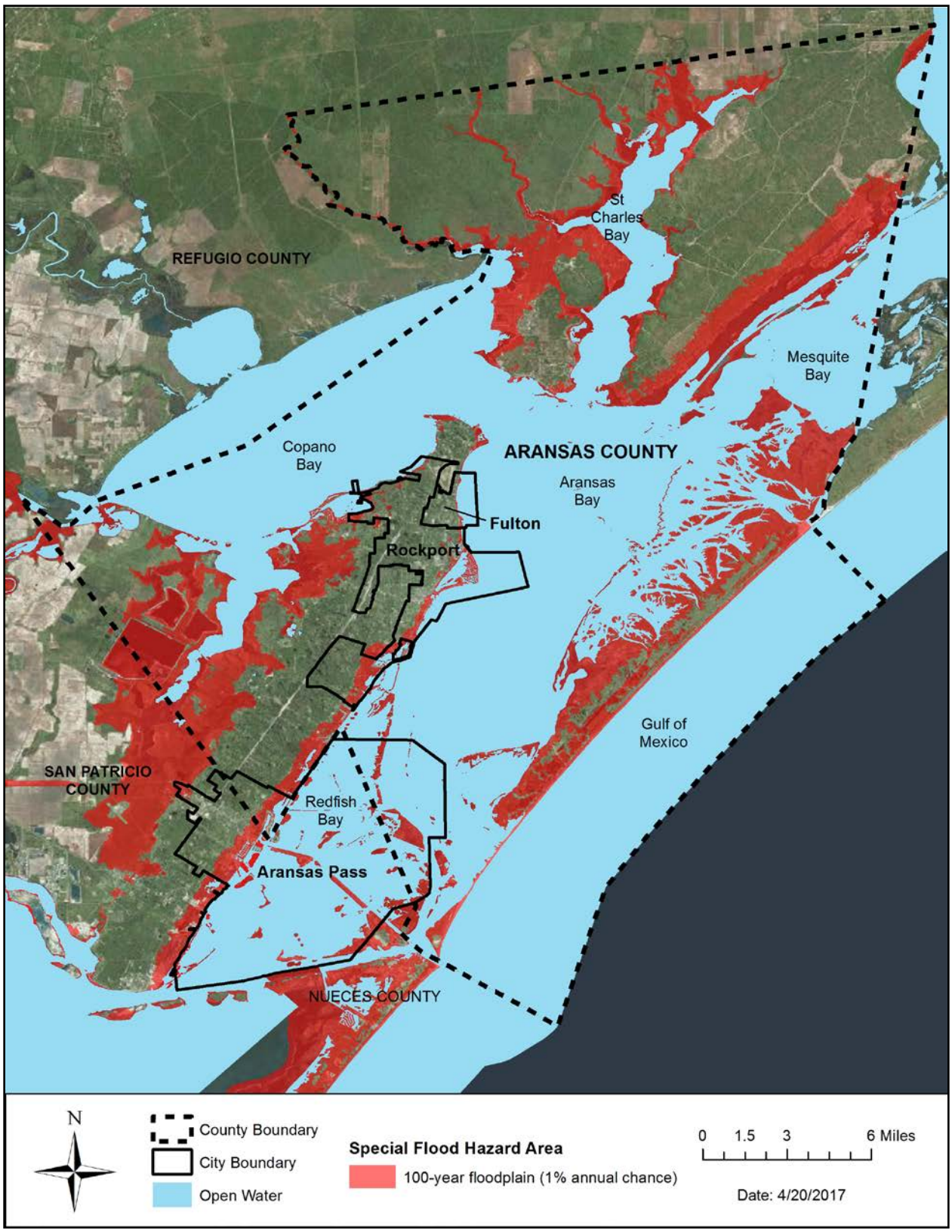
Map 5.2 Series: Aransas County Landcover.



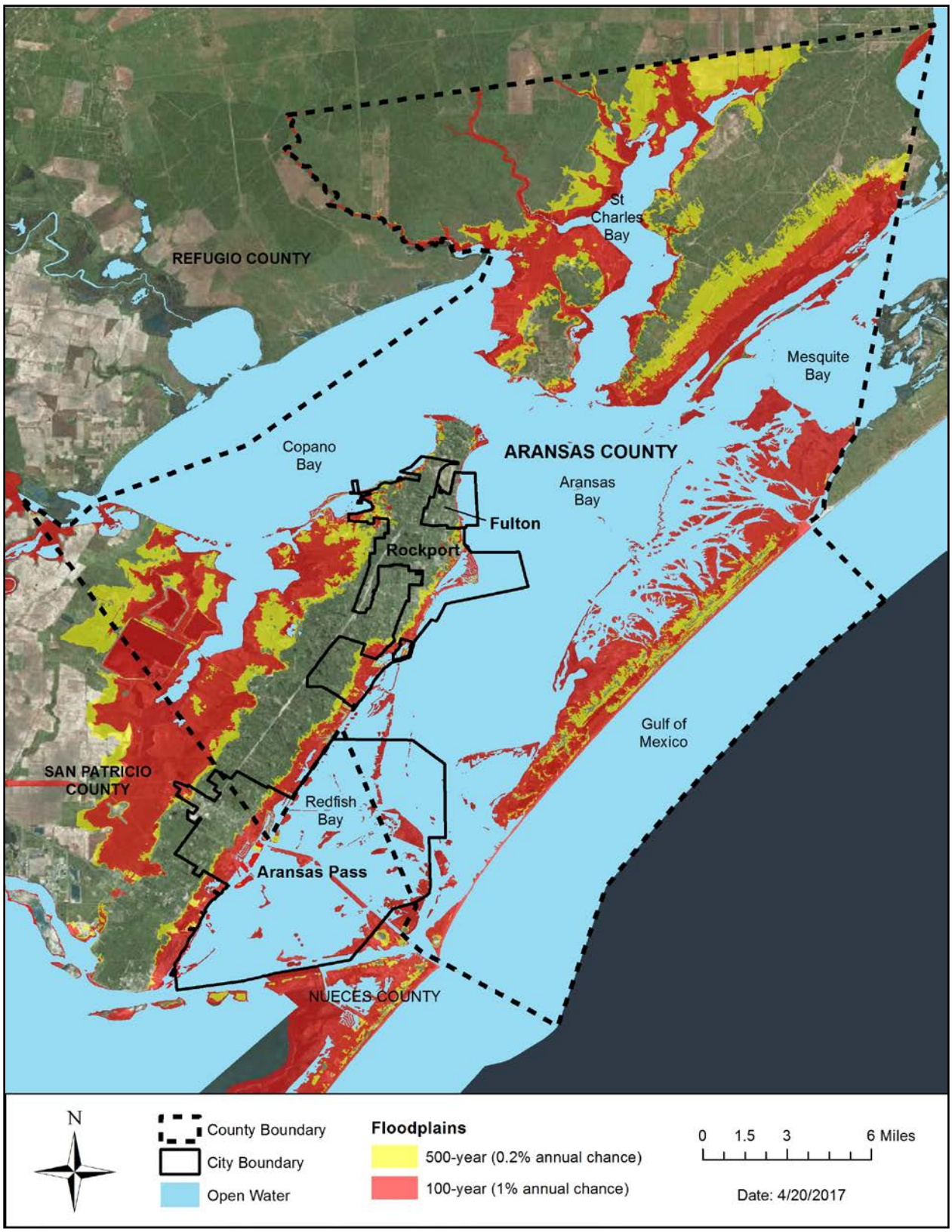
Map 5.2.a: Aransas County Landcover—Northern Region (see text pg. 26).



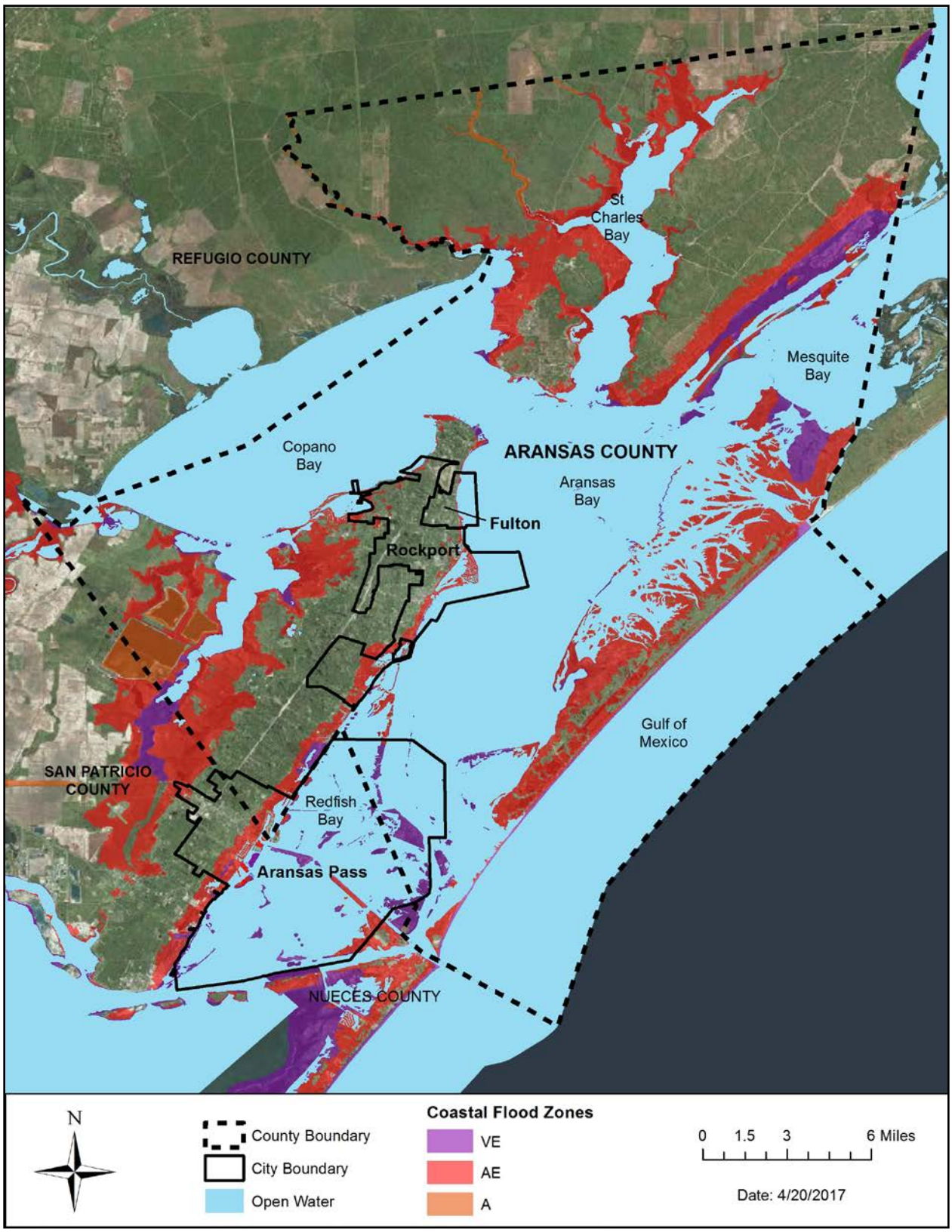
Map 5.2.b: Aransas County Landcover—Southern Region (see text pg. 26).



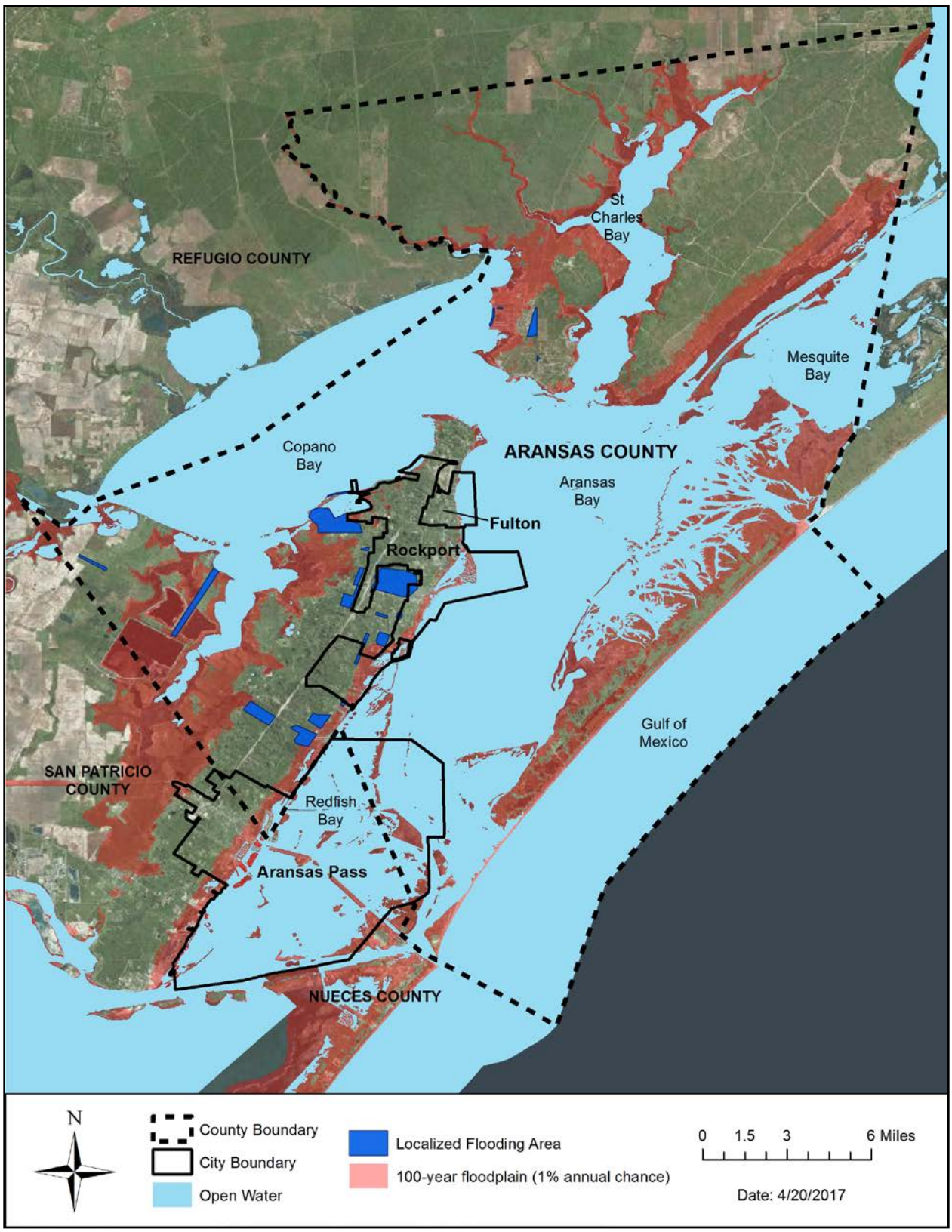
Map 5.3: Aransas County Special Flood Hazard Areas (see text pg. 26 & 27).



Map 5.4: Aransas County Floodplains (see text pg. 27).

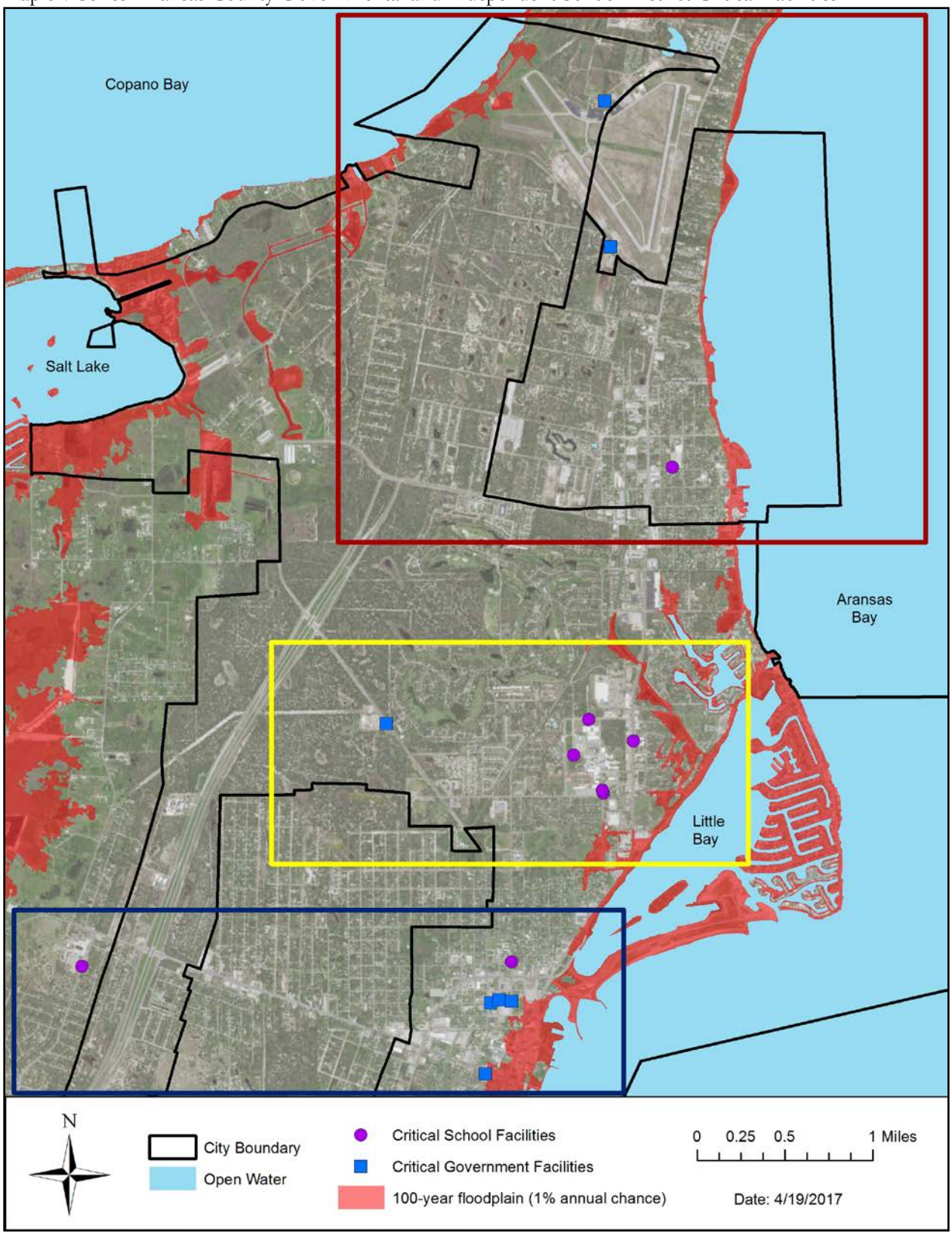


Map 5.5: Aransas County Coastal Flood Zones (see text pg. 27).

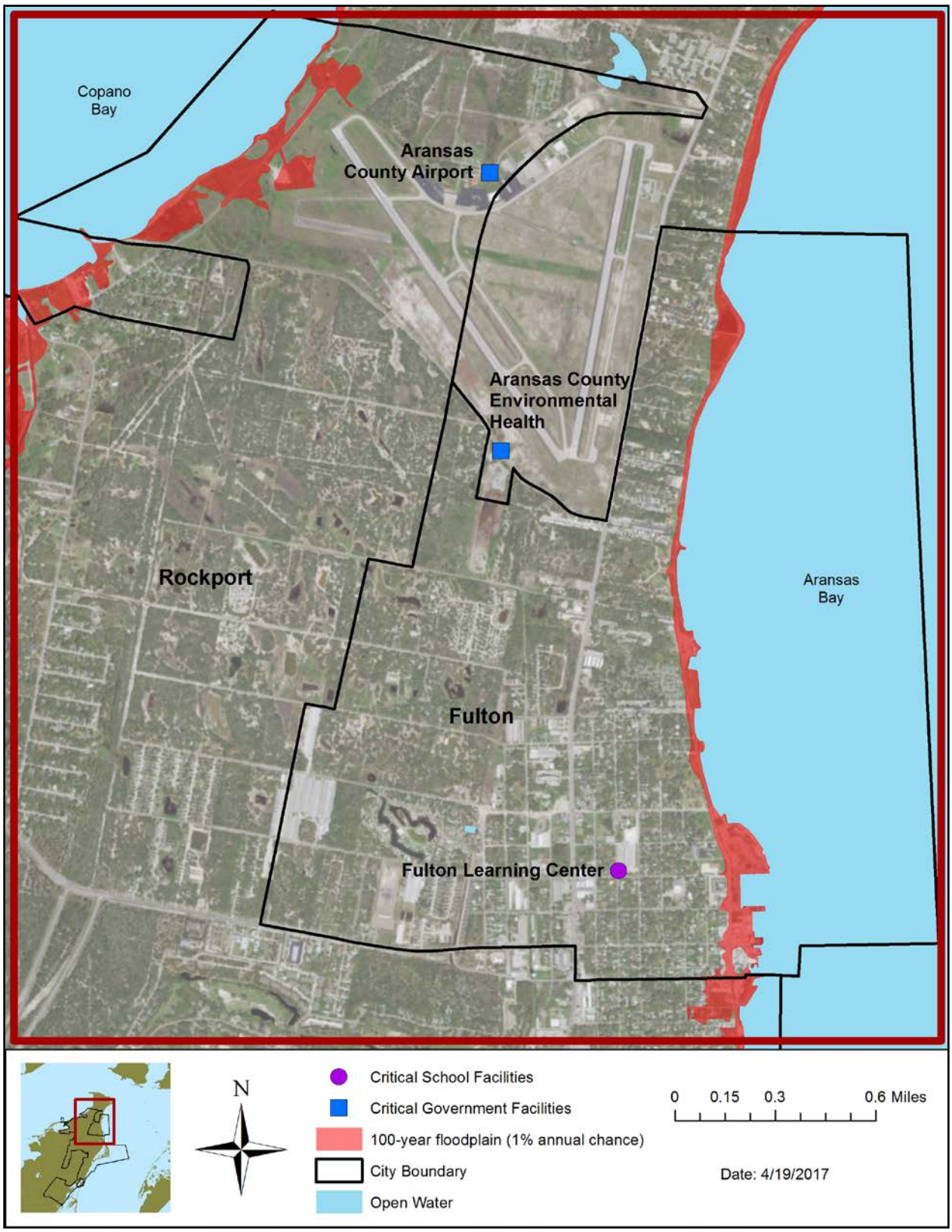


Map 5.6: Localized Flooding in Aransas County (see text pg. 28).

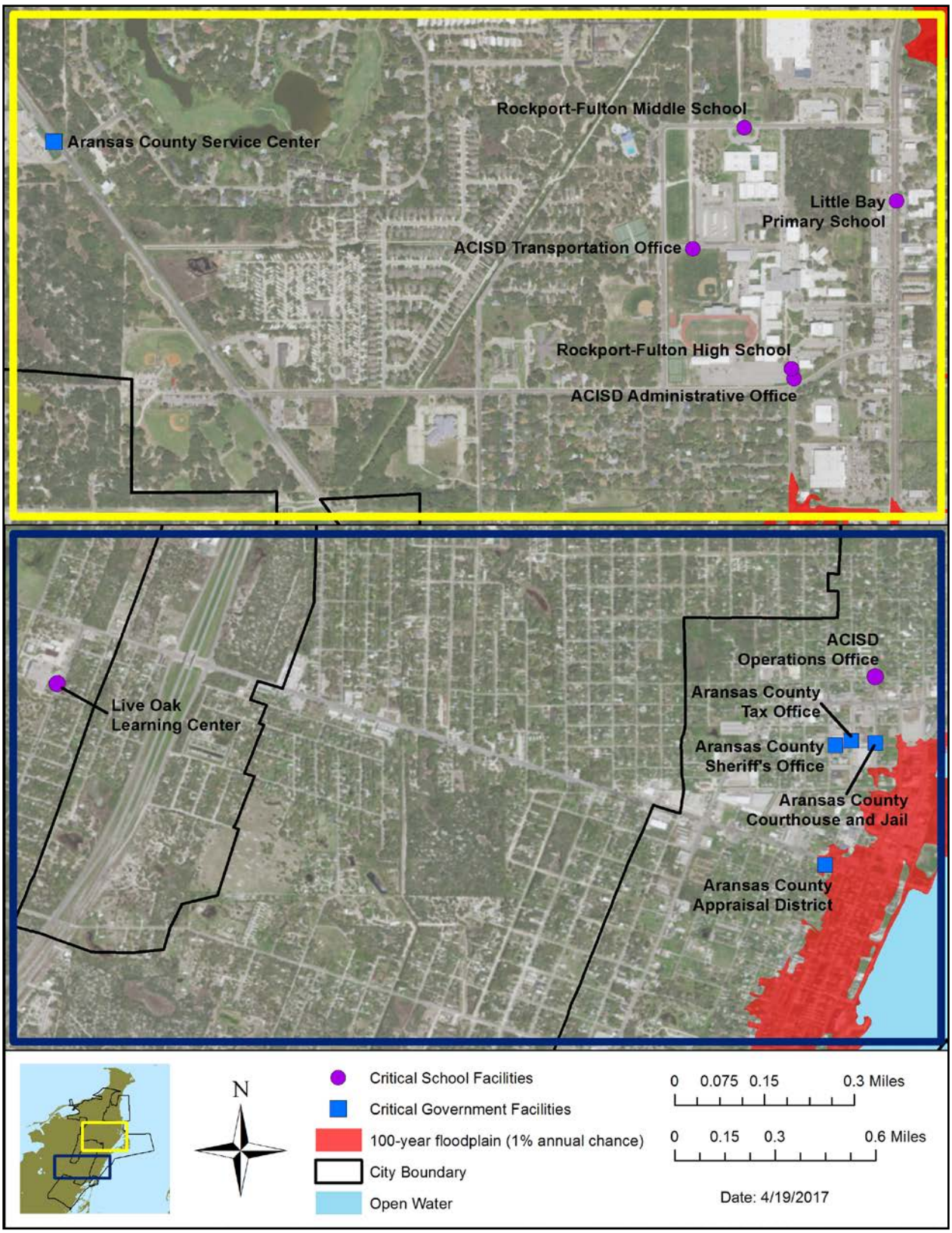
Map 5.7 Series: Aransas County Governmental and Independent School District Critical Facilities.



Map 5.7.a: Locator Map: Aransas County Governmental and Independent School District Critical Facilities (see text pg. 28).

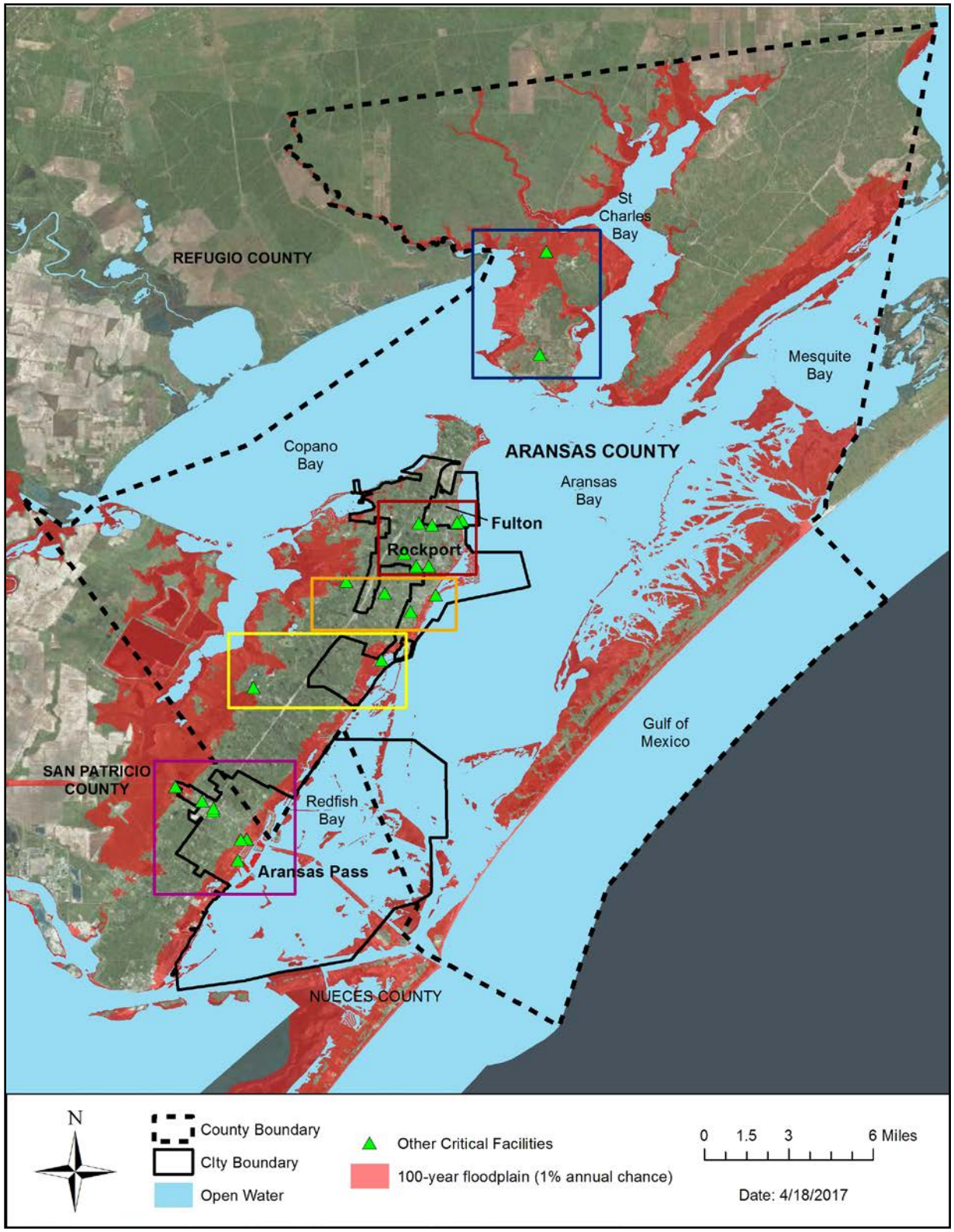


Map 5.7.b: Northern Region: Aransas County Governmental and Independent School District Critical Facilities (see text pg. 28).

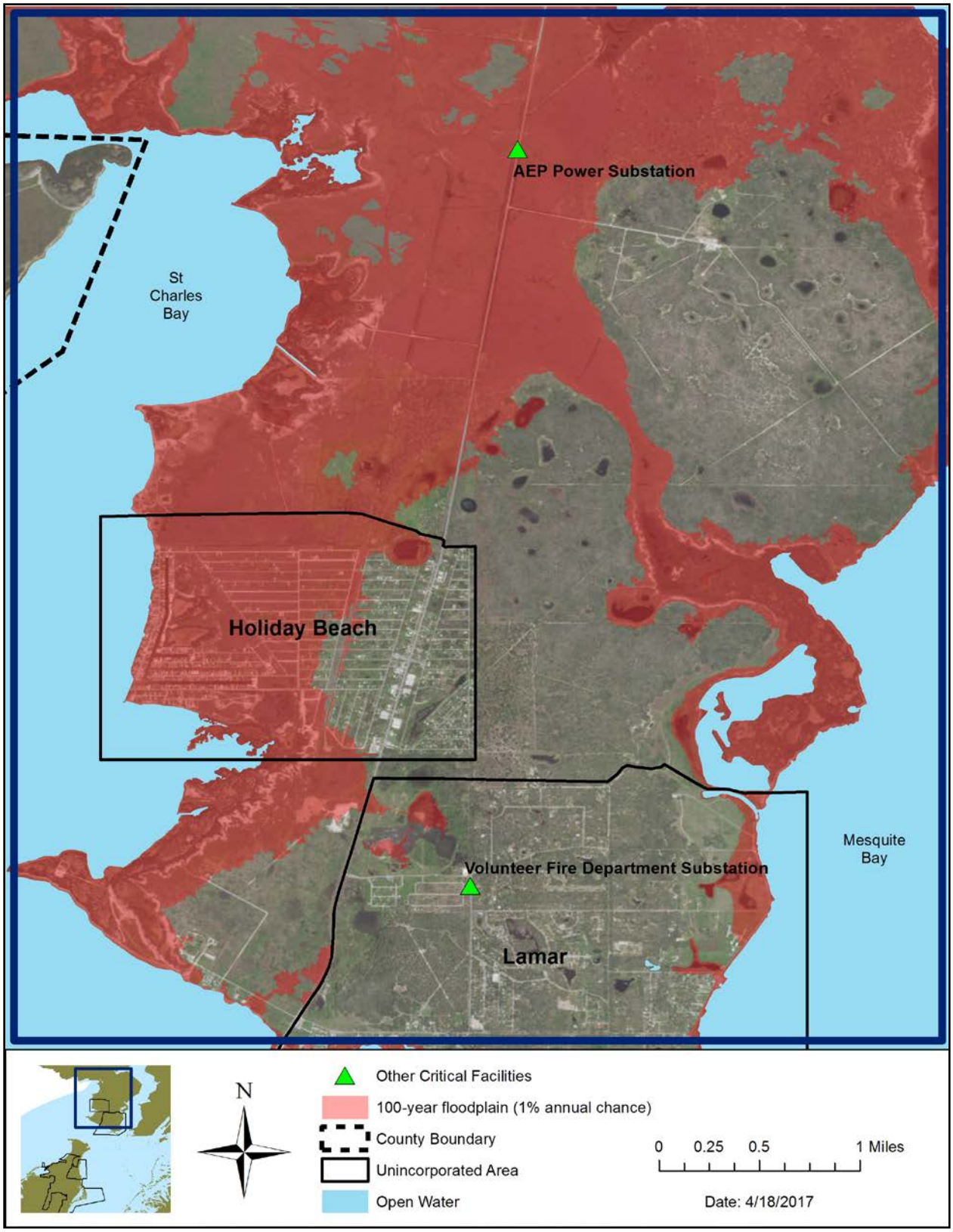


Map 5.7.c: Central and Southern Rockport Regions: Aransas County Governmental and Independent School District Critical Facilities (see text pg. 28).

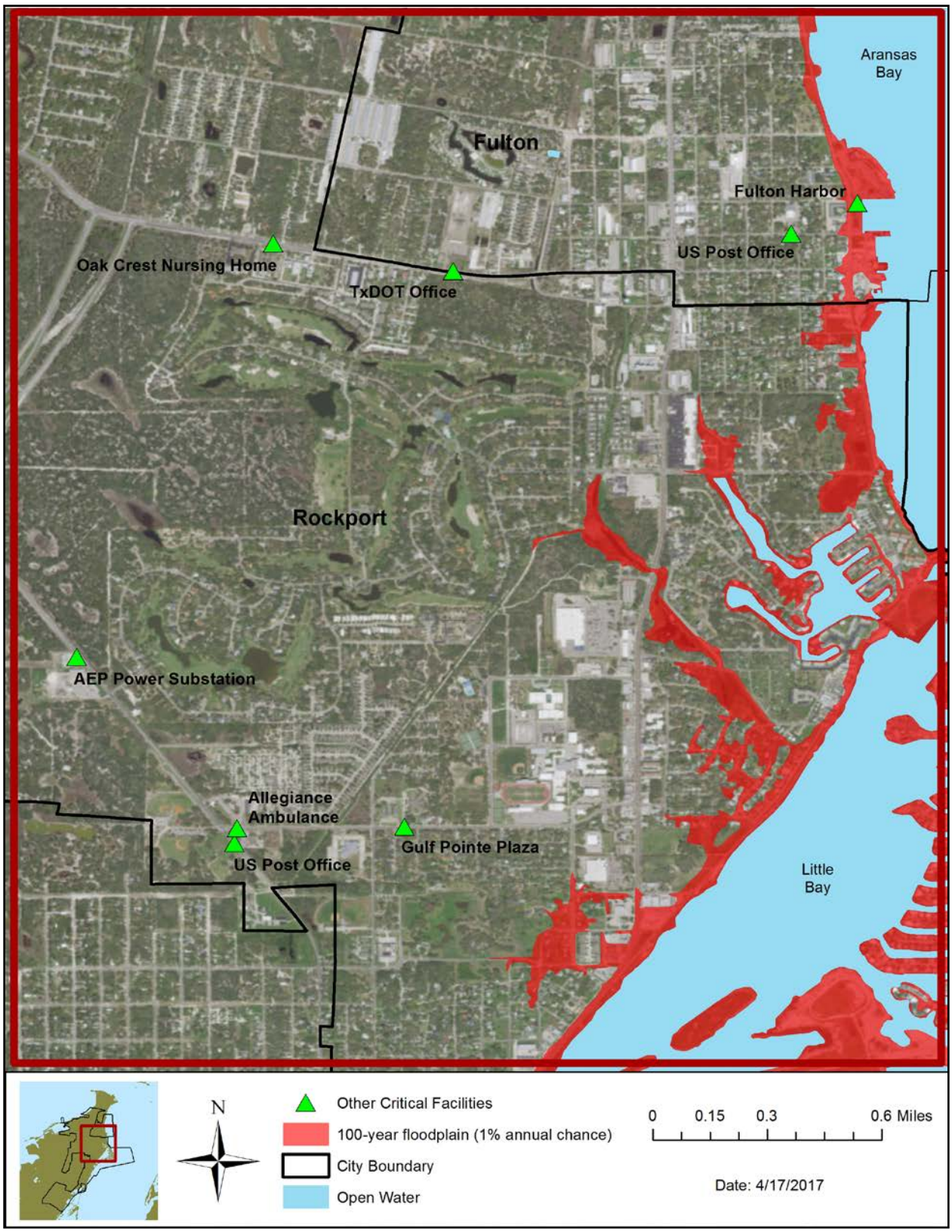
Map 5.8 Series: Other Critical Facilities in the County; but not Affiliated with County Government or Schools.



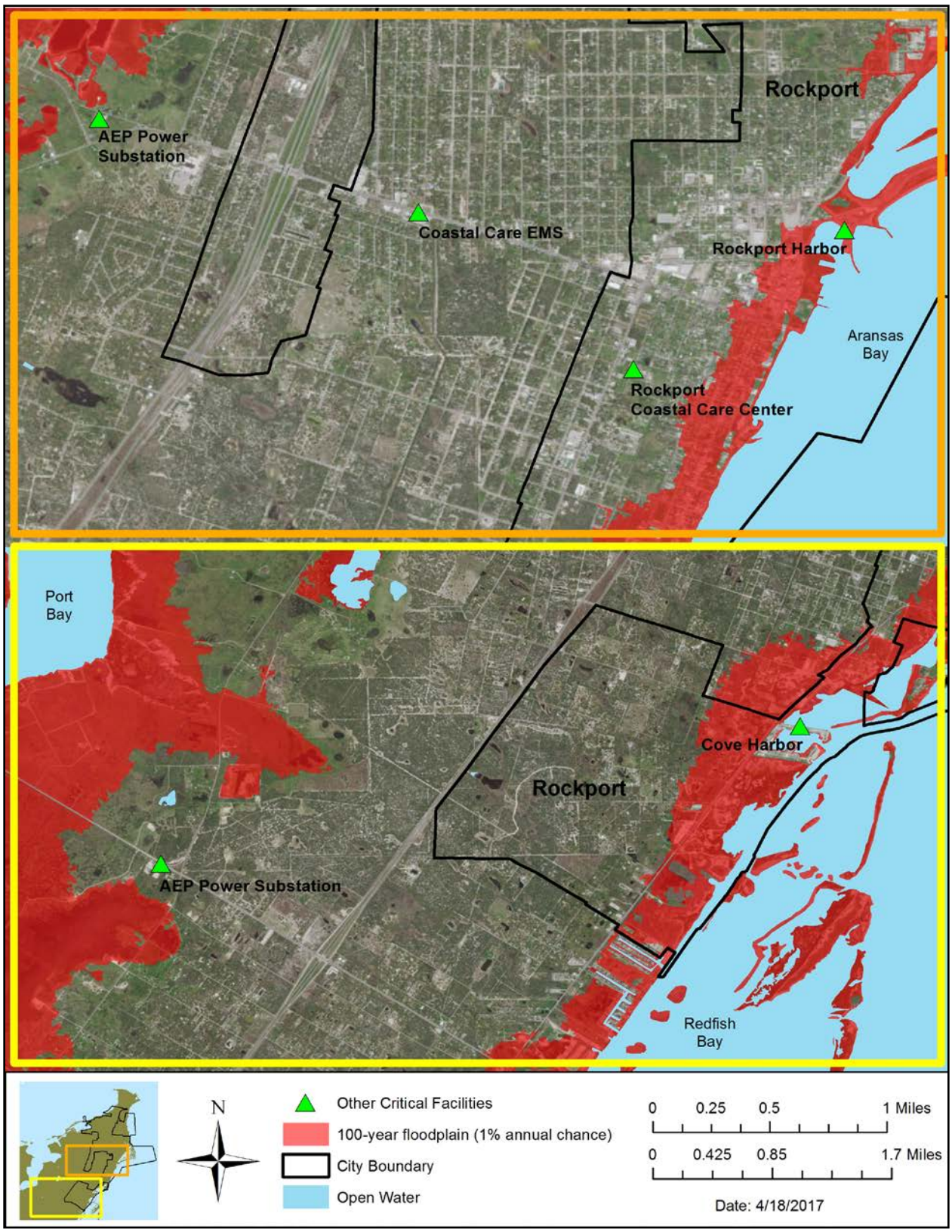
Map 5.8.a: Locator Map: Other Critical Facilities in the County; but not Affiliated with County Government or Schools (see text pg. 29).



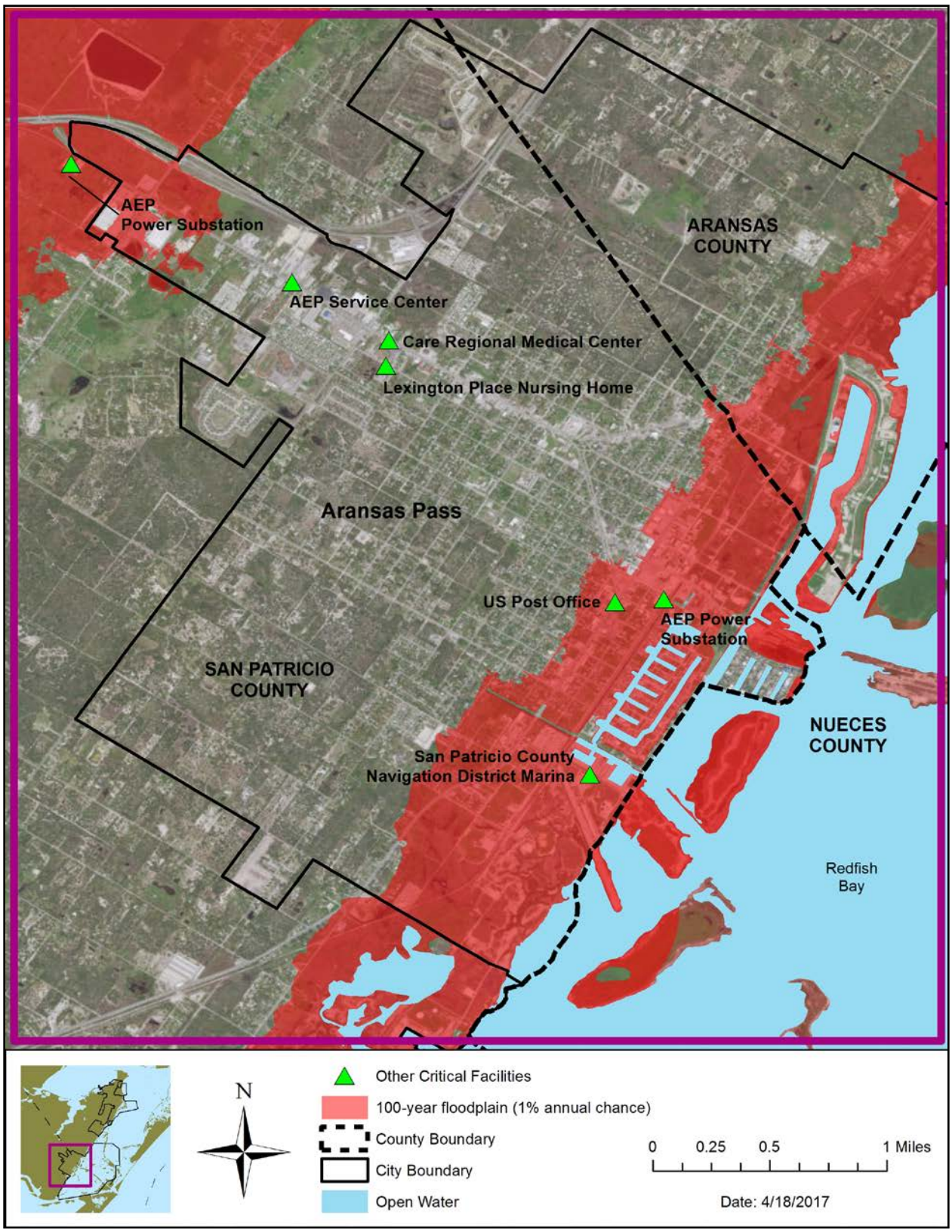
Map 5.8.b: Northern-most Region: Other Critical Facilities in the County; but not Affiliated with County Government or Schools (see text pg. 29).



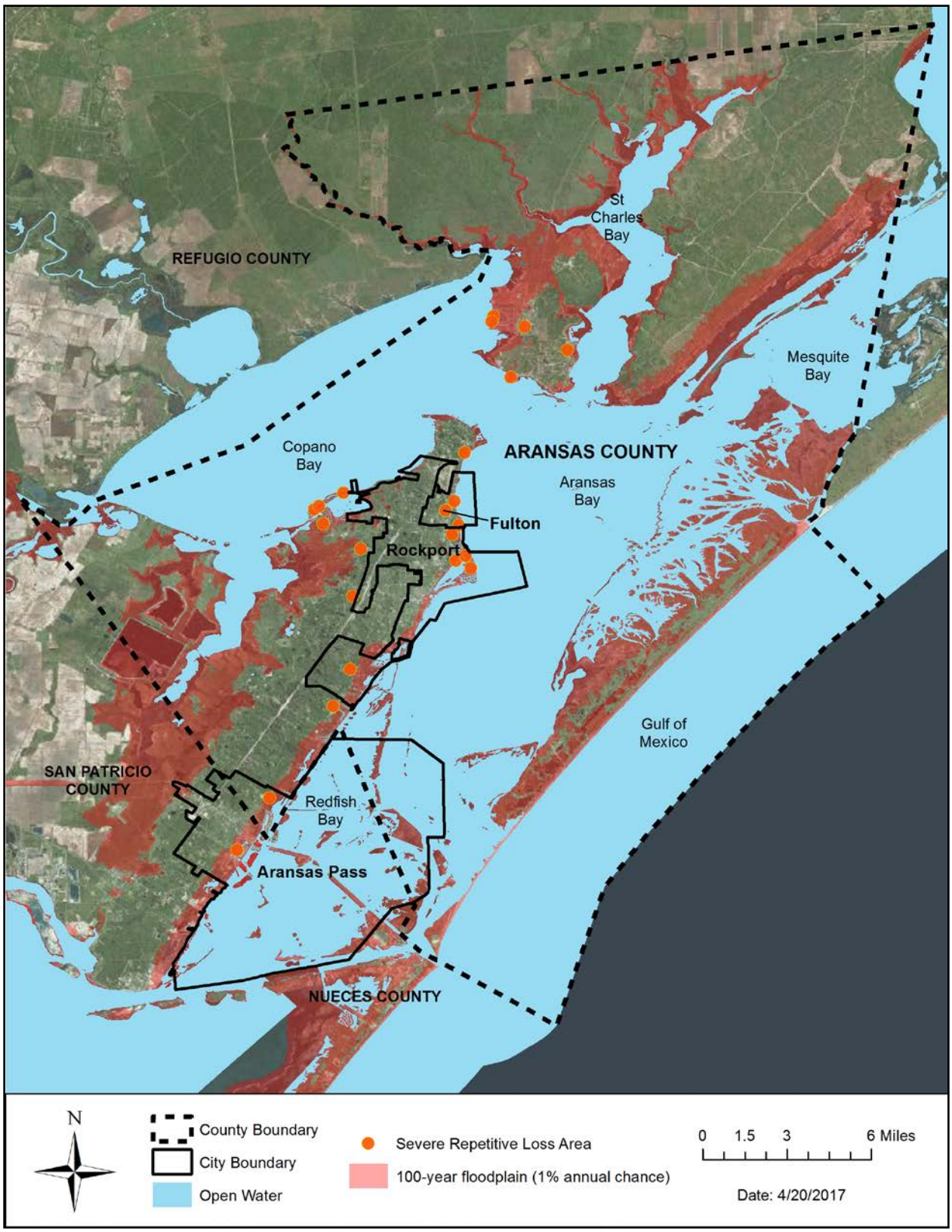
Map 5.8.c: Northern Rockport and Fulton Region: Other Critical Facilities in the County; but not Affiliated with County Government or Schools (see text pg. 29).



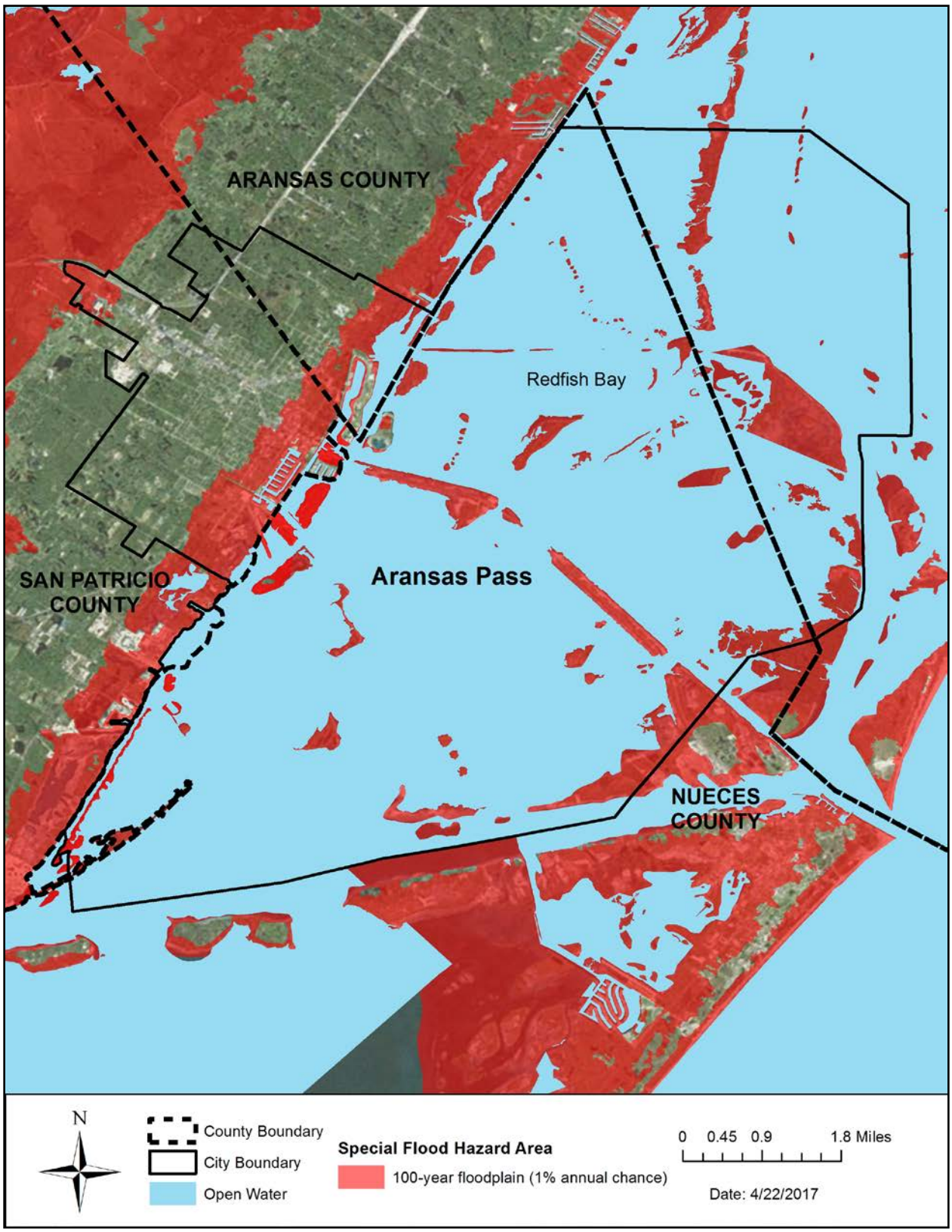
Map 5.8.d: Central and Southern Rockport Region: Other Critical Facilities in the County; but not Affiliated with County Government or Schools (see text pg. 29).



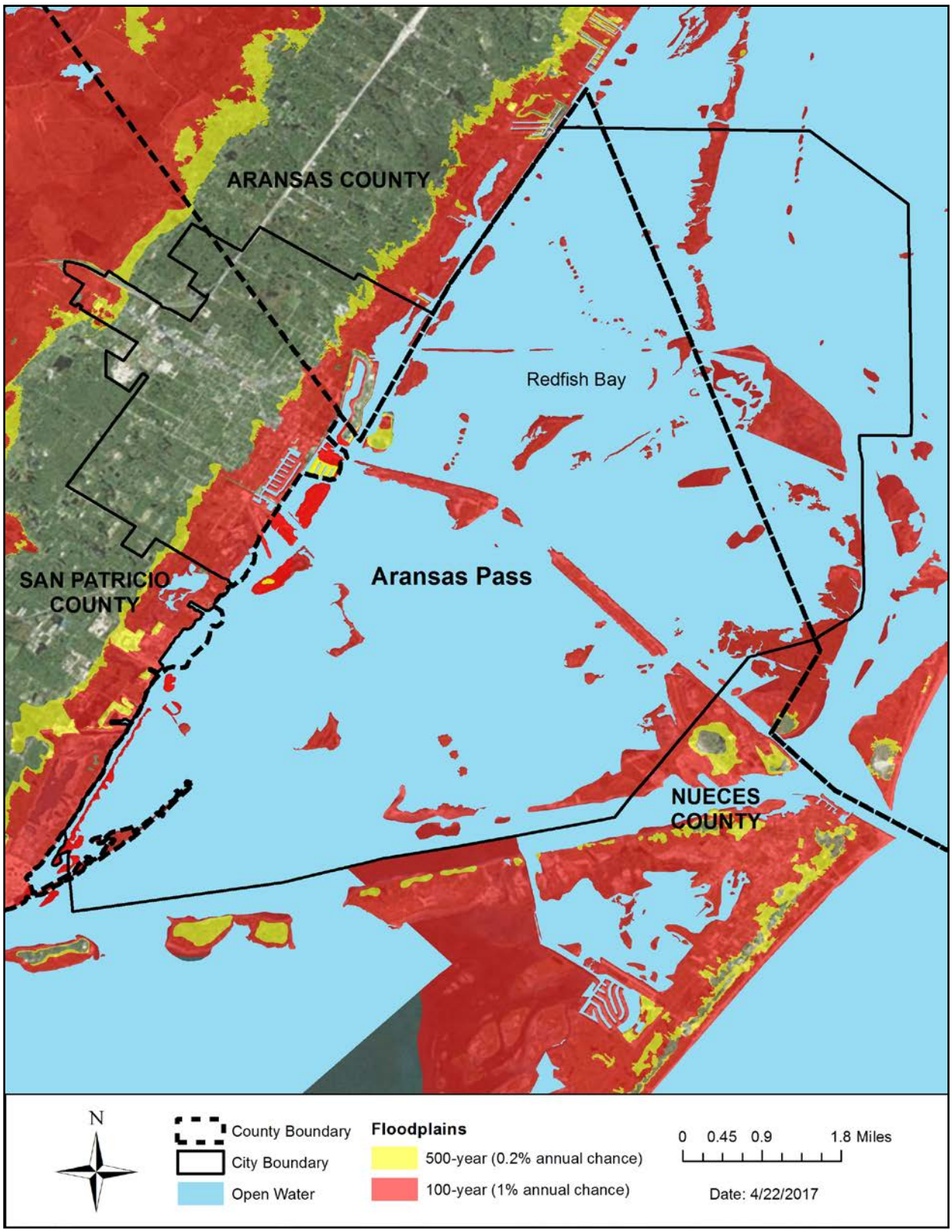
Map 5.8.e: Aransas Pass Region: Other Critical Facilities in the County; but not Affiliated with County Government or Schools (see text pg. 29).



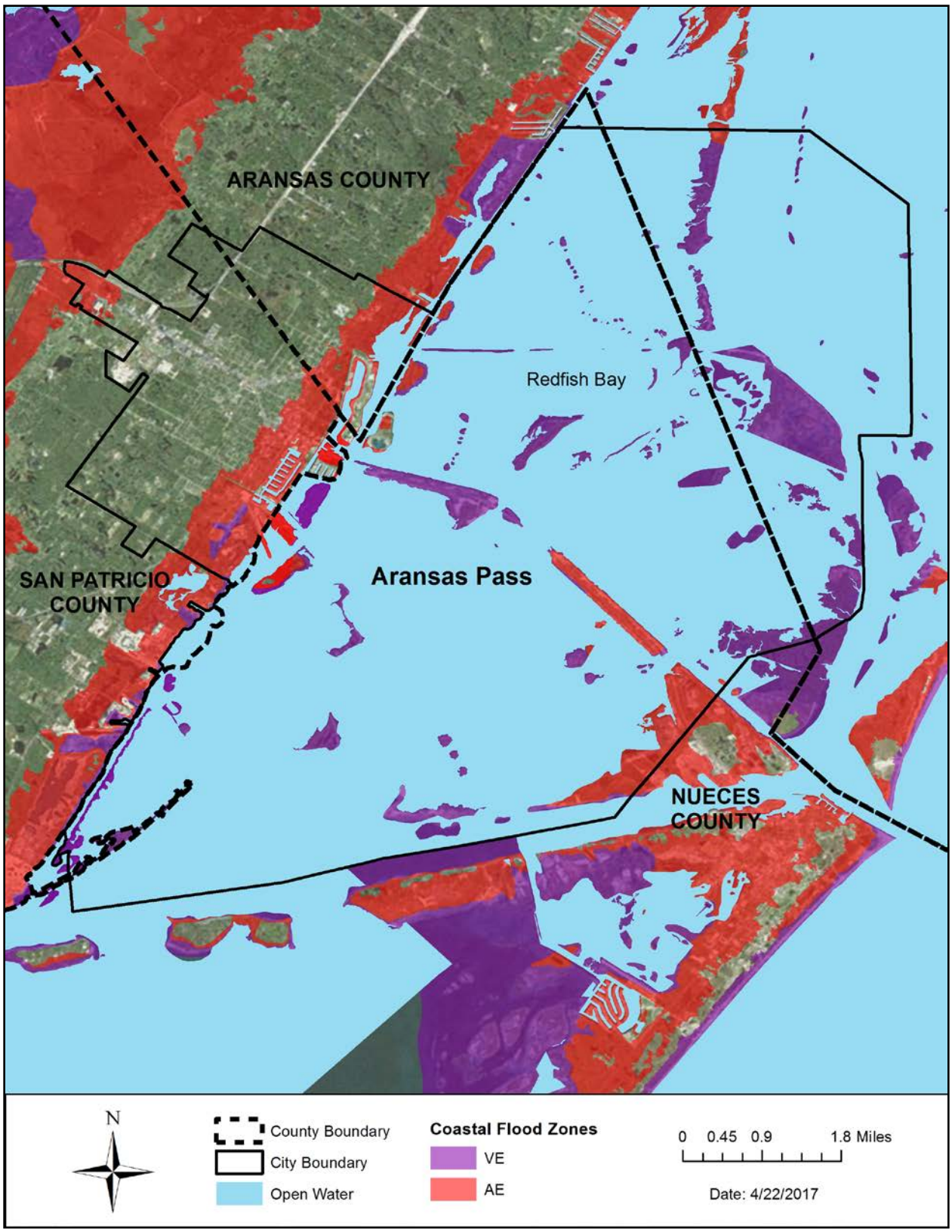
Map 5.9: Severe Repetitive Loss Areas in Aransas County (see text pg. 31).



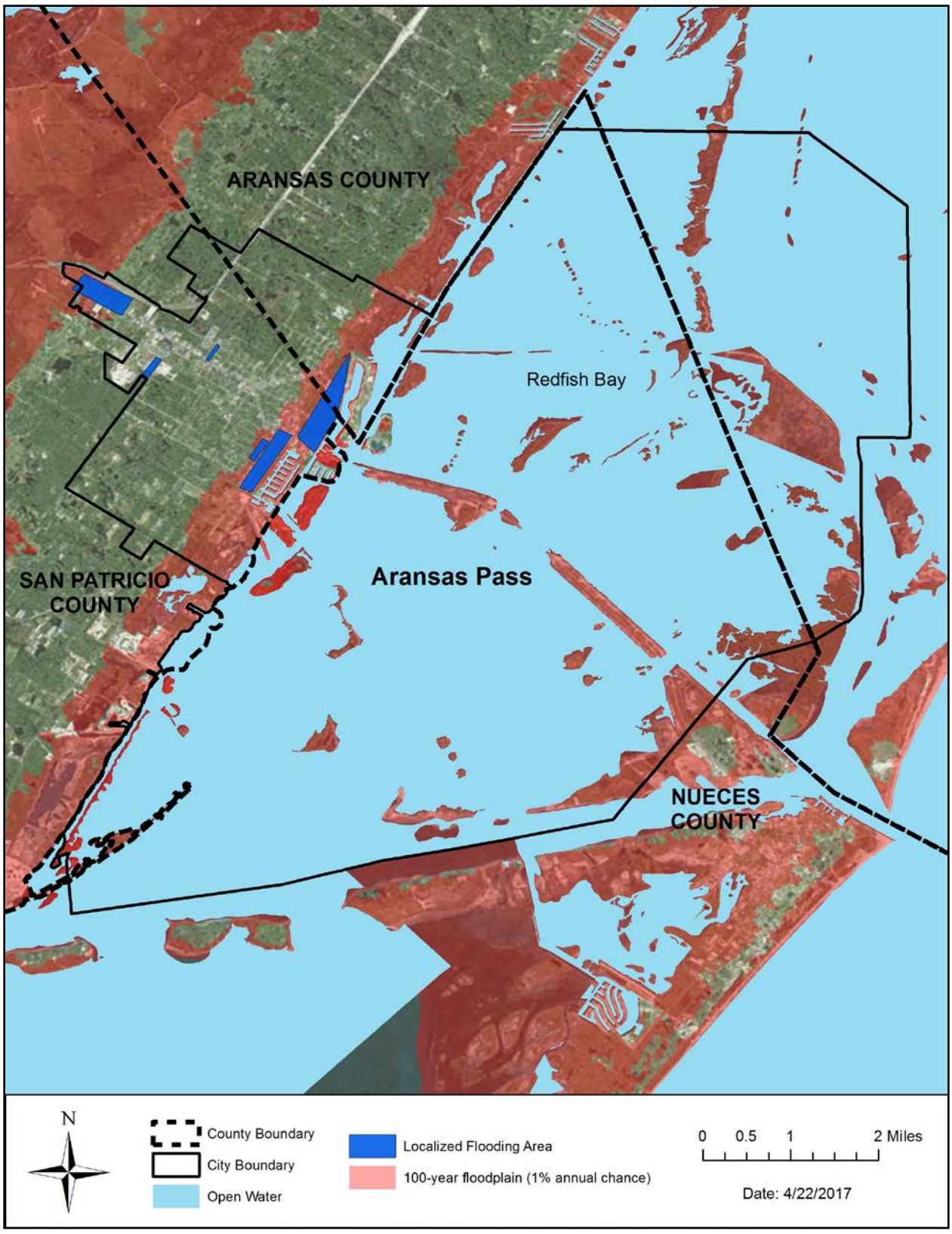
Map 5.10: Aransas Pass Special Flood Hazard Areas (see text pg. 31).



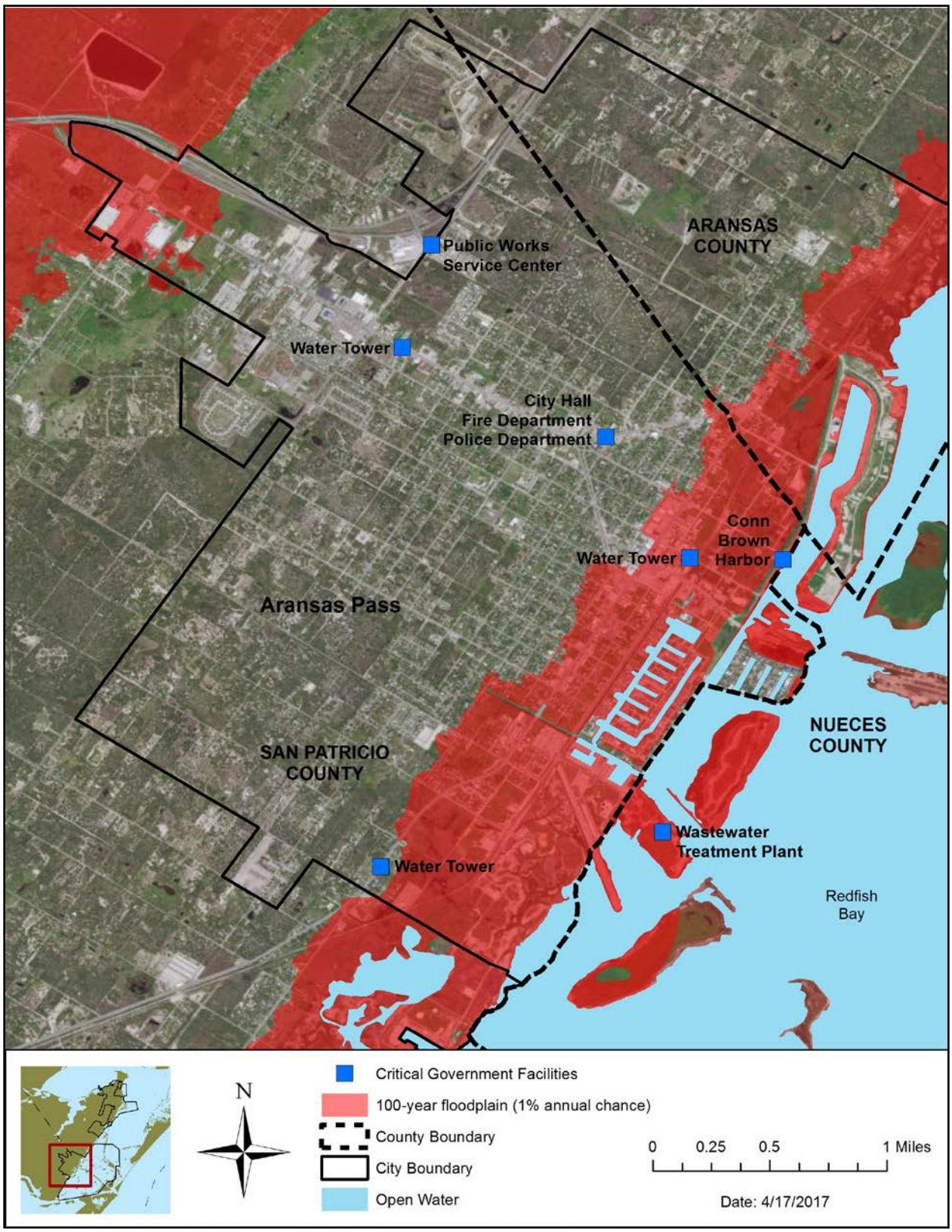
Map 5.11: Aransas Pass Floodplains (see text pg. 31).



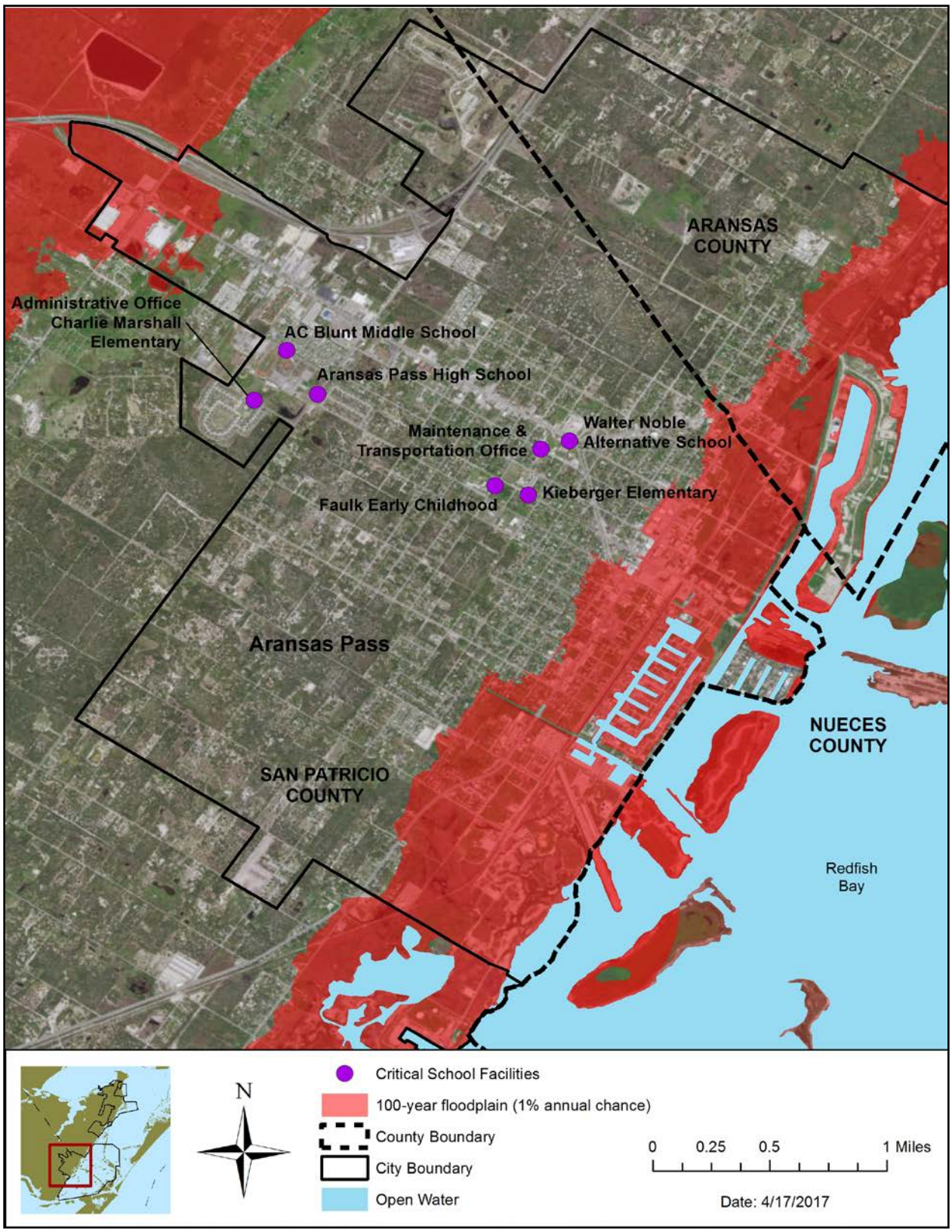
Map 5.12: Aransas Pass Coastal Flood Zones (see text pg. 32).



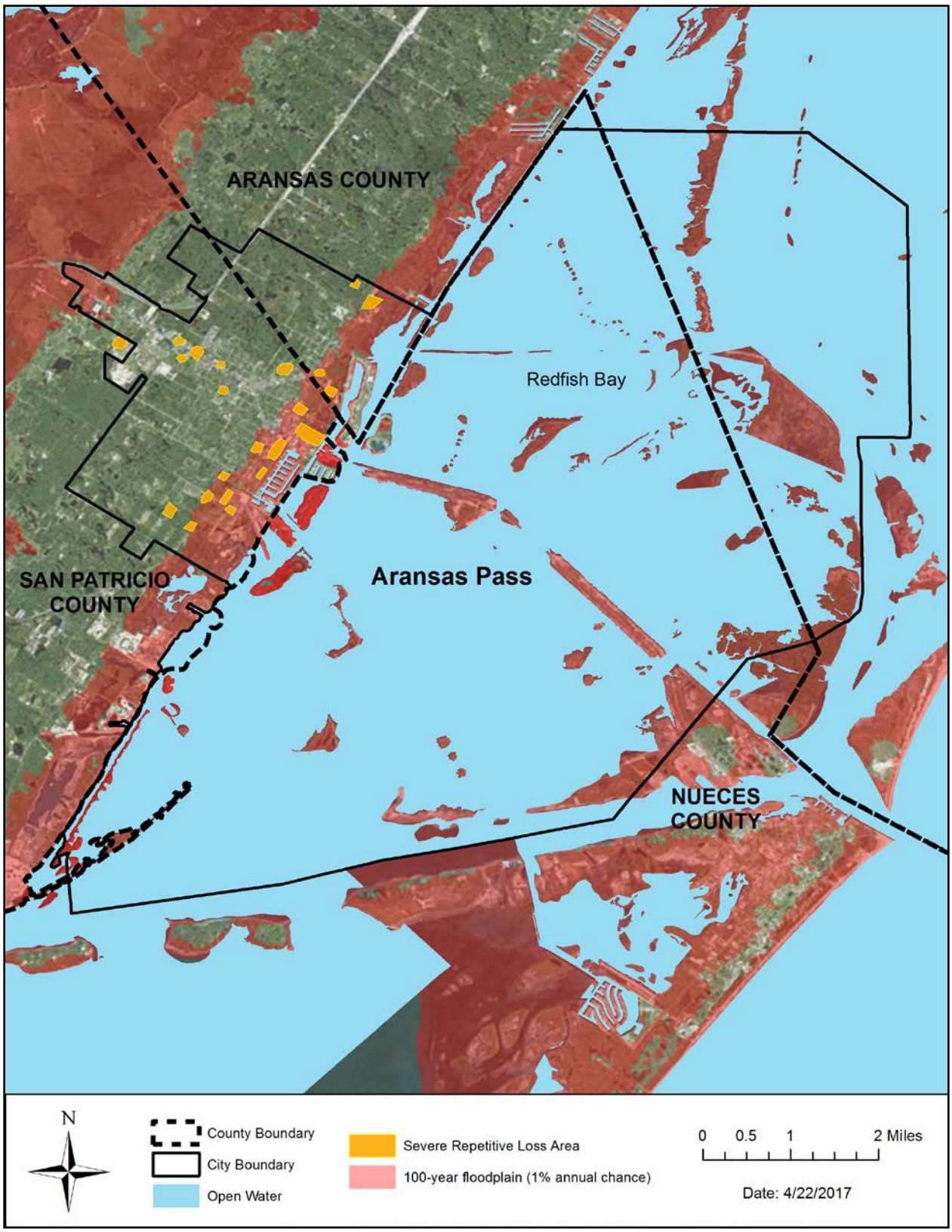
Map 5.13: Localized Flooding in Aransas Pass (see text pg. 32).



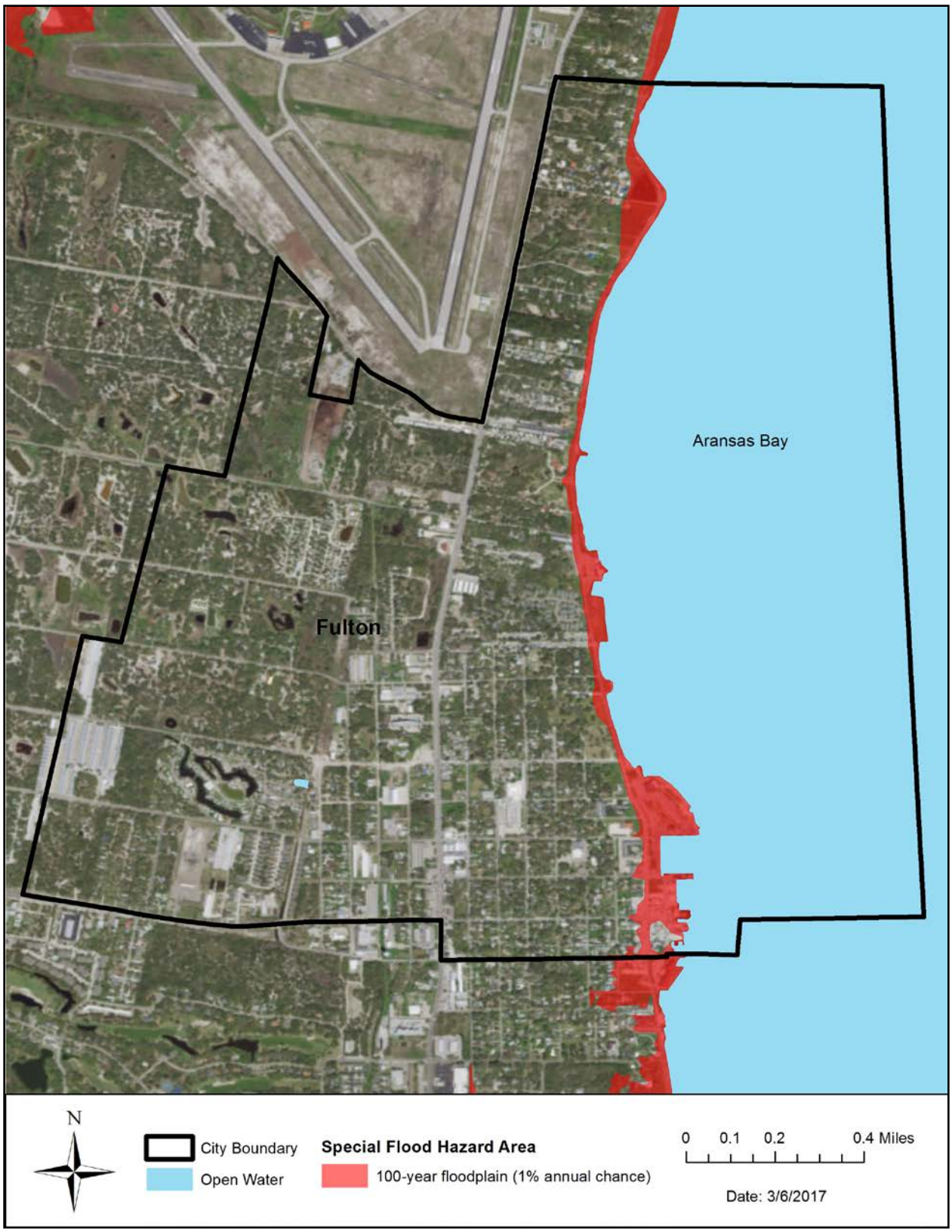
Map 5.14: Aransas Pass Governmental Critical Facilities (see text pg. 32).



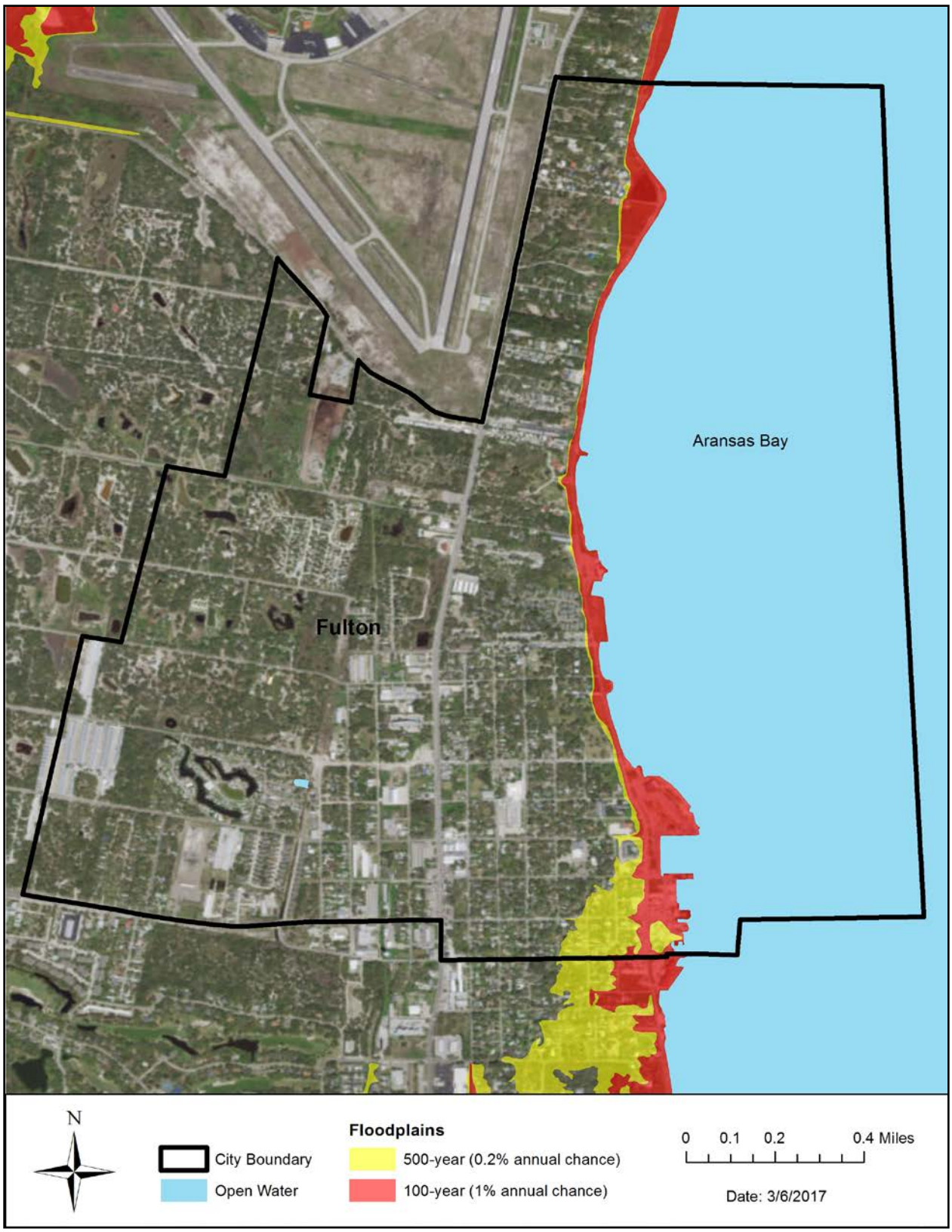
Map 5.15: Aransas Pass Independent School District Critical Facilities (see text pg. 32).



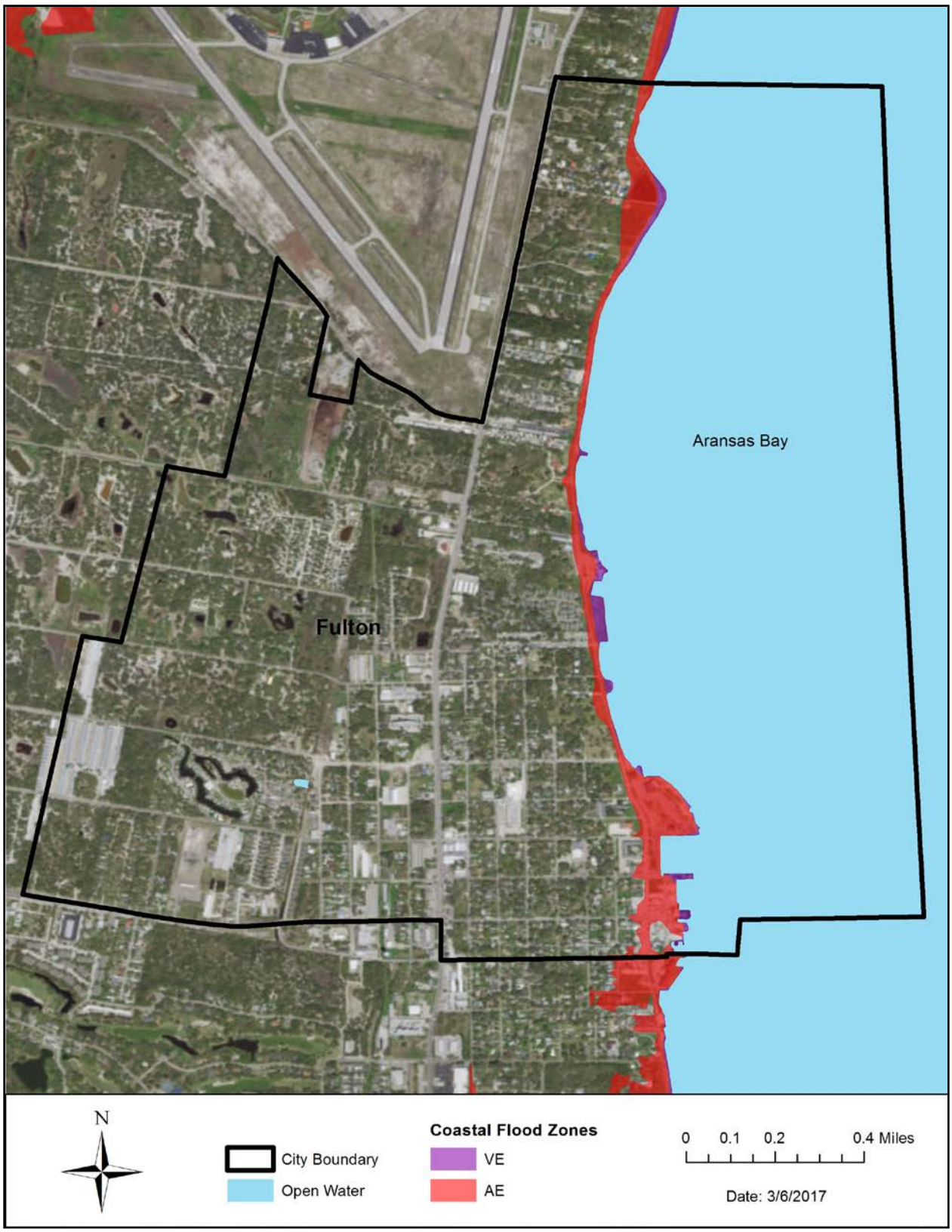
Map 5.16: Severe Repetitive Loss Areas in Aransas Pass (see text pg. 34).



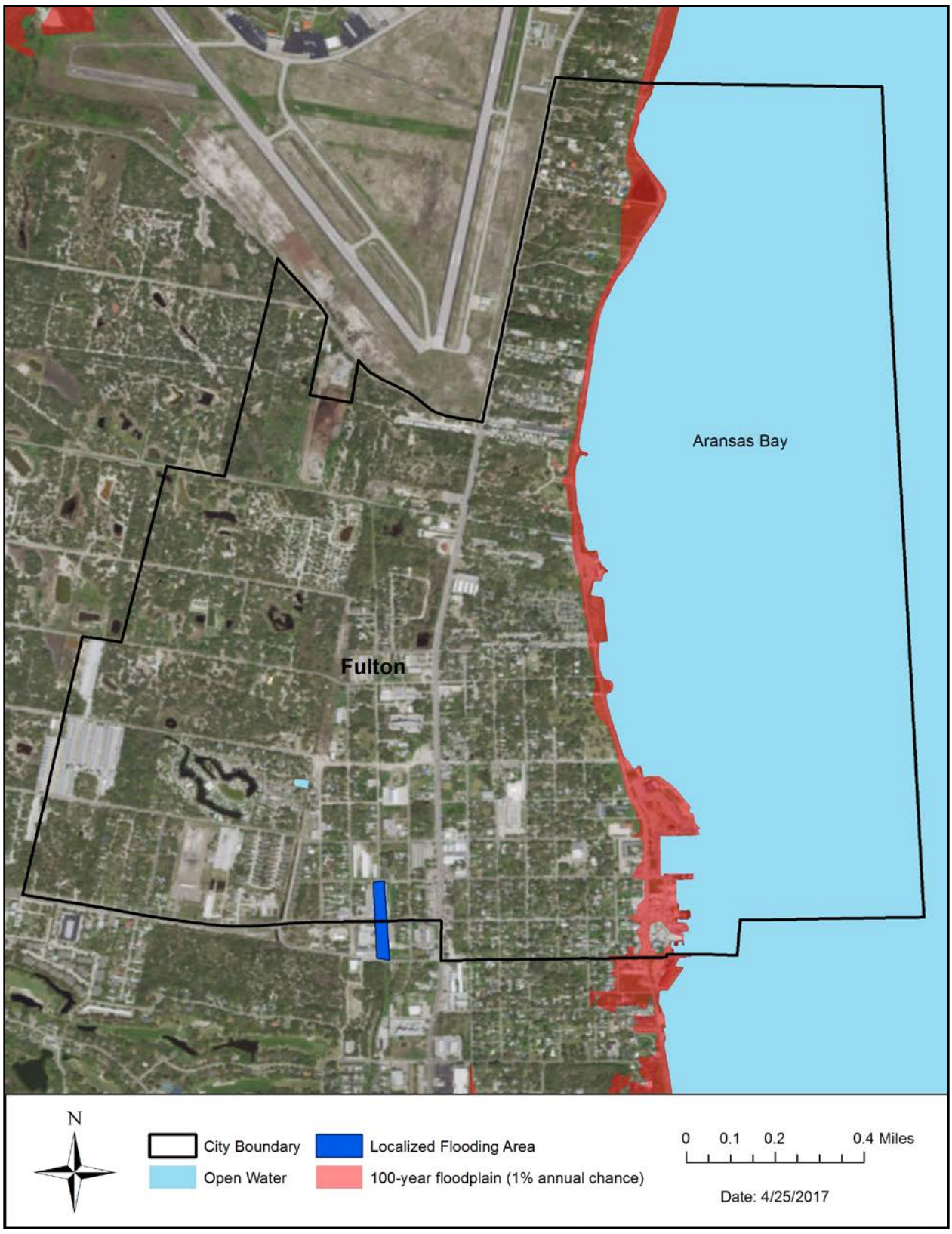
Map 5.17: Fulton Special Flood Hazard Areas (see text pg. 35).



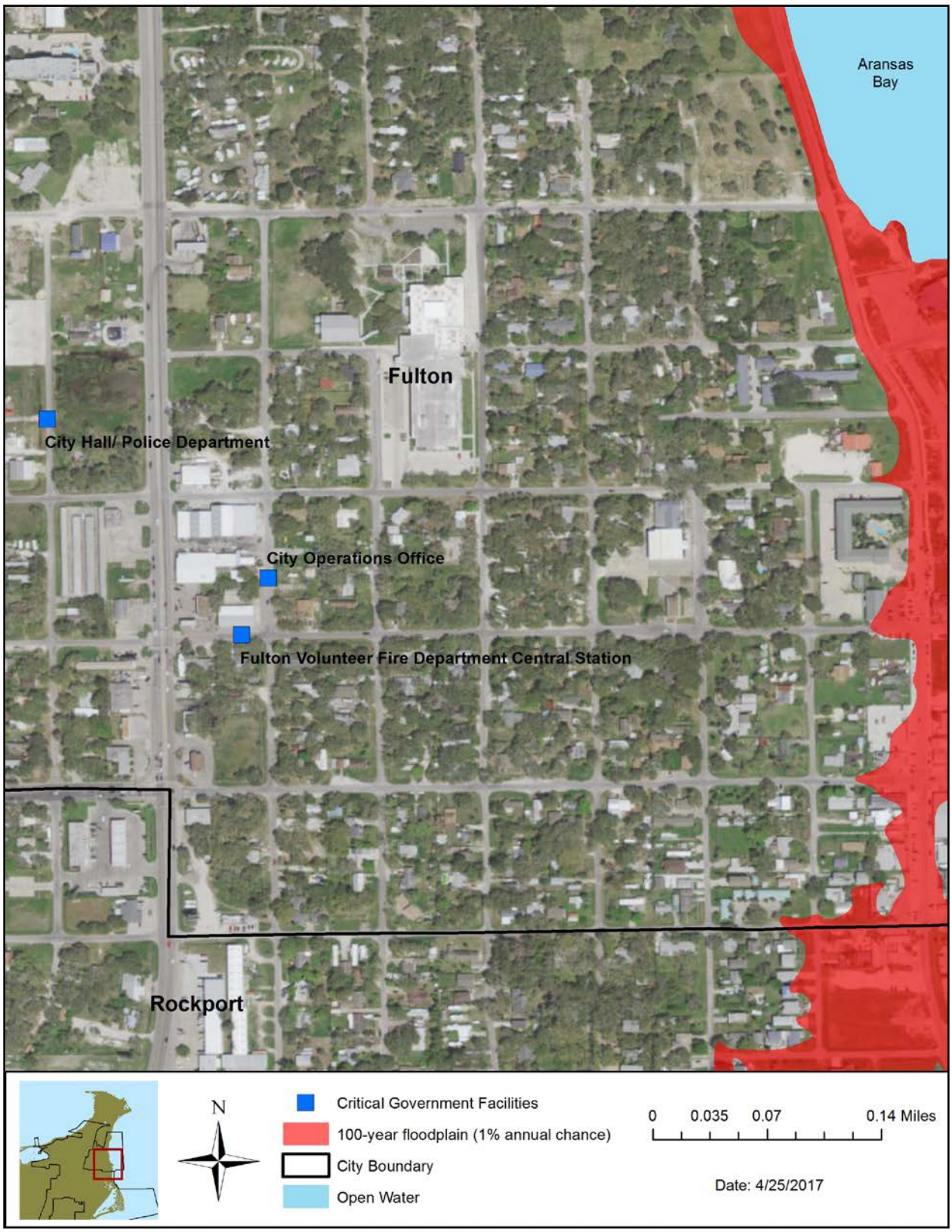
Map 5.18: Fulton Floodplains (see text pg. 35).



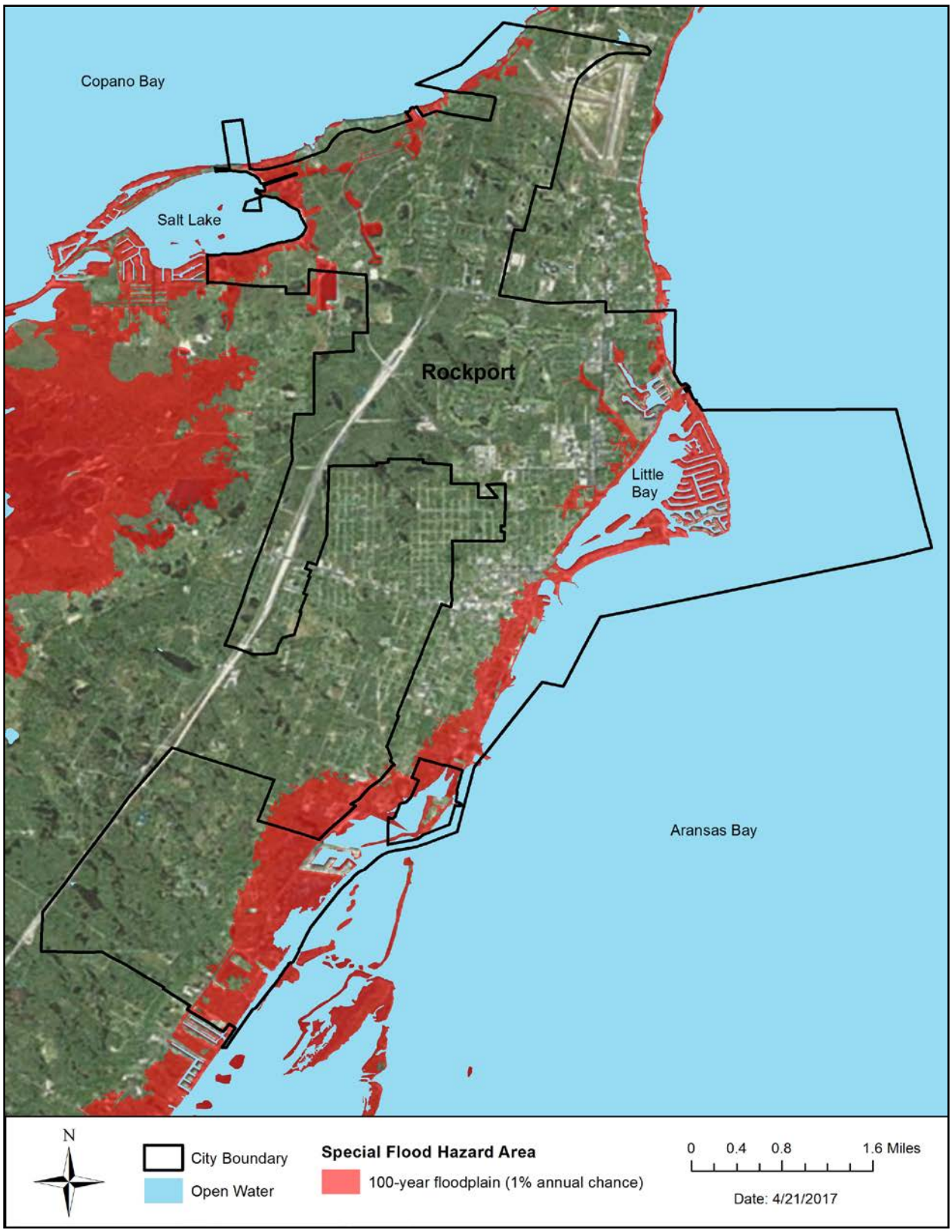
Map 5.19: Fulton Coastal Flood Zones (see text pg. 35).



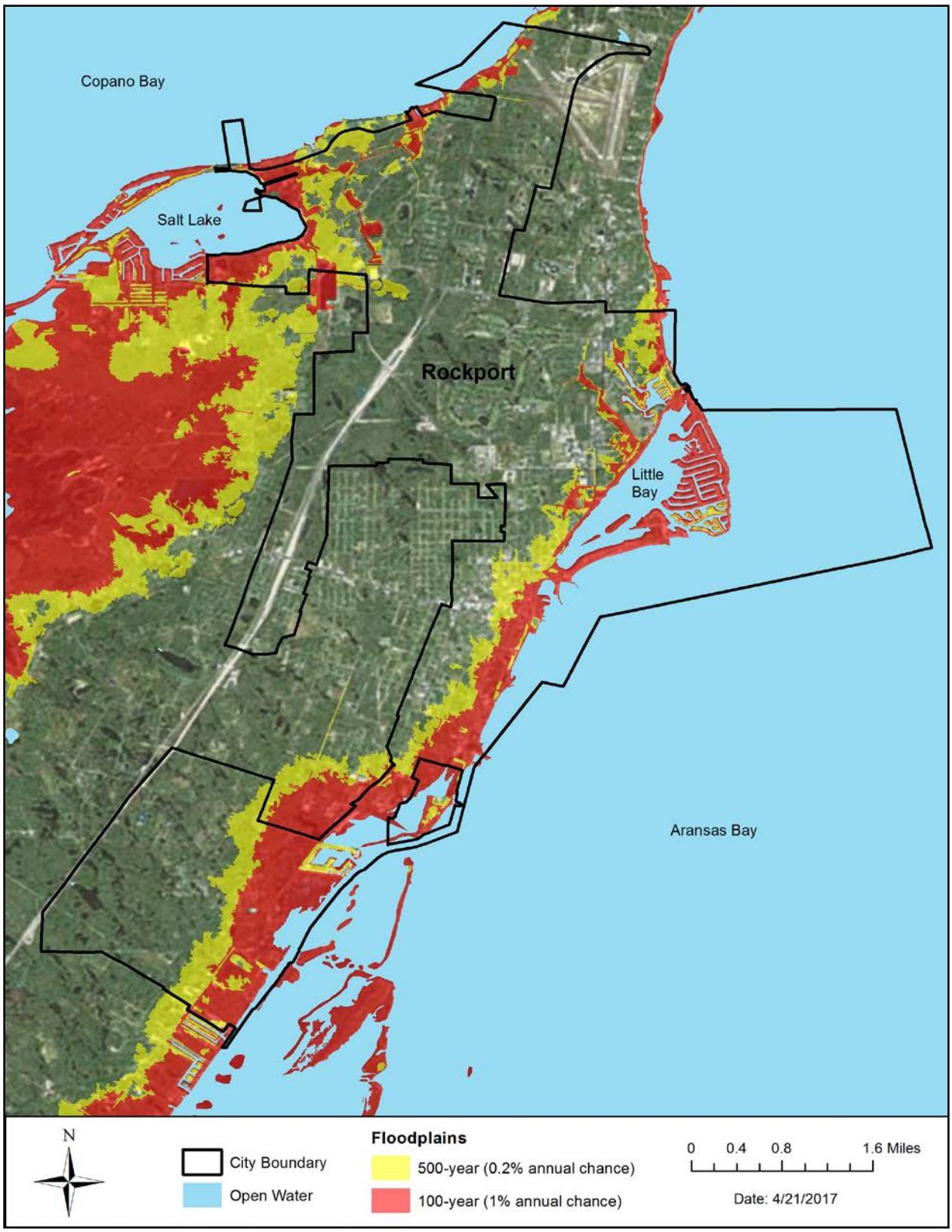
Map 5.20: Localized Flooding in Fulton (see text pg. 35).



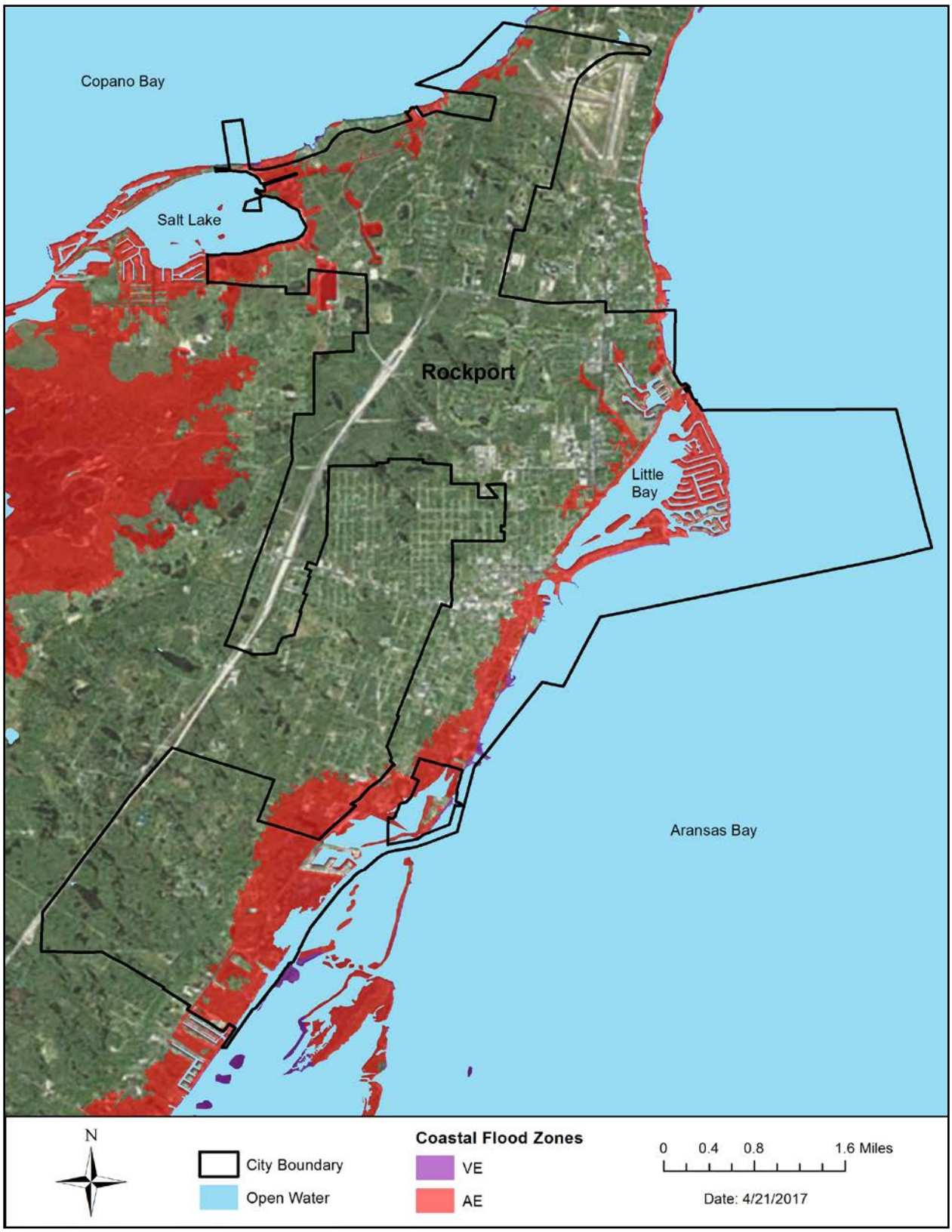
Map 5.21: Fulton Governmental Critical Facilities (see text pg. 35).



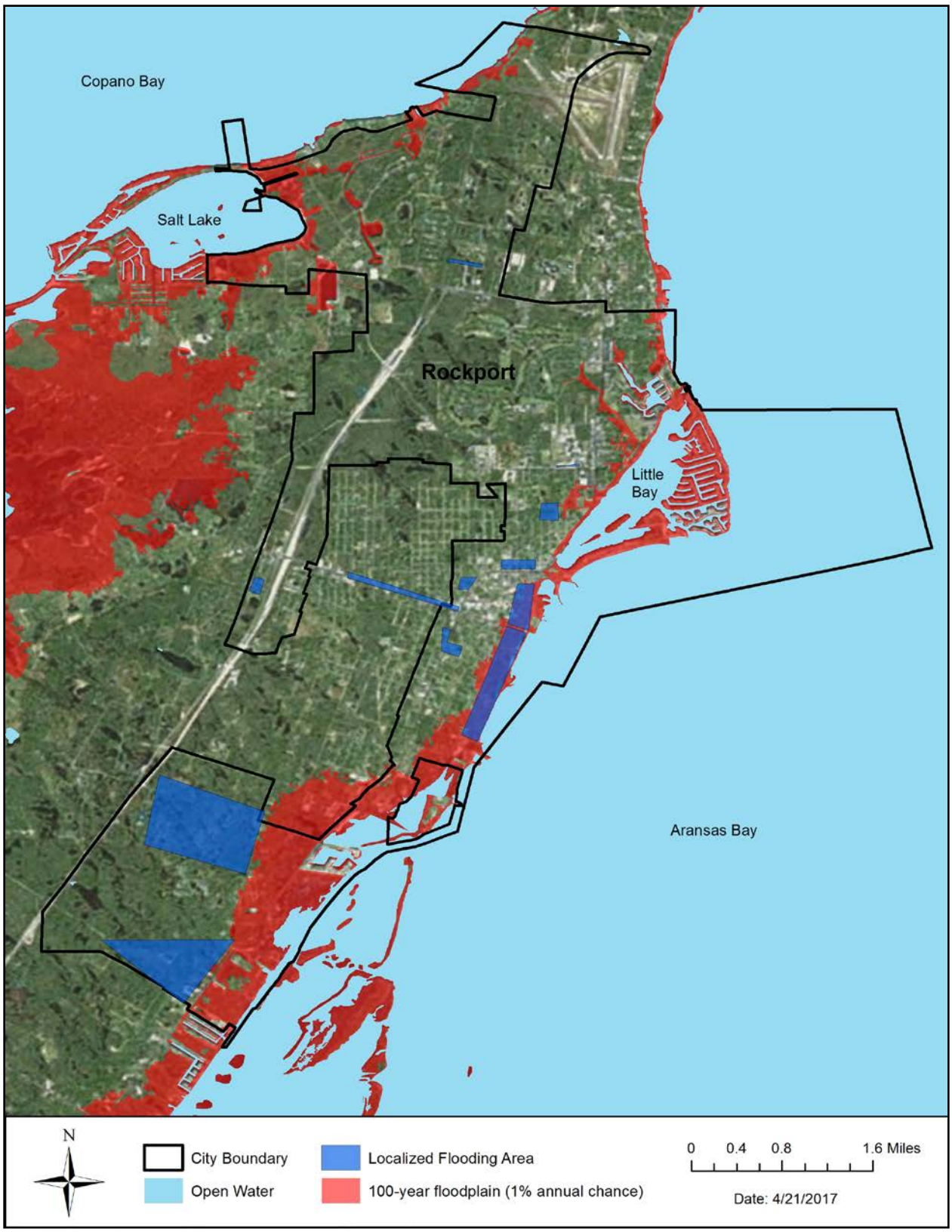
Map 5.22: Rockport Special Flood Hazard Areas (see text pg. 37).



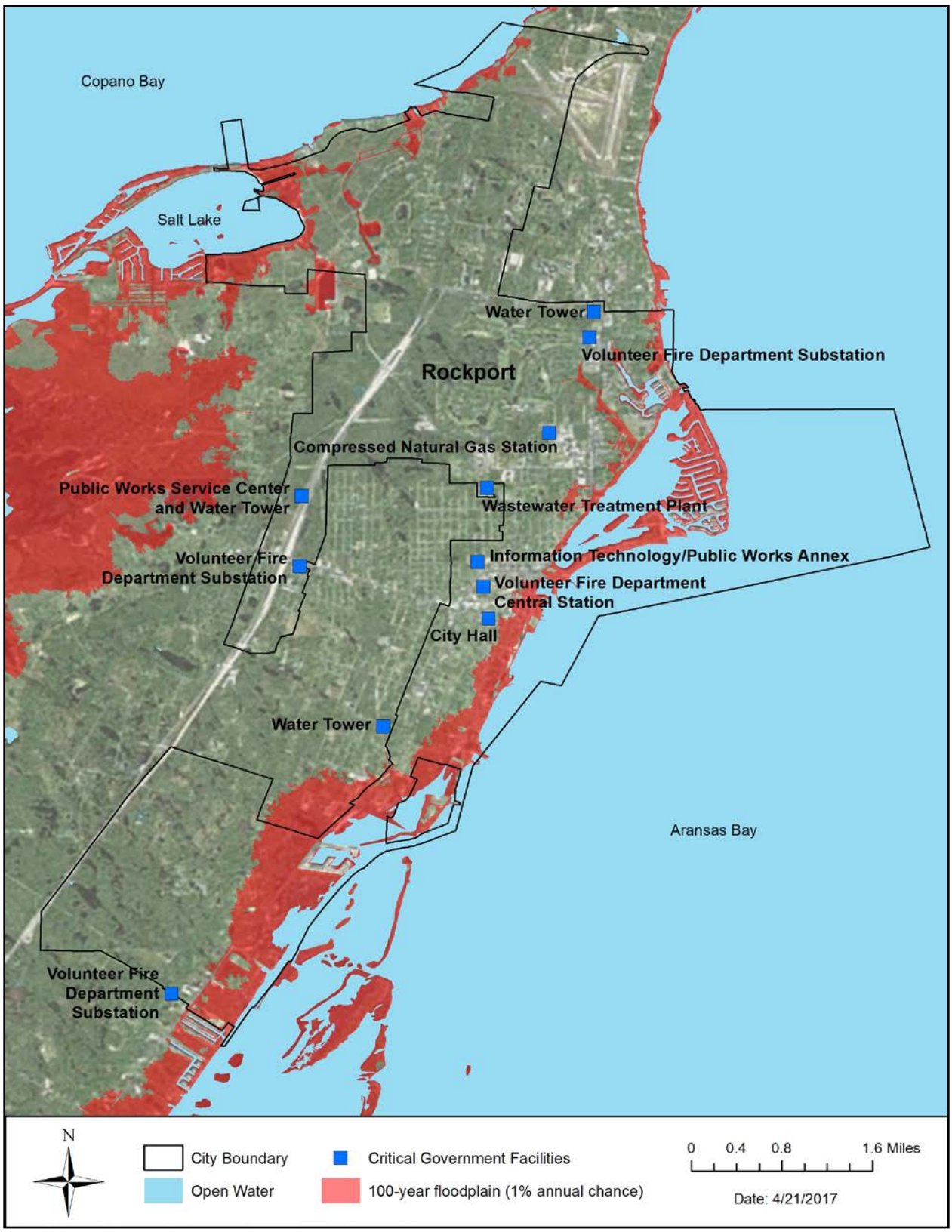
Map 5.23: Rockport Floodplains (see text pg. 37).



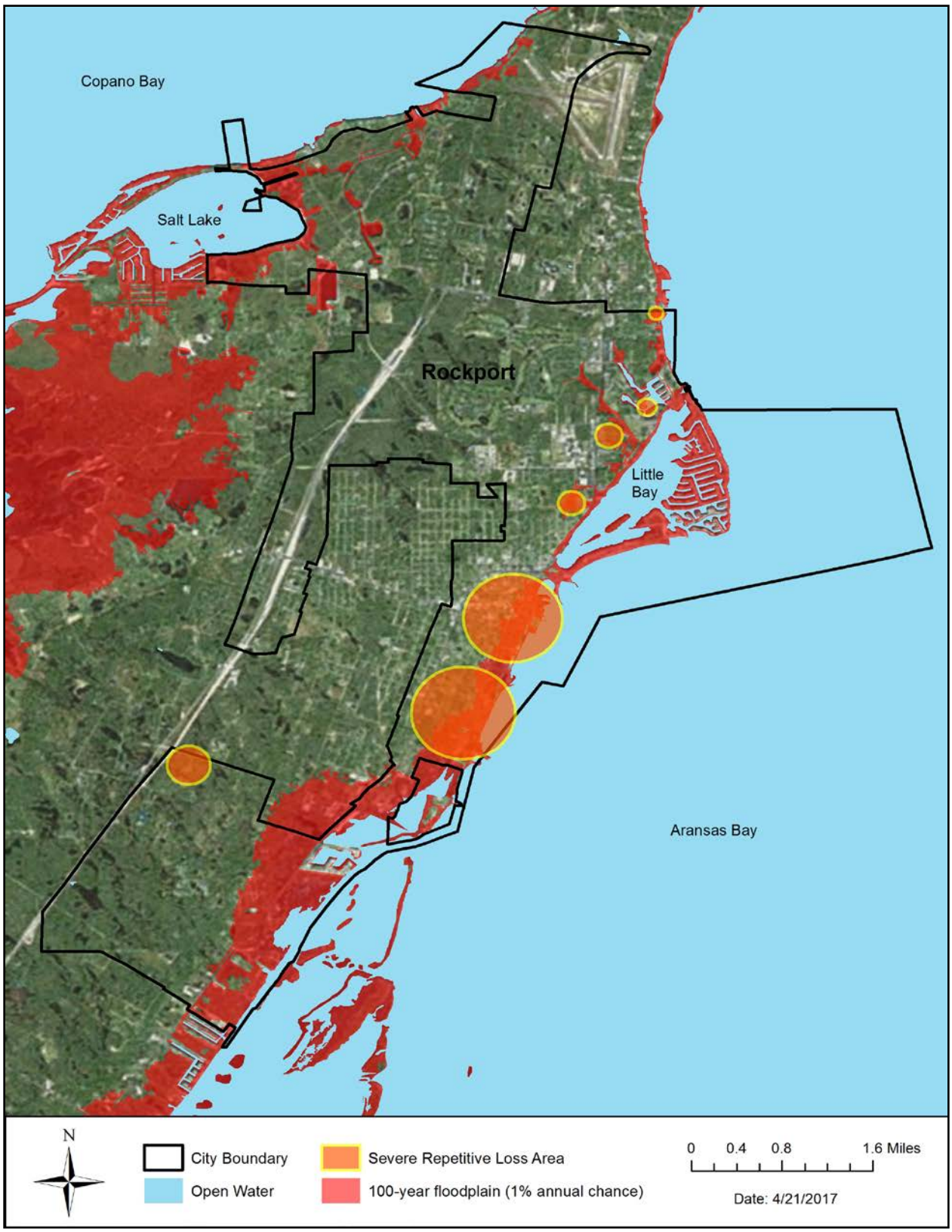
Map 5.24: Rockport Coastal Flood Zones (see text pg. 37).



Map 5.25: Localized Flooding in Rockport (see text pg. 38).



Map 5.26: Rockport Governmental Critical Facilities (see text pg. 38).



Map 5.27: Severe Repetitive Loss Areas in Rockport (see text pg. 40).

REFERENCE LIST

American Planning Association Texas Chapter. (2013). *A Guide to Urban Planning in Texas Communities*. Retrieved April 21, 2017 from https://txplanningguide-ojs-utexas.tdl.org/txplanningguide/index.php/tpg/issue/view/2/showToc

Aransas County. (2016). *Aransas County Coastal Resiliency Initiative*. Unpublished governmental packet.

Aransas County. (2012). *Aransas County Stormwater Master Plan and Management Manual*. Naismith Engineering, URS Corporation, LDP Consultants, Lippke Cartwright & Roberts.

Arbor Day Foundation. (2016). *2015 Tree City USA: Communities in Texas*. Retrieved October 2016 from https://www.arborday.org/programs/treeCityUSA/treecities.cfm?chosenstate=Texas

Balica, S., & Wright, N.G. (2009). A network of knowledge on applying an indicator based methodology for minimizing flood vulnerability. *Hydrological Processes, 23*(20), 2983-2986. DOI: 10.1002/hyp.7424

Edwards, R. (2016). National Oceanic and Atmospheric Administration, Storm Prediction Center. *The online tornado FAQ*. Retrieved December 2016 from http://www.spc.noaa.gov/faq/tornado/index.html#f-scale1

Federal Emergency Management Agency. (2017). *Community Status Book Report*. Retrieved April 13, 2017 from https://www.fema.gov/cis/TX.html

Federal Emergency Management Agency. (2017). *Definitions*. Retrieved April 18, 2017 from https://www.fema.gov/national-flood-insurance-program/definitions#S

Federal Emergency Management Agency. (2013). *Federal Guidelines for Dam Safety Emergency Action Planning for Dams*. Retrieved November 12, 2016 from http://www.swc.nd.gov/pdfs/fema_64_emergency_action_planning_dams.pdf

Federal Emergency Management Agency. (n.d.). *FEMA Flood Map Service Center*. Retrieved November 2016 from https://msc.fema.gov/portal/

Federal Emergency Management Agency. (2016). *Flood Insurance Study: Aransas County, Texas and incorporated areas*. Flood Insurance Study Number 48007CV000A.

Federal Emergency Management Agency. (2016). *Loss Statistics*. Retrieved September 30, 2016 from https://bsa.nfipstat.fema.gov/reports/1040.htm#48

Federal Emergency Management Agency. (2016). *Policy & Claim Statistics for Flood Insurance*. Retrieved September 30, 2016 from https://www.fema.gov/policy-claim-statistics-flood-insurance

Federal Emergency Management Agency. (2013). *National Flood Insurance Program Community Rating System Coordinator's Manual*. (Publication No. OMB 1660-0022 & FIA-15/2013). Retrieved from: http://crsresources.org/

Federal Emergency Management Agency. (2005). *National Flood Insurance Program: Frequently Asked Questions*. Retrieved December 2, 2016 from https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt

Federal Emergency Management Agency. (2016). *Special Flood Hazard Area*. Retrieved from https://www.fema.gov/special-flood-hazard-area

Federal Emergency Management Agency. (n.d.). *Geologic Hazards*. Retrieved October 2016 from https://www.fema.gov/media-library-data/20130726-1545-20490-9696/mhira_n2.pdf

Federal Emergency Management Agency. (2017). *Zone V*. Retrieved April 18, 2017 from https://www.fema.gov/zone-v

Flood Safety. (2016). *Flood Damage and Fatality Statistics*. Retrieved from: http://floodsafety.com/national/life/statistics.htm#biblio

Guthrie, K. (2010). Texas State Historical Association. *Handbook of Texas Online, Aransas Pass, TX*. Retrieved November 12, 2016 from http://www.tshaonline.org/handbook/online/articles/hfa06

National Drought Mitigation Center, Drought Risk Atlas. (2016). *Climate Data*. Retrieved October 2016 from http://droughtatlas.unl.edu/Data.aspx

National Oceanic and Atmospheric Administration. (2017). *Historical Hurricane Tracts*. Retrieved April 24, 2017 from https://coast.noaa.gov/hurricanes/

National Oceanic and Atmospheric Administration. (n.d.). *Severe Weather 101 – Hail*. Retrieved October 2016 from http://www.nssl.noaa.gov/education/svrwx101/hail/

National Oceanic and Atmospheric Administration. (n.d.). *Storm Surge and Coastal Inundation*. Retrieved from http://www.stormsurge.noaa.gov/overview_causes.html

National Oceanic and Atmospheric Administration, Tides and Currents. (n.d.). *Mean Sea Level Trend*. Retrieved October 2016 from https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8774770

National Oceanic and Atmospheric Administration, National Centers for Environmental Information. (n.d.). *Storm Events Database*. Retrieved on March 15, 2016 from https://www.ncdc.noaa.gov/stormevents/

National Weather Service. (2016). *Advanced Hydrologic Prediction Service*. Retrieved November 11, 2016 from http://water.weather.gov/ahps2

National Weather Service. (n.d.). *Hurricane Safety*. Retrieved October 2016 from http://www.nws.noaa.gov/om/hurricane/

National Weather Service. (n.d.). *Significant Corpus Christi Ice Storms*. Retrieved from http://www.weather.gov/crp/icestorms

National Weather Service. (n.d.). *South Texas Icing Event*. Retrieved April 24, 2017 from http://www.weather.gov/crp/icing_jan242014

National Weather Service. (n.d.). *South Texas Ice Storm*. Retrieved from http://www.weather.gov/crp/feb2011_icestorm

National Weather Service. (n.d.). *South Texas White Christmas 2004*. Retrieved April 24, 2017 from http://www.weather.gov/crp/whitechristmas2004

Rockport-Fulton Chamber of Commerce. (n.d.) *Top 10 employers*. Retrieved November 2016 from http://www.rockport-fulton.org/Top-10-Employers

State of Texas. (n.d.). Comptroller.texas.gov. Retrieved November 2016 from https://www.comptroller.texas.gov/

Texas A&M Forest Service. (2016). Wildfire Risk Assessment Portal. Retrieved November 2016 from https://www.texaswildfirerisk.com/

Texas A&M Forest Service. (2017). Wildfire Risk Assessment Portal. Retrieved April 25, 2017 from https://www.texaswildfirerisk.com/

Texas Department of Transportation. 2016. *Hurricane Information*. Retrieved from http://www.txdot.gov/inside-txdot/division/traffic/safety/weather/hurricane.html

Texas Division of Emergency Management. (2010). State of Texas Hazard Mitigation Plan.

Texas Parks and Wildlife Department. (2000). *Wetlands Assistance Guide for Landowners.* (PWD BK R0400-020 (11/00)) Retrieved from http://tpwd.texas.gov/landwater/water/habitats/wetland/publications/wetlands_assistance_guide.phtml

Urban Engineering. (2016). City of Rockport Master Drainage Plan Modeling Report.

United States Census Bureau. (n.d.). American fact finder: Community facts. Retrieved October 2016 from http://factfinder.census.gov/

United States Census Bureau. (2014). American fact finder: Community facts. Retrieved April 21, 2017 from https://factfinder.census.gov/bkmk/table/1.0/en/BP/2014/00A1/0500000US48007

United States Department of Agriculture, Natural Resources Conservation Service. (n.d.). *Web Soil Survey*. Retrieved October 2016 from http://websoilsurvey.sc.egov.usda.gov/

MAP DATA REFERENCES

Chamberlain, Michael. *TxDOT Evacuation Routes.* (Data files). ArcGIS online, November 2016. Retrieved: January 2017. https://www.arcgis.com/home/item.html?id=f2e4fdd46b764af4a514ce6391900d21

Community Health and Resource Management. *National and state parks.* (Data files). n.d.

Environmental Systems Research Institute. *Basemap.* (Data file). ArcGIS online, n.d.

Federal Emergency Management Agency. *Floodplain maps.* (Data files). Retrieved: January 2017. http://msc.fema.gov/portal/advanceSearch

National Oceanic and Atmospheric Administration. *Coastal change analysis program landcover.* (Data files). Retrieved: October 2016. https://coast.noaa.gov/digitalcoast/tools/lca.html

US Census Bureau. *TIGER 2016 roads.* (Data files). Retrieved: September 2016. ftp://ftp2.census.gov/geo/tiger/TIGER2016/ROADS/

US Census Bureau. *TIGER/Line shapefiles.* (Data files). Retrieved: January 2017. https://www.census.gov/geo/maps-data/data/tiger-line.html

ACTIONS TABLE

Goals, Objectives, and Actions	Time Frame	Priority	CRS Categories	Budget
Goal 1: Protect existing resources through regulatory standards.				
Objective 1.1: Investigate the adoption of any further floodplain regulations that would strengthen floodplain management in each of the entities.				
Action 1.1.a: Evaluate current floodplain management regulations in other coastal towns, cities, and counties in order to identify potential areas of improvement for Aransas County jurisdictions.	Years 1-2	Medium	Preventative	Staff time (operating funds)
Action 1.1.b: Using the information collected in Action 1.1.a, create a plan for how, and when, to integrate potential improvements into existing county and municipality regulations.	Years 3-5	Medium	Preventative	Staff time (operating funds)
Action 1.1.c: Create a coordinated development flow-chart for Aransas County, the Town of Fulton, and the City of Rockport floodplain managers.	Year 1	Medium	Preventative	Staff time (operating funds)
Action 1.1.d: Incorporate higher floodplain management standards into City of Aransas Pass comprehensive plan update.	Years 2-3	High	Preventative	Staff time (operating funds) & $76,754 Block Grant
Action 1.1.e: Incorporate higher floodplain management standards into City of Rockport comprehensive plan update.	Years 2-3	High	Preventative	Staff time (operating funds) & Possible Grant
Action 1.1.f: Incorporate higher floodplain management standards into Aransas County Hazard Mitigation Action Plan update.	Years 2-3	High	Preventative	FEMA Flood Mitigation Assistance Funds
Objective 1.2: Research "low impact development."				
Action 1.2.a: Collect best practices methods on low impact development from towns, cities, and counties of similar characteristics.	Years 3-5	Low	Preventative	Staff time (operating funds)
Action 1.2.b: Partner with Mission-Aransas National Estuarine Research Reserve to host a low impact development workshop.	Years 2-3	Low	Preventative	Staff time (operating funds)
Objective 1.3: Utilize the Community Rating System (CRS) to incentivize higher floodplain management standards.				
Action 1.3.a: Complete process of entry into CRS for the City of Rockport.	Year 1	High	Preventative	$60,000
Action 1.3.b: Complete process of entry into CRS for Aransas County.	Years 1-2	High	Preventative	$45,000 GOMA Grant
Action 1.3.c: Investigate whether CRS is viable for the City of Aransas Pass and the Town of Fulton.	Years 2-4	Low	Preventative	Staff time (operating funds)

Goals, Objectives, and Actions	Time Frame	Priority	CRS Categories	Budget
Goal 2: Protect property through mitigative measures.				
Objective 2.1: Develop a prioritized list of natural areas and repetitive loss properties that would be best suited for purchase, in order to create and preserve natural areas to mitigate future flooding.				
Action 2.1.a: Evaluate list of repetitive loss properties for opportunities to partner with property owners regarding potential mitigation actions.	Years 1-2	Medium	Property Protection & Natural Resource Protection	Staff time (operating funds)
Action 2.1.b: Evaluate areas in the floodplain viable for open space preservation.	Years 3-5	Medium	Property Protection & Natural Resource Protection	Staff time (operating funds)
Action 2.1.c: Investigate grant opportunities for property buyouts, open space preservation, or other flood mitigation measures.	Years 3-5	Medium	Property Protection & Natural Resource Protection	Staff time (operating funds)
Action 2.1.d: Investigate potential partnerships with local non-profit organizations to purchase high-priority areas for public parkland/open space preservation (organizations include, but are not limited to: Aransas Pathways, Aransas First, Coastal Bend Bays & Estuaries, and The Nature Conservancy).	Years 3-5	Low	Property Protection & Natural Resource Protection	Staff time (operating funds)
Goal 3: Create a coordinated flood preparedness and response strategy.				
Objective 3.1: Create a comprehensive Public Information Plan.				
Action 3.1.a: Attend public events to promote and sign up vulnerable populations to the State of Texas Emergency Assistance Registry.	Years 1-5 (Ongoing)	High	Public Information	Staff time (operating funds) & $5,000 of Rockport GOMA Award
Action 3.1.b: Develop a joint floodplain management and awareness website with all jurisdictions.	Years 1-2	High	Public Information	Staff time (operating funds) & $8,000 of Rockport GOMA Award
Action 3.1.c: Publish informational flood articles in city and county newsletters.	Years 1-5 (Ongoing)	High	Public Information	Staff time (operating funds) & $2,500 of Rockport GOMA Award

Goals, Objectives, and Actions	Time Frame	Priority	CRS Categories	Budget
Action 3.1.d: Partner with local media outlets to publish and distribute flood literature.	Years 1-2	High	Public Information	Staff time (operating funds) & $2,500 of Rockport GOMA Award
Action 3.1.e: Develop and install educational signage regarding flood safety to be located along low areas of roadways likely to flood.	Years 1-2	High	Public Information	Staff time (operating funds) & $7,000 of Rockport GOMA Award
Action 3.1.f: Create a flood response plan that develops public information projects to be disseminated before, during, and after a flood event.	Years 1-2	High	Public Information	Staff time (operating funds)
Action 3.1.g: Host workshops with property owners concerned about flooding to discuss flood risk and possible mitigation actions.	Years 1-2	High	Public Information	Staff time (operating funds) & $5,000 of Rockport GOMA Award
Action 3.1.h: Send informational mailers to repetitive loss property owners about buyouts and other mitigation options.	Years 1-2	High	Public Information, Property Protection, & Natural Resources Protection	Staff time (operating funds) & $5,000 of Rockport GOMA Award
Objective 3.2: Assess the needs for floodproofing of critical facilities located in the Special Flood Hazard Areas (SFHA).				
Action 3.2.a: Determine whether any lift stations and pump stations need generators.	Year 1	Low	Property Protection	Staff time (operating funds)
Action 3.2.b: Establish best management practices for floodproofing and mitigating historic buildings in Aransas County.	Years 3-5	Medium	Property Protection	Staff time (operating funds)
Goal 4: Create a coordinated infrastructure plan for all jurisdictions.				
Objective 4.1: Create a county-wide, prioritized, master plan of all flood related projects.				
Action 4.1.a: Work across jurisdictions to coordinate drainage/stormwater projects that impact the same watershed or sub-watersheds while working to create a county-wide, prioritized, master plan of all flood related projects.	Years 1-5 (Ongoing)	Medium	Preventive & Structural Projects	Operating & capital improvement funds
Action 4.1.b: Each jurisdiction will continue ongoing maintenance of drainage pipes, culverts, and swales until the county-wide master plan is approved and implementation can begin.	Years 1-5 (Ongoing)	High	Preventive & Structural Projects	Operating & capital improvement funds

Goals, Objectives, and Actions	Time Frame	Priority	CRS Categories	Budget
Action 4.1.c: Continue to use county resiliency group to investigate potential funding options for erosion protection and habitat restoration.	Years 1-5 (Ongoing)	Medium	Preventive, Natural Resource Protection, & Structural Projects	Staff time (operating funds)

FLOODPLAIN MANAGEMENT PLANNING CHECKLIST (510)

Community: Aransas County, Texas

Aransas County Multi-Jurisdictional Floodplain Management Plan

511.a Floodplain Management Planning (FMP)

Credit Points: *Enter the section or page number of the plan where each credited item can be found.*

	Section/Page	Item Score	Step Total
1. Organize to prepare the plan. (max:15)			
a. Involvement of Office Responsible for Community Planning (4)	Chapter 2, pg. 11-13; & Vol II, Chapter 8		
b. Planning committee of department staff (9)	Chapter 2, pg. 11-13; & Vol II, Chapter 8		
c. Process formally created by the community's governing board (2)	Chapter 2, pg. 13		0
2. Involve the public. (max: 120)			
a. Planning process conducted through a planning committee (60)	Chapter 2, pg. 11-13		
b. Public meetings held at the beginning of the planning process (15)	Chapter 3, pg. 14		
c. Public meeting held on draft plan (15)	Chapter 3, pg. 15		
d. Other public information activities to encourage input (Up to 30)	Chapter 3, pg. 14-15; & Vol. II, Chapters 4 & 5		0
3. Coordinate with other agencies. (max: 35)			
a. Review of existing studies and plans [REQUIRED] (5)	Chapter 4, pg. 16-18; & Vol. II, Chapter 6		
b. Coordinating with communities and other agencies (Up to 30)	Chapter 4, pg. 16-18; & Vol. II, Chapter 7		0
4. Assess the hazard. (max: 35)			
a. Plan includes an assessment of the flood hazard [REQUIRED] with:			
(1) A map of known flood hazards (5)	Maps 5.3-5.27, pg. 78-108		
(2) A description of known flood hazard (5)	Chapter 5, pg. 19-23		
(3) A discussion of past floods (5)	Chapter 5, pg. 19-23		
b. Plan includes assessment of less frequent floods (10)	Chapter 5, pg. 27-40; & Maps		
c. Plan includes assessment of areas likely to flood (5)	Chapter 5, pg. 27-40		
d. The plan describes other natural hazards [REQUIRED FOR DMA] (5)	Chapter 5, pg. 40-56		0

5. Assess the problem. (max: 52)			
a. Summary of each hazard identified in the hazard assessment and their community impact [REQUIRED] (2)	Chapter 5, pg. 40-56		
b. Description of the impact of the hazards on: (max: 25)			
(1) Life, safety, health, procedures for warning and evacuation (5)	Chapter 5, pg. 23-24		
(2) Public health including health hazards to floodwaters/mold (5)	Chapter 5, pg. 24		
(3) Critical facilities and infrastructure (5)	Chapter 5, pg. 27-40; & Maps		
(4) The community's economy and tax base (5)	Chapter 5, pg. 24-25		
(5) Number and type of affected buildings (5)			
c. Review of all damaged buildings/flood insurance claims (5)	Chapter 5, pg. 27-40		
d. Areas the provide natural floodplain functions (5)	Chapter 5, pg. 25-27		
e. Development/redevelopment/Population Trends (7)	Chapter 5, pg. 27-40		
f. Impact of future flooding conditions outline in Step 4, item c (5)			0
6. Set goals. [REQUIRED] (2)	Chapter 6, pg. 57		0
7. Review possible activities. (max: 35)			
a. Preventive activities (5)	Chapter 6, pg. 58		
b. Floodplain Management Regulatory/current & future conditions (5)	Chapter 6, pg. 58		
c. Property protection activities (5)	Chapter 6, pg. 59		
d. Natural resource protection activities (5)	Chapter 6, pg. 59		
e. Emergency services activities (5)	Chapter 6, pg. 59		
f. Structural projects (5)	Chapter 6, pg. 60		
g. Public information activities (5)	Chapter 6, pg. 59		0
8. Draft an action plan. (max: 60)			
a. Actions must be prioritized [REQUIRED]			
(1) Recommendations for activities from two of the six categories (10)	Chapter 7, pg. 61-69		
(2) Recommendations for activities from three of the six categories (20)	Chapter 7, pg. 61-69		
(3) Recommendations for activities from four of the six categories (30)	Chapter 7, pg. 61-69		
(4) Recommendations for activities from five of the six categories (45)	Chapter 7, pg. 61-69		

b. Post-disaster mitigation policies and procedures (10) c. Action items for mitigation of other hazards (5)	Chapter 7, pg. 61-69 (hurricanes and sea level rise)		0
9. Adopt the plan. (2)	Chapter 8, pg. 70; & Vol. II, Chapter 9		0
10. Implement, evaluate and revise. (max: 26)			
a. Procedures to monitor and recommend revisions [REQUIRED] (2)	Chapter 9, pg. 71		
b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation (24)	Chapter 9, pg. 71		0
Maximum Credit for 510 FMP = 382		**Plan Total:**	**0**