

Harris County Multi-Hazard Mitigation Action Plan

Volume 2—Planning Partner Annexes

April 2020



TETRA TECH



21. CITY OF SEABROOK

21.1 HAZARD MITIGATION PLAN POINT OF CONTACT

Primary Point of Contact

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21.2 JURISDICTION PROFILE

21.2.1 Location

The City of Seabrook is located just 30 minutes south of downtown Houston, Seabrook is the southernmost city Harris County along State Highway 146. Located on Galveston Bay, Clear Lake, and Taylor Lake. Seabrook has water on Eastern Side, South western side and the North West side of the City.

State Highway 146 divides the City into two halves. To the south of Seabrook is Kemah, Texas which is connected by the Seabrook/Kemah Bridge, which cross the Clear Creek Channel. To the north of Seabrook is Pasadena and Port of Houston Bayport Terminal. To the west of Seabrook is El Lago. Seabrook with El Lago and a portion of Pasadena is actually an Island in the southernmost portion of Harris County.

Seabrook currently encompasses an area of approximately 5 square miles of land not including several square miles of Galveston Bay.

21.2.2 History

The City of Seabrook was incorporated in October 23, 1961. Historic records date back to 1832, when Ritson Morris, a native Virginian, obtained a league of land from the Mexican government. A portion of the land was purchased by Seabrook W. Sydnor in 1895 and a plat was filed with the Harris County Courthouse the following year.

In March 1903, the Seabrook Company of Houston filed a revised layout of the proposed Seabrook town site, which appealed to local farmers, fishermen and merchants. Some years later, in 1961, local leaders had the city incorporated.

In 1964, not long after the city became incorporated, a bridge was built between Kemah and Seabrook plus State Highway 146 was established as a four-lane highway. The bridge and highway allowed easy access to Seabrook along Galveston Bay and the small town began to grow considerably. A youth center named for astronaut Edward H. White II, America's first space walker, opened in 1971.

Through the years the City has gone through many growing pains as the widening of Nasa Parkway, State High 146 and again the current widening of State High 146. Other growing pains of Natural Disasters strike home with Hurricane Carla, Hurricane Alicia, Hurricane Ike and Hurricane Harvey.

21.2.3 Climate

Seabrook’s climate is classified as humid subtropical. Prevailing winds from the south and southeast bring heat from the deserts of Mexico and moisture from the Gulf of Mexico.

Summer temperatures typically have highs near 91 °F though higher temperatures are not uncommon. The city’s proximity to the bay and the winds that it generates moderate the area’s temperatures and ease the effects of the humidity, creating a more pleasant climate than inland communities like Houston.

Winters in the area are temperate with typical January 61 °F and lows are near 45 °F. Snowfall is rare. Annual rainfall averages exceed 56 inches, with an annual average of 69 precipitation days.

The average elevation of Seabrook is approximately 11 ft. above sea level.

21.2.4 Governing Body Format

The City of Seabrook is a Home Rule City operating under the Council-Manager form of government, with a City Council composed of a Mayor (elected at large) and six at large Council members. The City Council appoints a City Manager to act as the chief administrative and executive officer of the City.

The City of Seabrook City Council assumes responsibility for the adoption of this plan; The Office of Emergency Management will oversee its implementation. Development of this annex was carried out by the members of the local mitigation planning team, whose members are listed in Table 21-1.

Table 21-1. Local Mitigation Planning Team Members

Name	Title
Charles J. Galyean	OEM Director
Nick Kondejewski	Building Official, FPM
Sean Landis	Deputy City Manager
Kevin Padgett	Public Works Director
Brian Craig	Assistant Public Works Dir
Brad Goudie	Director of Emergency Services
Amanda Alvarado	Communication

21.3 CURRENT TRENDS

21.3.1 Population

According to U.S. Census, the population of City of Seabrook, as of July 1, 2017 was 13,693. Since 2010, the population has grown at an average annual rate of 3 percent. Over the last year the population growth has leveled off due to a lack of development and lack of buildable land space.

21.3.2 Development

The City of Seabrook is zoned community with large residential base with commercial throughout the major roadways in the city. Major construction by the State of Texas on a Roadway expansion project will and has had a

very large impact to the community. There were over 60 business that were affected by this expansion and many did not relocate within the city and some have chosen to not to reopen anywhere after the buyout by TxDOT.

With the multi-year long construction project by TxDOT development along this corridor is slow and slow city wide due to the impact of construction. During this time construction is primarily in fill in the residential areas of the city.

Table 21-2 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 21-2. Recent and Expected Future Development Trends

Criterion	Response																														
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • If yes, give the estimated area annexed and estimated number of parcels or structures.	No																														
Is your jurisdiction expected to annex any areas during the performance period of this plan? • If yes, describe land areas and dominant uses. • If yes, who currently has permitting authority over these areas?	No																														
Are any areas targeted for development or major redevelopment in the next five years? • If yes, briefly describe, including whether any of the areas are in known hazard risk areas	Yes The areas for development over the next 5 years are as follows: <ul style="list-style-type: none"> • S.H. 146 corridor -- This will be commercial development consisting on mainly retail. • Repsdorph and Lakeside (Town Center) -- will consist of commercial development that will mainly contain retail. • Water Front Drive – Will consist of commercial with retail, restaurant, entertainment. • North end of the City East of State Hwy 146 – Commercial, Light industrial and residential 																														
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">2014</th> <th style="text-align: center;">2015</th> <th style="text-align: center;">2016</th> <th style="text-align: center;">2017</th> <th style="text-align: center;">2018</th> </tr> </thead> <tbody> <tr> <td>Single Family</td> <td style="text-align: center;">19</td> <td style="text-align: center;">20</td> <td style="text-align: center;">23</td> <td style="text-align: center;">27</td> <td style="text-align: center;">30</td> </tr> <tr> <td>Multi-Family</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Other (commercial, mixed use, etc.)</td> <td style="text-align: center;">4</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">24</td> <td style="text-align: center;">21</td> <td style="text-align: center;">28</td> <td style="text-align: center;">32</td> <td style="text-align: center;">32</td> </tr> </tbody> </table>		2014	2015	2016	2017	2018	Single Family	19	20	23	27	30	Multi-Family	1	0	1	0	0	Other (commercial, mixed use, etc.)	4	1	4	5	2	Total	24	21	28	32	32
	2014	2015	2016	2017	2018																										
Single Family	19	20	23	27	30																										
Multi-Family	1	0	1	0	0																										
Other (commercial, mixed use, etc.)	4	1	4	5	2																										
Total	24	21	28	32	32																										
Provide the number of new-construction permits for each hazard area or provide a qualitative description of where development has occurred.	<ul style="list-style-type: none"> • Special Flood Hazard Areas: 110 • Landslide: 0 • High Liquefaction Areas: 0 • Tsunami Inundation Area: 0 • Wildfire Risk Areas: 0 																														
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Currently the City is about at 85% buildout with limited areas for development. Fill in areas with in the residential areas and fill in area through the Commercially Zoned areas.																														

21.4 CAPABILITY ASSESSMENT

The City of Seabrook performed an assessment of its existing capabilities for implementing hazard mitigation strategies. The introduction at the beginning of this volume of the hazard mitigation plan describes the components included in the capability assessment and their significance for hazard mitigation planning. This section summarizes the following findings of the assessment:

- An assessment of legal and regulatory capabilities is presented in Table 21-3.
- Development and permitting capabilities are presented in Table 21-4.
- An assessment of fiscal capabilities is presented in Table 21-5.
- An assessment of administrative and technical capabilities is presented in Table 21-6.
- An assessment of education and outreach capabilities is presented in Table 21-7.
- Information on National Flood Insurance Program (NFIP) compliance is presented in Table 21-8.
- Classifications under various community mitigation programs are presented in Table 21-9.
- The community’s adaptive capacity for the impacts of climate change is presented in Table 21-10.

Findings of the capability assessment were reviewed to identify opportunities to expand, initiate or integrate capabilities to further hazard mitigation goals and objectives. Where such opportunities were identified and determined to be feasible, they are included in the action plan. The “Analysis of Mitigation Actions” table included in the action plan for this annex identifies these as community capacity building mitigation actions.

Table 21-3. Legal and Regulatory Capability

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Codes, Ordinances, & Requirements				
Building Code	Yes	No	No	No
<i>Comment: Seabrook has adopted the 2015 ICC Code complement and the 20117 NEC</i>				
Zoning Code	Yes	No	No	No
<i>Comment: Seabrook, Texas Code of Ordinance, Chapter80</i>				
Subdivisions	Yes	No	No	No
<i>Comment: Seabrook, Texas Code of Ordinance, Chapter80</i>				
Stormwater Management	Yes	Yes	Yes	No
<i>Comment: Seabrook, Texas Charter Article II – Flood Damage Prevention</i>				
Post-Disaster Recovery	No	No	no	NO
<i>Comment:</i>				
Real Estate Disclosure	Yes	No	Yes	Yes
<i>Comment:</i>				
Growth Management	Yes	No	No	No
<i>Comment:</i>				
Site Plan Review	Yes	Yes	No	No
<i>Comment: Both the city and county review commercial development plans storm water requirements</i>				
Environmental Protection	Yes	Yes	Yes	Yes
<i>Comment:</i>				
Flood Damage Prevention	Yes	No	Yes	Yes
<i>Comment: Harris County</i>				
Emergency Management	Yes	Yes	Yes	Yes
<i>Comment: Emergency Operations Plan with Basic Plan with 22 Annexes updated every fifth year</i>				
Climate Change	No	No	No	No
<i>Comment: Seabrook Currently has no specific regulations related to change but may consider in the future.</i>				

	Local Authority	Other Jurisdiction Authority	State Mandated	Integration Opportunity?
Planning Documents				
General Plan <i>Comment: City of Seabrook Comprehensive Master Plan</i>	Yes	No	Yes	Yes
Capital Improvement Plan <i>How often is the plan updated? Annually</i> <i>Comment:</i>	Yes	No	No	Yes
Disaster Debris Management Plan <i>Comment:</i>	No	No	No	NO
Floodplain or Watershed Plan <i>Comment: Harris County Flood Control</i>	No	Yes	No	No
Stormwater Plan <i>Comment: MS4 permit and SWQMP</i>	Yes	No	Yes	No
Urban Water Management Plan <i>Comment:</i>	No	No	No	No
Habitat Conservation Plan <i>Comment: Gulf / Houston regional conservation plan.</i>	No	Yes	No	No
Economic Development Plan <i>Comment:</i>	No	No	No	No
Shoreline Management Plan <i>Comment: Gulf / Houston regional conservation plan.</i>	No	Yes	Yes	No
Community Wildfire Protection Plan <i>Comment: Gulf / Houston regional conservation plan.</i>	No	Yes	No	No
Forest Management Plan <i>Comment:</i>	No	No	No	No
Climate Action Plan <i>Comment:</i>	No	No	No	Yes
Emergency Management Plan <i>Comment: Annex P — Hazard Mitigation and Hazard Summaries in Basic Plan</i>	Yes	Yes	Yes	Yes
Threat & Hazard Identification & Risk Assessment (THIRA) <i>Comment: State and Harris County</i>	No	Yes	yes	yes
Post-Disaster Recovery Plan <i>Comment: Currently in the works</i>	Yes	No	No	Yes
Continuity of Operations Plan <i>Comment: Currently in the works</i>	Yes	No	No	No
Public Health Plan <i>Comment:</i>	No	Yes	No	NO
Park Plan <i>Comment: Park Trails Master Plan</i>	Yes	No	No	Yes

Table 21-4. Development and Permitting Capability

Criterion	Response
Does your jurisdiction issue development permits? • If no, who does? If yes, which department?	Yes (Building Department)
Does your jurisdiction have the ability to track permits by hazard area?	Yes (Flood Only)
Does your jurisdiction have a buildable lands inventory?	No

Table 21-5. Fiscal Capability

Financial Resource	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes – Water and Sewer
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	No
State-Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Table 21-6. Administrative and Technical Capability

Staff/Personnel Resource	Available?	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Public Work/Seabrook/City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Yes	Public Work/Seabrook/City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Public Work/Seabrook/City Engineer
Staff with training in benefit/cost analysis	Yes	Emergency Management
Surveyors	No	(Reliance on licensed consultant)
Personnel skilled or trained in GIS applications	Yes	Public Works/Seabrook/GIS Tech
Scientist familiar with natural hazards in local area	No	(Reliance on licensed professional)
Emergency manager	Yes	Emergency Management
Grant writers	No	Everyone No professional
Other	Yes/No	Insert appropriate information

Table 21-7. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes Links to the Harris County Plan Building Department is responsible for floodplain management and public outreach efforts regarding flooding hazards for CRS participation.
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes Link to Harris County Sites
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	No
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes Community Rating System, Social Media accounts, and Emergency Management websites. City Hall and Library can be a source of printed material on hazard mitigation and flooding.
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes Telephone Call down & TEXT, Email, Social Media

Table 21-8. National Flood Insurance Program Compliance

Criterion	Response
What local department is responsible for floodplain management?	Building Department
Who is your floodplain administrator? (department/position)	Building Department/Building Official
Are any certified floodplain managers on staff in your jurisdiction?	Yes
What is the date that your flood damage prevention ordinance was last amended?	November 1, 2016
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Exceeds Higher regulatory standards enforced across the entire city (beyond the SFHA)
When was the most recent Community Assistance Visit or Community Assistance Contact?	Fall 2018
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state what they are.	No N/A
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what they are.	No Harris County – Flood Insurance Study, revised preliminary November 13, 2018. Coastal flood mapping – TXCHART, Preliminary March 29, 2013.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If no, state why.	Yes Map revisions will be made based on the most recent precipitation frequencies in Texas through the NOAA Atlas 14 study.
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Yes Any and all training is never enough
Does your jurisdiction participate in the Community Rating System (CRS)? • If yes, is your jurisdiction interested in improving its CRS Classification? • If no, is your jurisdiction interested in joining the CRS program?	Yes Yes N/A
How many flood insurance policies are in force in your jurisdiction? • What is the insurance in force? • What is the premium in force?	3383 ^a \$1,004,594,000 ^a \$3,163,902 ^a
How many total loss claims have been filed in your jurisdiction? • How many claims are still open or were closed without payment? • What were the total payments for losses?	2,505 ^a 0 ^a \$119,384,447 ^a

a. According to FEMA statistics as of March 3, 2019

Table 21-9. Community Classifications

	Participating?	Classification	Date Classified
Community Rating System	Yes	7	Oct. 1, 2011
Building Code Effectiveness Grading Schedule	Yes	4/4	Oct. 2, 2017
Public Protection	Yes	3	March 1, 2016
Storm Ready	No	N/A	N/A
Firewise	No	N/A	N/A

Table 21-10. Adaptive Capacity for Climate Change

Criterion	Jurisdiction Rating^a
Technical Capacity	
Jurisdiction-level understanding of potential climate change impacts <i>Comment:</i>	Low
Jurisdiction-level monitoring of climate change impacts <i>Comment:</i>	Low
Technical resources to assess proposed strategies for feasibility and externalities <i>Comment:</i>	Low
Jurisdiction-level capacity for development of greenhouse gas emissions inventory <i>Comment:</i>	Low
Capital planning and land use decisions informed by potential climate impacts <i>Comment:</i>	Low
Participation in regional groups addressing climate risks <i>Comment:</i>	Low
Implementation Capacity	
Clear authority/mandate to consider climate change impacts during public decision-making processes <i>Comment:</i>	Low
Identified strategies for greenhouse gas mitigation efforts <i>Comment:</i>	Low
Identified strategies for adaptation to impacts <i>Comment:</i>	Low
Champions for climate action in local government departments <i>Comment:</i>	Low
Political support for implementing climate change adaptation strategies <i>Comment:</i>	Low
Financial resources devoted to climate change adaptation <i>Comment:</i>	Low
Local authority over sectors likely to be negative impacted <i>Comment:</i>	Low
Public Capacity	
Local residents knowledge of and understanding of climate risk <i>Comment:</i>	Low
Local residents support of adaptation efforts <i>Comment:</i>	Low
Local residents' capacity to adapt to climate impacts <i>Comment:</i>	Low
Local economy current capacity to adapt to climate impacts <i>Comment:</i>	Low
Local ecosystems capacity to adapt to climate impacts <i>Comment:</i>	Low

a. High = Capacity exists and is in use; Medium = Capacity may exist, but is not used or could use some improvement;
Low = Capacity does not exist or could use substantial improvement; Unsure= Not enough information is known to assign a rating.

21.5 INTEGRATION WITH OTHER PLANNING INITIATIVES

For hazard mitigation planning, “integration” means that hazard mitigation information is used in other relevant planning mechanisms, such as general planning and capital facilities planning, and that relevant information from those sources is used in hazard mitigation. This section identifies where such integration is already in place, and where there are opportunities for further integration in the future. Resources listed in this annex were used to provide information on integration. The progress reporting process described in Volume 1 will document the progress of hazard mitigation actions related to integration and identify new opportunities for integration.

21.5.1 Existing Integration

Some level of integration has already been established between local hazard mitigation planning and the following other local plans and programs:

- **Capital Improvement Plan** — Looking to make sure improvements are made with the Mitigation Plan needs
- **Basic Plan** — The Basic Plan provides a summary on the hazards and threats in the community.
- **Annex P — Hazard Mitigation** is assigned to the Engineering Department and addresses the hazards and threats in the community. The Annex also identifies the various hazard mitigation related programs implemented in the City of Seabrook and which agencies are responsible for administration.

21.5.2 Opportunities for Future Integration

The capability assessment presented in this annex identified the following plans and programs that do not currently integrate hazard mitigation information but provide opportunities to do so in the future:

21.6 JURISDICTION-SPECIFIC NATURAL HAZARD EVENT HISTORY

Table 21-11 lists past occurrences of natural hazards for which specific damage was recorded in City of Seabrook. Other hazard events that broadly affected the entire planning area, including City of Seabrook, are listed in the risk assessments in Volume 1 of this hazard mitigation plan.

Table 21-11. Past Natural Hazard Events

Type of Event	FEMA Disaster #	Date	Damage Assessment
Hurricane Harvey	4332	2017	\$1,000,000
Serve Storms and Flooding	4269	2016	Not Available
Serve Storms and Flooding	4272	2016	Not Available
Tropical Storm Bill	N/A	2015	Not Available
Hurricane IKE	1791	2008	\$15,000,000
Thunder Strom	N/A	1/31/2008	\$5,000
Tropical Storm Erin	1730	2007	Not Available
Hail	N/A	07/11/2003	\$8000
Thunderstorm Wind	N/A	07/11/2003	\$11000
Hail	N/A	04/07/2003	\$2000
Tornado	N/A	12/30/2002	\$5000
Tropical Storm Allison	1379	2001	\$10,000
Hurricane Alicia	689	1983	\$5,000,000

21.7 HAZARD RISK RANKING

Table 21-12 presents a local ranking for City of Seabrook, of all hazards of concern for which this hazard mitigation plan provides complete risk assessments. This ranking summarizes how hazards vary for this jurisdiction. As described in detail in Volume 1, the ranking process involves an assessment of the likelihood of occurrence for each hazard, along with its potential impacts on people, property and the economy. Mitigation actions target hazards with high and medium rankings.

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Flooding	51	High
2	Severe Weather	48	High
2	Hurricane	48	High
3	Earthquake	14	Low
3	Hazardous Materials	14	Low
3	Tsunami	14	Low
4	Wildfire	11	Low
5	Drought	6	Low
5	Mass Movement	6	Low
6	Dam Failure	0 (No exposure)	None
6	Coastal Erosion	0 (No exposure)	None

NOTE: The process used to assign risk ratings and rankings for each hazard is described in Volume 1 of this hazard mitigation plan.

21.8 JURISDICTION-SPECIFIC VULNERABILITIES

Volume 1 of this hazard mitigation plan provides complete risk assessments for each identified hazard of concern. This section provides information on a few key vulnerabilities for the jurisdiction. Available jurisdiction-specific risk maps of the hazards are provided at the end of this annex.

21.8.1 Repetitive Loss Properties

Repetitive loss records are as follows:

- Number of FEMA-identified Repetitive-Loss Properties: 209
- Number of FEMA-identified Severe-Repetitive-Loss Properties: 26
- Number of Repetitive-Loss Properties or Severe-Repetitive-Loss Properties that have been mitigated: 90

21.8.2 Other Noted Vulnerabilities

The following jurisdiction-specific issues have been identified based on a review of the results of the risk assessment, public involvement strategy, and other available resources:

- The City of Seabrook is vulnerable to maritime threats and hazards since it is located along the Port of Houston and the Houston Ship Channel.
- The City of Seabrook is vulnerable to hazardous material incidents and chemical accidents from surrounding petrochemical industries, chemical manufacturers, and chemical storage facilities.

Mitigation actions addressing these issues were prioritized for consideration in the action plan presented in this annex.

21.9 STATUS OF PREVIOUS PLAN ACTIONS

Table 21-13 summarizes the actions that were recommended in the previous version of the hazard mitigation plan and their implementation status at the time this update was prepared.

Table 21-13. Status of Previous Plan Actions

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Install early warning systems for public buildings <i>Comment:</i> Currently the emergency notification is relied on by a telephone communication system. Providing alerting systems in Critical facilities will help contain hazardous incident when they arise.			X	SBK10
Buyout/acquisition/demobilization of Severe Repetitive Loss properties and Repetitive Loss properties <i>Comment:</i> Severe Repetitive Loss and Repetitive loss structures throughout the city can be reduced by taking care of these structures when the owners cannot.			X	SBK1
Install flood barrier systems, i.e. modular flood panels designed to withstand high velocity water loads and high impact forces to enhance flood protection at critical care and/or public infrastructure <i>Comment:</i> Currently the city has no protection in place for this time of the hazard. Facilities did receive water during a flooding event but funds were not in place to mitigate any further.			X	SBK11
Relocate critical infrastructure out of flood hazard area <i>Comment:</i> Improving the productivity of the city staff and city services by moving these structures out of the flood plain will be huge. Currently Waste water treatment and Public works facilities are out dated and reside in the flood prone areas.			X	SBK1, SBK5, SBK7
Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy <i>Comment:</i> Currently the City of Seabrook has 20 parks with trails and trees. A clearing process is needed to harvest dead trees and protect the critical infrastructure of the city.			X	SBK13
Adopt higher standards/latest edition of 2015 IBC – Construction Standards, which provide high-wind requirements for critical facilities to withstand severe thunderstorms, hurricane winds, tornadoes and hail. <i>Comment:</i> Codes have changed since the structures were built and upgrades need to be made. Buildings are smaller and the staff has grown. Codes Have been updated	X			
Install protective structures to minimize damage to critical assets and equipment from hail, snow loads/freezing and high-winds. <i>Comment:</i> Assists obtained by the city need to be protected to insure a longer life of the assets. Completed with the Building of the New Public Works Facility	X			
Improve code/ordinance to require removal of dead vegetation/dry fuel sources in risk areas <i>Comment:</i> 20 parks and trail and tree systems provides for a large area of potential fire fuel. Keeping the area clean and free of dead trees can help prevent accidental fires which can lead to disaster.			X	SBK9
Harden water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought <i>Comment:</i> This has been put into place with a new replacement system			X	SBK12

Action Item	Completed	Removed; No Longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
<p>Establish emergency water supply lines and infrastructure to provide alternate emergency pathways during water breaks/shortages by installing more valves to shut-off or re-route water.</p> <p><i>Comment:</i> Providing more valves to shut off water and reroute water in the event of a water breakage/shortages caused by drought.</p>			X	SBK8
<p>Improve or install lighter color roofing materials or cooler paving materials</p> <p><i>Comment:</i> Enhancing the building and surrounding parking lots to make the buildings cooler and providing a more energy efficient building.</p>			X	SBK19
<p>Improve and enhance cover and freeze protection of above (insulate pipes above) ground water pipes, public irrigation systems and fire sprinkler systems, FDC connections</p> <p><i>Comment:</i> New public awareness campaign kicked off and maintenance has improved on city equipment</p>	X			
<p>Implement or establish code/ordinance to require hazardous materials transportation corridor</p> <p><i>Comment:</i> Traffic Plan was adopted by the City that reflects this item</p>	X			
<p>Establish/improve code/ordinance to require shutoff valves at entry and exit point of city limits for new construction</p> <p><i>Comment:</i> Pipeline ordinance adopted and addressed this</p>	X			
<p>Identify exposed/above ground pipelines in flood hazard area</p> <p><i>Comment:</i> This is an ongoing process</p>			X	SBK20
<p>Implement a GIS System to Create a map of Emergency Routes to be used by emergency vehicles in flooding conditions.</p> <p><i>Comment:</i> GIS department has been established</p>	X			
<p>Add 2-foot freeboard requirement to Flood Damage Prevention Ordinance.</p> <p><i>Comment:</i> The City agreed on 18 inch</p>	X			
<p>Replace the three existing water flow culverts with bridges; Second Street, Elmar and Meyer and Pine Gully</p> <p><i>Comment:</i> The city has completed one of the Three</p>			X	SBK21
<p>Investigate the impact of the new Flood Hazard Recovery Data and how it effects the City and residents.</p> <p><i>Comment:</i> New maps adopted</p>	X			
<p>Relocate the current Emergency operations Center (EOC) and Police Department to a higher elevation site within the City of Seabrook</p> <p><i>Comment:</i> Still needing to be done. Relocating out of the flood hazard area</p>			X	SBK7
<p>Harden critical city facilities to lessen the impacts of natural and human-caused hazards.</p> <p><i>Comment:</i> Ballistic Material added to the Lobby of City Hall</p>	X			
<p>Develop reliable fiber-optic communications network to maintain communications during disasters, and facilitate disaster preparedness and recovery for data network.</p> <p><i>Comment:</i> In process</p>			X	SBK6
<p>Identify vulnerable populations to extreme heat hazards.</p> <p><i>Comment:</i> Continued process through outreach</p>			X	SBK22

Action Item	Completed	Removed; No longer Feasible	Carried Over to Plan Update	
			Check if Yes	Action # in Update
Develop/implement cooling center program to educate the public on the hazards of extreme heat and actions they can take to limit the effects of extreme heat upon health and property. <i>Comment:</i> Worked with Harris County and use of Library	X			
Develop/implement groundwater contingency measures for Critical Infrastructure <i>Comment:</i> New above ground tank added for more capacity for the City	X			
Develop/implement water smart program to educate the public on drought hazards and actions to minimize the impacts of drought upon property <i>Comment:</i> Ongoing campaign of outreach	X			
Construct shelter for critical equipment and vehicles. <i>Comment:</i> Completed with New Construction of Public Works Facility	X			
Investigate the impact of the new Flood Hazard Recovery Data and how it effects the City and residents. <i>Comment:</i> New maps adopted	X			
Clean-up of heavy wildfire fuel areas (abandoned buildings, abandoned lands, etc.). <i>Comment:</i> Ongoing with Code Enforcement	X			
Develop/implement a Winter Storm Public Education Program for home heating, to educate the public on winter hazards and personal actions to mitigate winter damages to property and to safely heat homes <i>Comment:</i> In Process; The City continues to distribute FLASH Materials on natural hazards at City Hall.			X	SBK23
Increase Haz-Mat training/equipment for local responders. <i>Comment:</i> Continue Training			X	SBK14
Develop/implement Haz-Mat Safety Program. <i>Comment:</i> Completed with Traffic Plan and out reach	X			
Send appropriate local officials to FEMA's Emergency Management Institute for continuing education and training <i>Comment:</i> Some have gone others need to go			X	SBK24
Develop/implement pipeline program. <i>Comment:</i> Information has been presented in open meetings and safety fairs on pipelines and pipeline safety. Also information has been placed in the City of Seabrook Website and local Television Channel. Staff has been to training with the Pipeline Group. Staff attending annual training.	X			
Relocate the current Waste Water Treatment facility from the location on Galveston Bay to a high location in the City <i>Comment:</i> In process, Have applied for grants with no luck so far part of CIP			X	SBK5
Re-level the City Benchmark System to the new FEMA datum to accurately correlate the new flood zone maps <i>Comment:</i> Part of CRS Annual Inspection	X			

21.10 HAZARD MITIGATION ACTION PLAN AND EVALUATION OF RECOMMENDED ACTIONS

Table 21-14 lists the actions that make up the hazard mitigation action plan for this jurisdiction. Table 21-15 identifies the priority for each action. Table 21-16 summarizes the mitigation actions by hazard of concern and mitigation type.

Table 21-14. Hazard Mitigation Action Plan Matrix						
Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline ^a
Action SBK 1 — Where appropriate, support retrofitting, purchase or relocation of structures located in hazard areas, prioritizing those that have experienced repetitive losses and/or are located in high- or medium-risk hazard areas.						
<i>Hazards Mitigated:</i> Flooding, Hurricane, Severe Weather						
Existing	12, 13, 14, 15	Building Department	EM, Com Dev	High	HMGP, PDM, FMA	Long-term
Action SBK 2 — Integrate the hazard mitigation plan into other plans, ordinances and programs that dictate land use decisions in the community, including Capital Improvement Programs, Master Plans, and Strategic Plans						
<i>Hazards Mitigated:</i> Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami, Mass Movement,						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 3 — Actively participate in the plan maintenance protocols outlined in Volume 1 of this hazard mitigation plan.						
<i>Hazards Mitigated:</i> All hazards						
New and Existing	3, 5, 7, 9, 10	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Short-term
Action SBK 4 — Continue to maintain good standing and compliance under the NFIP through implementation of floodplain management programs that, at a minimum, meet the NFIP requirements:						
<ul style="list-style-type: none"> • Enforce the flood damage prevention ordinance. • Participate in floodplain identification and mapping updates. • Provide public assistance/information on floodplain requirements and impacts. 						
<i>Hazards Mitigated:</i> Flooding, Hurricane, Severe Weather						
New and Existing	2, 8, 9, 11, 14	EM	ENG, PLNG, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 5 — Relocate the current Waste Water Treatment facility from the location on Galveston Bay to a high location in the City						
<i>Hazards Mitigated:</i> Flooding, Hurricane						
New and Existing	3, 7, 9, 11, 13	PW	EM, ENG	High	HMGP	Short-term
Action SBK 6 — Develop reliable fiber-optic communications network to maintain communications during disasters, and facilitate disaster preparedness and recovery for data network.						
<i>Hazards Mitigated:</i> Severe Weather, Hurricanes						
New and Existing	6, 7, 10, 13	IT	EM, PW	High	Staff Time, General Funds	Short-term
Action SBK 7 — Relocate the current Emergency operations Center (EOC) and Police Department to a higher elevation site within the City of Seabrook						
<i>Hazards Mitigated:</i> Severe Weather, Flooding, Hurricanes						
New and Existing	1, 7, 9, 11, 12, 13, 15	PD	EM, ENG, COM DEV	High	HMGP, FMA	Long-term
Action SBK 8 — Establish emergency water supply lines and infrastructure to provide alternate emergency pathways during water breaks/shortages by installing more connections and valves to shut-off or re-route water.						
<i>Hazards Mitigated:</i> Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Ongoing
Action SBK 9 — Improve code/ordinance to require removal of dead vegetation/dry fuel sources in risk areas						
<i>Hazards Mitigated:</i> Wild Fires						
New and Existing	2, 2, 4, 6, 8, 15	COM DEV	EM, PW	Low	Staff Time, General Funds	Short-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline ^a
Action SBK 10 — Install early warning systems for public buildings						
<u>Hazards Mitigated:</u> Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami, Mass Movement,						
New and Existing	1, 3, 4, 9	EM	PW	Low	Staff Time, General Funds	Short-term
Action SBK 11 — Install flood barrier systems, i.e. modular flood panels designed to withstand high velocity water loads and high impact forces to enhance flood protection at critical care and/or public infrastructure						
<u>Hazards Mitigated:</u> Flooding						
New and Existing	9, 10, 11, 12	EM	PW, COM DEV, ENG	High	HMGP, FMA	Long-term
Action SBK 12 — Harden water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought						
<u>Hazards Mitigated:</u> Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Short-term
Action SBK 13 — Implement a tree management program to limit debris damage to critical infrastructure, public facilities from falling tree canopy						
<u>Hazards Mitigated:</u> Wild Fires						
New and Existing	2, 3, 4, 6, 8, 15	COM DEV	EM, PW	low	Staff Time, General Funds	Short-term
Action SBK 14 — Increase Haz-Mat training/equipment for local responders						
<u>Hazards Mitigated:</u> Hazardous Materials Incident						
New and Existing	3, 6, 9, 14	EM	PD, FD, PW	low	Staff Time, General Funds	Short-term
Action SBK 15 — Continue on building the relationships with local essential personnel throughout the neighboring communities and communications to the Public						
<u>Hazards Mitigated:</u> Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami, Mass Movement,						
New and Existing	1, 3, 4, 9, 11	EM	Communications	Low	Staff Time, General Funds	Ongoing
Action SBK 16 — Harden waste water piping lines and systems with non-corrosive linings/coatings (drought resistant materials) to prevent loss of water due to breaks caused by dry ground conditions from drought						
<u>Hazards Mitigated:</u> Drought						
New and Existing	3, 4, 7, 9, 11, 13	PW	ENG	High	Staff Time, General Funds	Long-term
Action SBK 17 — Conform to NOAA ATLAS 14 standards in all Repetitive Loss areas impacted by 100-year storm event.						
<u>Hazards Mitigated:</u> Flooding, Severe Weather						
New and Existing	3, 4, 10, 11, 12, 13	ENG	COM DEV, PW	Low	Staff Time, General Funds	Ongoing
Action SBK 18 — Eliminate low lying areas that prohibit emergency access during flooding events. Remove to NOAA ATLAS 14 Guidelines						
<u>Hazards Mitigated:</u> Flooding, Severe Weather						
New and Existing	3, 4, 10, 11, 12, 13	ENG	PW, COM DEV	High	HMGP, CDBG, FMA	Long-term
Action SBK 19 — Improve or install lighter color roofing materials or cooler paving materials						
<u>Hazards Mitigated:</u> Severe Weather						
Existing	5, 7, 13	PW	ENG	Medium	Staff Time, General Funds	Long-term
Action SBK 20 — Identify exposed/above ground pipelines in flood hazard area						
<u>Hazards Mitigated:</u> Severe weather, flooding, hurricane						
Existing	3, 4, 7, 9, 11, 13	PW	ENG	Low	Staff Time, General Funds	Long-term
Action SBK 21 — Replace the three existing water flow culverts with bridges; Second Street, Elmar and Meyer and Pine Gully						
<u>Hazards Mitigated:</u> Flooding, Severe weather, hurricane						
	3, 4, 7, 9, 11, 13	PW	ENG	High	General and/or grant funds	Long-term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline ^a
Action SBK 22 — Identify vulnerable populations to extreme heat hazards.						
<i>Hazards Mitigated:</i> Severe weather						
Existing	3, 4,	EM	COM DEV	Low	Staff Time, General Funds	Short term
Action SBK 23 — Develop/implement a Winter Storm Public Education Program for home heating, to educate the public on winter hazards and personal actions to mitigate winter damages to property and to safely heat homes						
<i>Hazards Mitigated:</i> Severe weather						
Existing	1, 4, 10, 11	EM	COMM	Low	Staff Time, General Funds	Short term
Action SBK24 — Actively participate in and support the implementation of the six area-wide actions identified in Volume 1 of this plan.						
<i>Hazards Mitigated:</i> Flooding, Severe Weather, Hurricane, Earthquake, Hazardous Materials, Wildfire, Drought, Tsunami , Mass Movement						
New and Existing	1, 3, 4, 5, 9, 10, 11, 15	City Administration	HCOHSEM	Low	General Funds	Ongoing

a. Short-term = Completion within 5 years; Long-term = Completion within 10 years; Ongoing= Continuing new or existing program with no completion date

See the introduction to this volume for list of acronyms used here.

Table 21-15. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Implementation Priority ^a	Grant Pursuit Priority ^a
SBK 1	4	High	High	Yes	Yes	No	Medium	High
SBK 2	5	Medium	Low	Yes	No	Yes	High	Low
SBK 3	5	Low	Low	Yes	No	Yes	High	Low
SBK 4	5	Medium	Low	Yes	No	Yes	High	Low
SBK 5	5	High	High	Yes	Yes	Yes	High	High
SBK 6	4	Medium	Medium	Yes	No	Yes	High	Low
SBK 7	7	High	High	Yes	No	No	Medium	High
SBK 8	6	High	High	Yes	Yes	Yes	High	Low
SBK 9	6	Medium	Low	Yes	No	No	Medium	Low
SBK 10	4	High	Low	Yes	Yes	No	Medium	Low
SBK 11	4	High	High	Yes	Yes	No	High	High
SBK 12	6	High	High	Yes	Yes	Yes	High	High
SBK 13	6	High	Low	Yes	No	Yes	High	Low
SBK 14	4	High	Low	Yes	No	No	High	Low
SBK 15	5	High	Low	Yes	No	Yes	High	Low
SBK 16	6	High	High	Yes	Yes	Yes	High	High
SBK 17	6	High	Low	Yes	Yes	Yes	Low	Low
SBK 18	6	High	High	Yes	Yes	No	High	High
SBK 19	3	Medium	Medium	Yes	No	Yes	Medium	Low
SBK 20	6	Medium	Low	Yes	No	Yes	Medium	Low
SBK 21	6	High	High	Yes	Yes	No	High	High

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Implementation Priority ^a	Grant Pursuit Priority ^a
SBK 22	2	High	Low	Yes	No	Yes	High	Low
SBK 23	4	High	Low	Yes	No	Yes	High	Low
SBK24	8	Medium	Low	Yes	Yes	Yes	High	High

a. See the introduction to this volume for explanation of priorities.

Table 21-16. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type ^a							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Flooding	SBK 2, 3, 4, 5, 10, 11, 15, 17, 18, 20, 21, 24	SBK 1, 4, 5, 7, 11, 17, 18, 20, 21	SBK 4, 10, 15, 24	SBK 1	SBK 5, 7, 11, 15, 20, 24	SBK 5, 7, 11, 17, 18, 20, 21		SBK 2, 24
Severe Weather	SBK 2, 3, 6, 10, 15, 17, 18, 20, 21, 24	SBK 1, 5, 7, 17, 18, 20, 21	SBK 4, 10, 15, 23, 24	SBK 1	SBK 6, 7, 15, 20, 24	SBK 7, 17, 18, 19, 20, 21	SBK 22	SBK 2, 22, 24
Hurricane	SBK 2, 3, 5, 6, 10, 15, 20, 21, 24	SBK 1, 5, 7, 20, 21	SBK 4, 10, 15, 24	SBK 1	SBK 5, 6, 7, 15, 24	SBK 5, 7, 20, 21		SBK 2, 24
Low-Risk Hazards								
Earthquake	SBK24	N/A	SBK24	N/A	SBK24	N/A	N/A	SBK24
Hazardous Material	SBK 2, 3, 10, 15, 24	SBK 1	SBK 4, 10, 15, 24	SBK 1	SBK 14, 15, 24			SBK 2, 24
Wildfire	SBK 2, 3, 9, 10, 13, 15, 24	SBK 9, 13	SBK 9, 10, 13, 15, 24	SBK 1, 9, 13	SBK 15, 24		SBK 9, 13	SBK 2, 24
Drought	SBK 2, 3, 8, 10, 12, 15, 16, 24	SBK 8, 10, 12, 16	SBK 15, 24	SBK 8, 10, 12, 16	SBK 15, 24	SBK 8, 10	SBK 8, 10, 12, 16	SBK 2, 24
Tsunami	SBK24		SBK24		SBK24			SBK24
Mass Movement	SBK24		SBK24		SBK24			SBK24

a. See the introduction to this volume for explanation of mitigation types.

21.11 REVIEW AND INCORPORATION OF INFORMATION FOR THIS ANNEX

The following technical reports, plans, and regulatory mechanisms were reviewed to provide information for this annex.

- **City of Seabrook Municipal Code** — The municipal code was reviewed for the full capability assessment and for identifying opportunities for action plan integration.
- **City of Seabrook Flood Damage Prevention Ordinance Chapter 38 Article II Flood Damage Prevention** — The flood damage prevention ordinance was reviewed for compliance with the National Flood Insurance Program.

The following outside resources and references were reviewed:

- **Hazard Mitigation Plan Annex Development Toolkit** — The toolkit was used to support the identification of past hazard events and noted vulnerabilities, the risk ranking, and the development of the mitigation action plan.
- **Capital Improvement Plan** – The CIP was used to in the development in Hazard Mitigation Action Items.

21.12 FUTURE NEEDS TO BETTER UNDERSTAND RISK/VULNERABILITY

The City of Seabrook needs the following to better understand future risks and vulnerabilities from natural hazards and to better plan for the future:

- Updated and revised flood maps and flood hazard areas.
- Develop an updated Drainage Plan and Study to better understand local drainage issues, run-off, sheet-flow, and ponding.
- Develop an enhanced outreach program on flood insurance and wind insurance.
- Build capacity and strategies for resilience to cope with future impacts from natural hazards.
- Develop local community planning, development, and building design standards that address impacts from natural hazards to build a safer and stronger city.

Seabrook

Critical Facilities

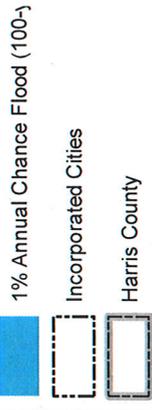
- Education Facilities
- Emergency Services
- Government Facilities
- Hazardous Material Sites
- Health and Medical Facilities
- Historical and Cultural Sites
- Transportation Systems
- Utility Systems
- ▭ Incorporated Cities
- ▭ Harris County



0 0.175 0.35 0.7 Miles

Seabrook

FEMA Flood Hazard

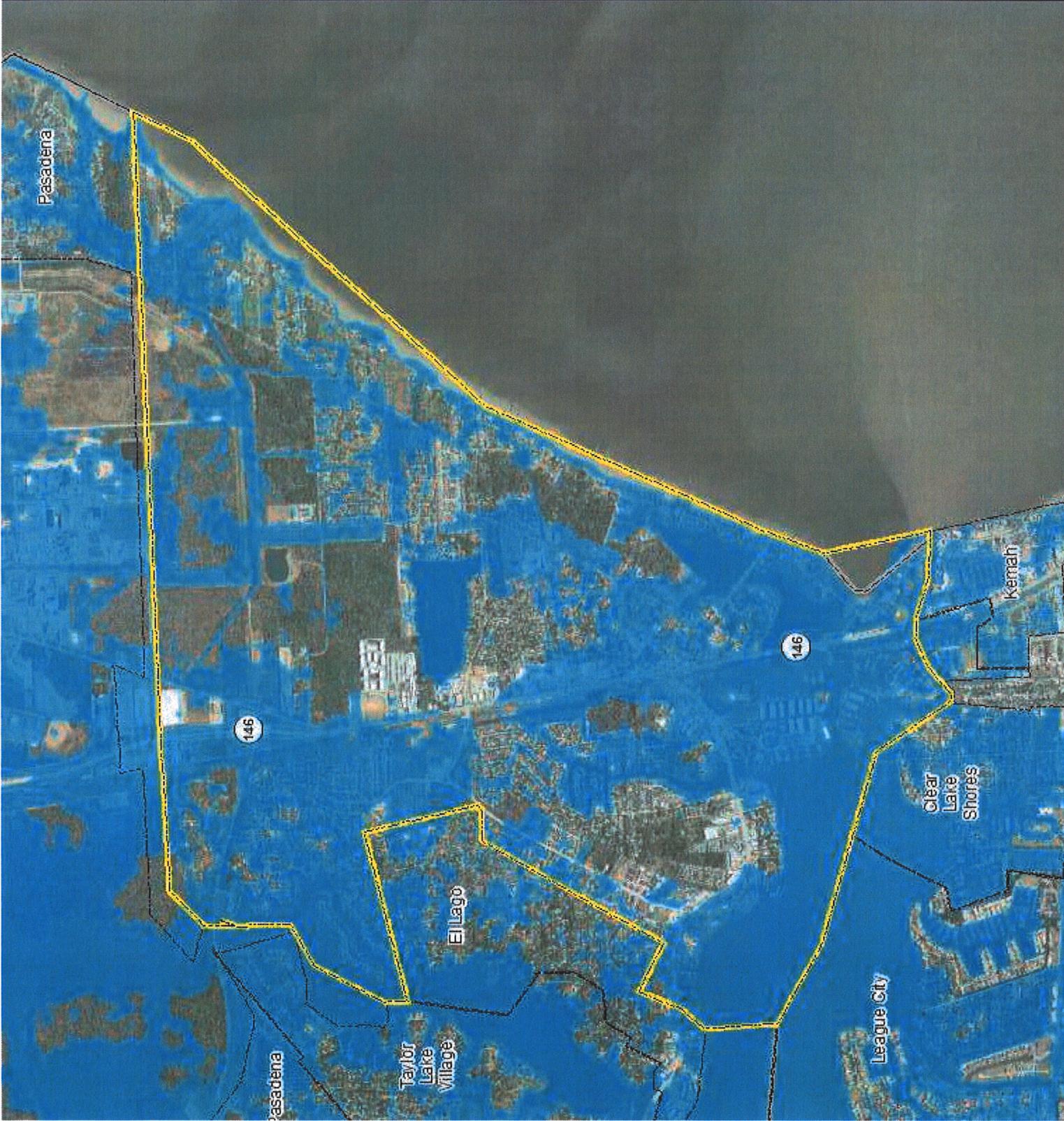


Seabrook

Flood Hazard Hurricane Harvey

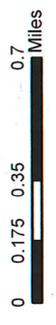
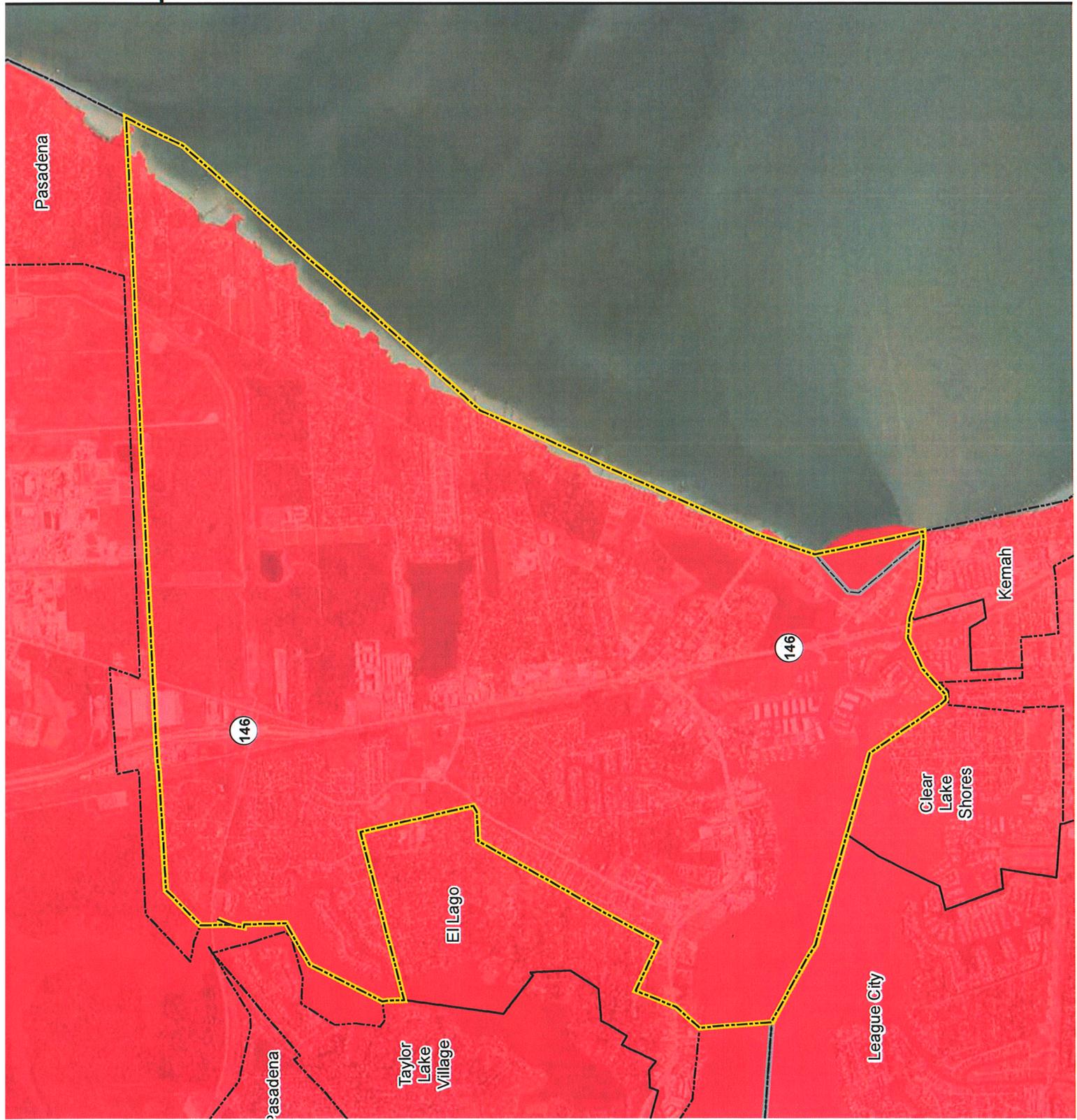
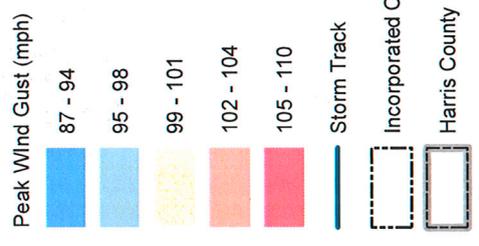


Note: Flooding extent shown for Hazarc Mitigation Plan planning area only.



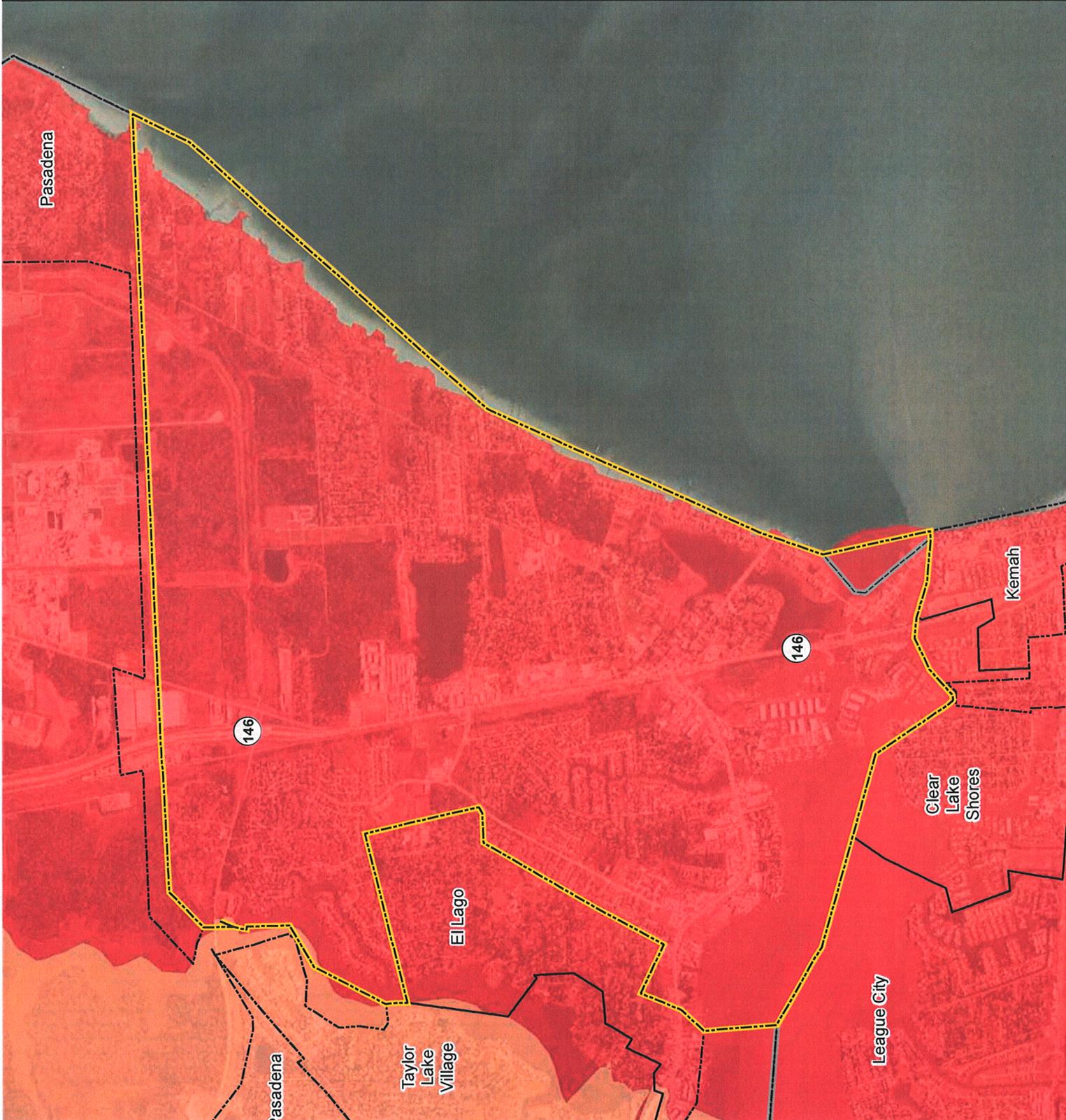
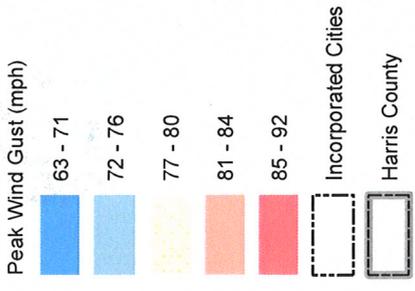
Seabrook

Hurricane Alicia (1983)



Seabrook

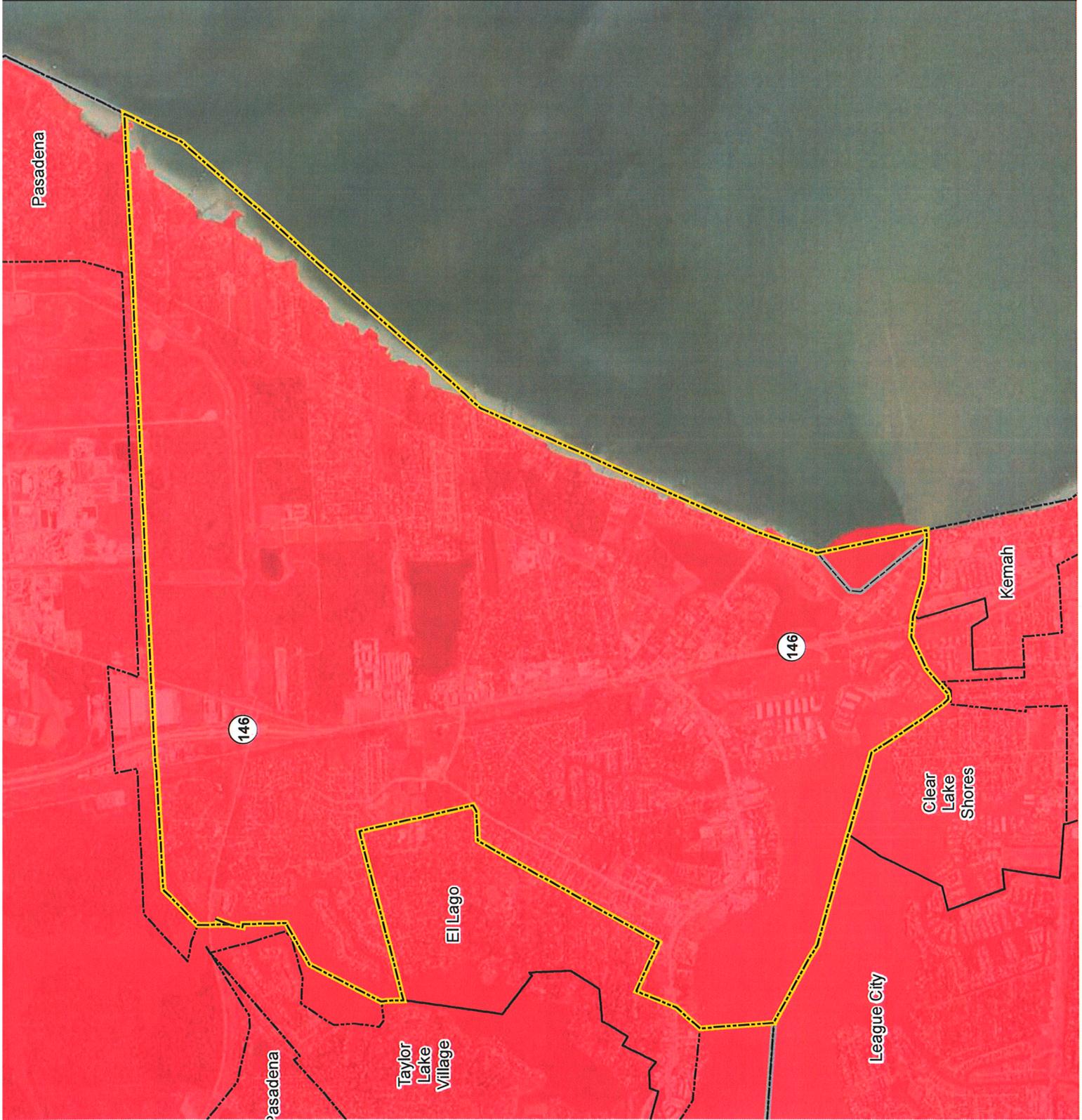
20-year Probabilistic Hurricane



Seabrook

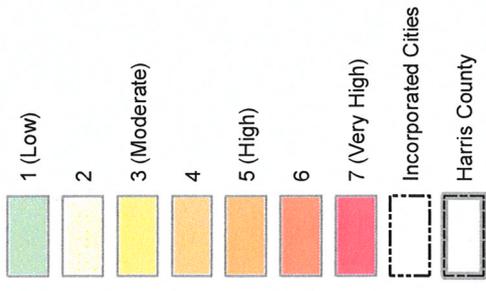
100-year Probabilistic Hurricane

Peak Wind Gust (mph)



Seabrook

Wildfire Ignition Density



Seabrook

Wildfire Threat

