

## Fort Bend County Levee Improvement District No. 7 Hazard Mitigation Plan

Adopted December 5, 2018

## Table of Contents

Exec	utive S	Summary	i					
1	The F	Planning Process	1-1					
	1.1	Introduction	1-1					
	1.2	Authority & Current Capabilities	1-1					
	1.3	The Mitigation Planning Committee	1-2					
	1.4	Public Involvement	1-4					
	1.5	Review and Incorporation of Existing Plans, Studies, Reports, and Technical Information	1-4					
	1.6	Plan Adoption and Continued Public Involvement	1-5					
	1.7 Plan Monitoring, Evaluating and Updating							
	1.8	Incorporating Mitigation Plan Requirements into Other Local Planning Mechanisms	1-6					
2	Haza	rd Assessment	2-1					
	2.1	Overview of Risks	2-1					
	2.2	District Hazards	2-1					
	2.3	Geography, Climate, and Population	2-3					
	2.4	Past Disaster Declarations	2-5					
	2.5	Hurricanes and Tropical Storms	2-6					
		2.5.1 Location of Hurricanes and Tropical Storms	2-7					
		2.5.2 Extent of Hurricanes and Tropical Storms	2-7					
		2.5.3 Historical Hurricanes and Tropical Storms	2-8					
		2.5.4 Probability of Hurricanes and Tropical Storms	. 2-10					
		2.5.5 Impact and Vulnerability related to Hurricanes and Tropical Storms	. 2-10					
	2.6	Flood	. 2-11					
		2.6.1 Types of Flooding	. 2-11					
		2.6.2 Location of Flooding	. 2-12					
		2.6.3 Previous Occurrences of Flooding	. 2-13					
		2.6.4 Extent of Flooding	. 2-14					
		2.6.5 Probability of Flooding	. 2-15					
		2.6.6 Impact and Vulnerability Related to Flooding	. 2-16					
		2.6.7 NFIP Repetitive Loss structures	. 2-16					
	2.7	Levee Failure	. 2-16					
		2.7.1 Levee Failure Location	. 2-17					
		2.7.2 Extent of Levee Failure	. 2-19					
		2.7.3 Probability and Historical Levee Failure	. 2-19					
		2.7.4 Impact and Vulnerability Related to Levee Failure	. 2-19					
3	Mitig	ation Strategy	3-1					
	3.1	District Mitigation Goals	3-1					
		3.1.1 Mitigation Goal Statement	3-1					
	3.2	State of Texas Mitigation Goals	3-1					

3.3	Federal Mitigation Goal	. 3-1
3.4	Previous Mitigation Actions	. 3-1
3.5	Identifying Priority Actions	. 3-2
3.6	District Mitigation Actions	. 3-2

## Appendices

- Appendix A Planning Team Meetings
- Appendix B Public Involvement
- Appendix C Adoption Resolution for the District
- Appendix D FEMA Approval Letter
- Appendix E Sources
- Appendix F Mitigation Action Worksheets

## List of Tables

Table 1 – Mitigation Planning Committee	1-2
Table 2 – Stakeholders	1-3
Table 3 – Hazard Probability	2-3
Table 4 – 2010 Population of Plan Area	2-4
Table 5 – Declared Emergencies and Major Disasters in Fort Bend County (Source: FEMA, Disaster Declaration Summary Database)	2-5
Table 6 – Classification of Tropical Cyclones	2-7
Table 7 – Saffir/Simpson Hurricane Wind Scale	2-7
Table 8 – Damage-Causing Historical Hurricane and Tropical Storm Events in Fort Bend County         from 1998-2017	2-8
Table 9 – Critical Facilities Protected by the Levee in LID No. 7	2-16
Table 10 – STAPLEE Methodology	3-2
Table 11 – Proposed District Mitigation Actions	3-2

## List of Figures

Figure 1 – Hazard Mitigation Study Area, Fort Bend County Levee Improvement District No. 7	i
Figure 2 – Location of District Assets	2-2
Figure 3 – Planning Area: Fort Bend County Levee Improvement District No. 7	2-4
Figure 4 – Depth of Precipitation for 100-Year Storm for 7-Day Duration in Texas (Source: USGS	
Rainfall Atlas)	2-8

Figure 5 – Historical Hurricanes and Tropical Storms in Fort Bend County	. 2-10
Figure 6 – FEMA Effective Floodplains	. 2-13
Figure 7 – Depth of Precipitation for 100-Year, 6-Hour Duration: Approximately 9 Inches (Source:	
USGS Rainfall Atlas)	. 2-15
Figure 8 – Location of Levees in the Vicinity of FBCLID No. 7.	. 2-18

## List of Acronyms

BFE	Base Flood Elevation
CFR	Code of Federal Regulations
FBCLID	Fort Bend County Levee Improvement District
FBCMUD	Fort Bend County Municipal Utility District
FEMA	Federal Emergency Management Agency
DFIRM	Digital Flood Insurance Rate Map
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
HMP	Hazard Mitigation Plan
LID	Levee Improvement District
MPC	Mitigation Planning Committee
mph	Miles per Hour
NCEI	National Centers for Environmental Information
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
RL	Repetitive Loss
TDEM	Texas Division of Emergency Management
TWDB	Texas Water Development Board
USGS	U.S. Geological Survey

### **Executive Summary**

The Fort Bend County Levee Improvement District No. 7 ("the District") undertook development of this Hazard Mitigation Plan (Plan) because of the increasing awareness that natural hazards, especially flood hazards and the potential for levee failure, may affect people and property in the area. The District was created under the provisions of Article XVI, Section 59 of the Texas Constitution, and operates pursuant to Chapters 49 and 57 of the Texas Water Code, as amended, and Chapter 7808 of the Texas Special District Local Laws Code. The District was created to construct certain levee and drainage improvements to provide protection to the land and improvements of residential and commercial property owners in the New Territory subdivision, which is part of the City of Sugar Land, from flooding from the Brazos River.

The Hazard Mitigation Plan was written to identify District vulnerabilities to hazards and outline mitigation actions that help to reduce or avoid the impacts of hazards. Approval of the Plan will make the District eligible for federal mitigation grant program funds administered by the State of Texas Division of Emergency Management (TDEM) and the Texas Water Development Board (TWDB). In this Plan, the Mitigation Planning Committee (MPC) looked at what actions need to be taken based on the vulnerabilities of the District and the residents within the boundary of the District. **Figure 1** shows the planning area for this Hazard Mitigation Plan.



Figure 1 – Hazard Mitigation Study Area, Fort Bend County Levee Improvement District No. 7

The District is susceptible to a range of hazards inherent to southeast Texas; however, the hazards considered in this Plan are limited to those impacting the District's ability to fulfil its purpose. According to the petition for its creation, the District was organized for the following purposes:

- 1) To construct and maintain levees and other improvements on, along, and contiguous to rivers, creeks, and streams within and adjacent to the District;
- 2) To reclaim land within the District from overflow from these streams;
- 3) To control and distribute the waters of rivers and streams within and adjacent to the District by straightening and otherwise improving them; and
- 4) To provide for the proper drainage and other improvement of the reclaimed land within the District.

Authority for the preparation of the Hazard Mitigation Plan is derived from Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; The National Flood Insurance Act of 1968 (NFIA), as amended; and Title 44 Code of Federal Regulations Section 201.6 (44 CFR 201.6).

## 1 The Planning Process

#### 1.1 Introduction

The Fort Bend County Levee Improvement District No. 7 ("the District") undertook development of this Hazard Mitigation Plan because of increasing awareness that natural hazards, especially flood hazards and the potential for a levee failure, may affect people and property in the area. The Hazard Mitigation Plan (Plan) was written to identify District vulnerabilities to hazards and to outline mitigation actions that help to reduce or avoid the impacts of hazards. Approval of the Plan will make the District eligible for federal mitigation grant program funds administered by the State of Texas Division of Emergency Management (TDEM) and the Texas Water Development Board (TWDB).

In this Plan, the Mitigation Planning Committee looked at what actions should be taken based on the vulnerabilities of the District and the residents within the boundary of the District.

#### 1.2 Authority & Current Capabilities

The District is a special purpose district of the State of Texas created under the provisions of Article XVI, Section 59, of the Texas Constitution, and operating pursuant to Chapters 49 and 57 of the Texas Water Code, as amended, and Chapter 7808 of the Texas Special District Local Laws Code.

The District was created to construct certain levee and drainage improvements to provide protection to the land and improvements of residential and commercial property owners in the New Territory subdivision, which is part of the City of Sugar Land, from flooding from the Brazos River. According to the petition for its creation, the District was organized for the following specific purposes:

- 1) To construct and maintain levees and other improvements on, along, and contiguous to rivers, creeks, and streams within and adjacent to the District;
- 2) To reclaim land within the District from overflow from these streams;
- 3) To control and distribute the waters of rivers and streams within and adjacent to the District by straightening and otherwise improving them; and
- 4) To provide for the proper drainage and other improvement of the reclaimed land within the District.

From its inception until May 2018, the District was governed by a three-member Board of Directors, appointed by the Fort Bend County Commissioners Court. During the May 2018 election, voters approved a five-member elected board. Both the old and new board members participated in the Hazard Mitigation Planning process. The Board holds a regular meeting once a month to manage and conduct the business and affairs of the District, and these meetings are open to the public pursuant to the Open Meetings Act, Chapter 551, Texas Government Code.

As is typical for smaller governmental agencies, the District contracts with consultants such as attorneys, engineers, auditors, bookkeepers, tax assessor-collectors, operators, and financial advisors. These consultants provide services, advice, and reports to assist the Board in managing the District.

The District, which encompasses the New Territory subdivision, operates and maintains approximately 3.75 miles of levees and other drainage facilities that include:

- Ellis Creek, an internal drainage channel that collects and conveys storm water runoff;
- Outfall structures where internal storm water drainage is discharged outside of the levee and into the Brazos River via an external drainage channel that is also operated and maintained by the District;

- One pump station (electric facility that pumps stormwater within the levee to the outside of the levee and into the external drainage channel during a combined river/rainfall flood event);
- Flap gates (gates preventing river water from entering New Territory); and
- Nine detention/retention ponds (artificial lakes that include a permanent pool of water and space to detain excess water).

The District also has the power (pursuant to a separate statute) to construct, maintain and operate a reclaimed water system, which is currently under construction, for purposes of providing a non-potable water source to the New Territory Residential Community Association, Inc. for irrigation of the common areas and make-up water to the lakes within New Territory.

In order to improve capabilities, the District actively participates in regional emergency planning exercises with adjacent cities, special districts, and County staff. Communication to residents occurs through many forms, including a District specific website which was launched in 2018. Furthermore, the District maintains and regularly updates its Emergency Action Plan (EAP), which establishes procedures and processes for the District to employ during a severe flood event. To address significant maintenance or upgrade needs, the District also administers a capital improvement program.

Authority for the preparation of the Hazard Mitigation Plan is derived from Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended; The National Flood Insurance Act of 1968 (NFIA), as amended; and Title 44 *Code of Federal Regulations* Section 201.6 (44 CFR 201.6). These require State and local governments to develop and formally adopt Hazard Mitigation Plans in order to be eligible for certain disaster mitigation grant funding sources.

It should be noted that, due to the District's limited authority, the District is not a participant in the National Flood Insurance Program (NFIP). The land within the District's levees is either within Fort Bend County or the City of Sugar Land; both entities are participants in the NFIP. The City of Sugar Land is the Floodplain Administrator for the area within the District boundaries.

#### **1.3 The Mitigation Planning Committee**

The Mitigation Planning Committee (MPC) was established to direct the Hazard Mitigation Plan development. The MPC members are identified in **Table 1**. The MPC oversaw the development of the plan, incorporated public involvement and input, and scheduled all meetings. The MPC determined that in addition to the small committee that would steer the planning process, a larger group of interested and potentially effected individuals called "Stakeholders" would be included in the planning process to discuss the planning process, submit proposed mitigation actions, review drafts and provide comments at critical points in the development of the Plan. Once the Plan was drafted, the MPC reviewed the contents with the District Board of Directors for their comment and approval. Note that the MPC will change slightly before final adoption to include the newly elected Board Members.

Team Member	Job Title	Organization
Epifanio E. Salazar Jr.	Chairman	FBCLID7
James R. Grotte	Vice Chairman FBCLID7	
Cindy Picazo	Secretary	FBCLID7
Sarah Lambert	Project Manager	AECOM
Vanessa Hoene	Mitigation Planning Consultant	AECOM

#### Table 1 – Mitigation Planning Committee

1-2

Team Member	Job Title	Organization
Ross Gordon	Project Principal	AECOM
Jon Vanderwilt	Engineer for the District	Costello, Inc.
Stephen Wilcox	Engineer for the District	Costello, Inc.
Chris Skinner	Attorney for the District	Schwartz, Page & Harding, L.L.P
Matt Reed	Attorney for the District	Schwartz, Page & Harding, L.L.P
Simon Vandyk	Communications	Triton Consulting Group, LLC
Jeff Perry	Operations / Maintenance	Levee Management Services, LLC

A Stakeholder Meeting was held on April 19, 2018 through an online webinar to introduce the District's planning process and request Stakeholder involvement and input. Stakeholders were also invited to the public meeting and were requested to provide feedback through email or by telephoning the District. The Stakeholder group invited to participate included the individuals and entities listed in **Table 2**. See **Appendix B** for invitations and presentations from the Stakeholder Involvement process.

#### Table 2 – Stakeholders

Member	Title	Organization	
Michael Walker	Executive Director	New Territory Residential Community Association	
Jorge Alba	Senior Drainage Engineer	City of Sugar Land	
Chris Steubing	Assistant City Manager	City of Sugar Land	
Doug Brinkley	Chief of Police	City of Sugar Land Police Department	
Patrick Hughes	Assistant Fire Chief; Director of Emergency Management.	City of Sugar Land Emergency Management Coordinator	
Jeff Braun	Emergency Management Coordinator	Fort Bend County Emergency Operations	
Doug Barnes	Senior Planning Coordinator	Fort Bend County Emergency Operations	
Richard Stolleis	County Engineer	Fort Bend County	
Mark Vogler	Chief Engineer and General Manager	Fort Bend County Drainage District	
Mike Stone	General Manager and Chief Operating Officer	Fort Bend County Toll Road Authority	
Andre McDonald	President	FBCLID2	
David Gornet	Vice-President	FBCLID17	
Justin R. Ring	President	FBCLID11	
Don Burns	President	FBCLID10	
Greg Baird	President	FBCMUD 121	
Dave Scott	Presiding Officer	Brazos River Authority	
David Collinsworth	General Manager	Brazos River Authority	

#### 1.4 Public Involvement

Consistent with District's standard objective to inform and involve citizens, and to fulfill the public involvement requirements of the mitigation planning programs, the District solicited input, notified, and invited residents to participate in the mitigation planning process. Regular and special session board meetings, which are open to and well attended by members of the public, are typically held twice a month. Since Hurricane Harvey in August 2017, the Board has held 8 regular meetings and 9 special meetings. A major focus of these meetings has been discussion of risks and mitigation efforts.

In particular, the development and review of the Plan was on the officially published agenda and was discussed in detail at Board meetings on March 1, 2018 and April 5, 2018. The Board also held a highly attended community open house on April 24, 2018 to discuss in detail proposed mitigation strategies which are listed in the Plan and which the Board is including in a summer 2018 bond election. See **Appendix B** for details of these meetings.

The public had an opportunity to review the draft Plan when the document was posted on the District's website at <u>http://www.fbclid7.com/news</u>. Prior to placing the document online, at the May 3, 2018 Board Meeting the District announced that the draft Plan would be available for review and comments would be taken at the May 15, 2018 Public Board Meeting, and that this meeting was open to the public and all stakeholders. See **Appendix B** for the May 15<sup>th</sup> meeting agenda.

Prior to the Public Meeting, a press release was prepared informing the public about the Hazard Mitigation Planning process and urging the public to be involved. It also provided the time, date, and location of the Public Meeting. The notice was published on the District Website, in addition to the official published agenda for the Board Meeting. The press release and website post advertising the Public Meeting are included in **Appendix B** of this Plan.

On May 15, 2018 the Public Meeting was held to consider comments on the draft Plan and to solicit additional public input. At the meeting, the District provided comment forms for any members of the public to formally submit a comment. The attendee list and sign-in sheet from the Public Meeting are included in **Appendix B** of this Plan.

All input received was reviewed and considered for incorporation into this Plan.

## 1.5 Review and Incorporation of Existing Plans, Studies, Reports, and Technical Information

Other planning documents can be used as a valuable resource for integrating information related to hazard mitigation into the District's Plan. As part of the development of the Plan, other plans, studies, and reports that are applicable to the natural hazards discussed in the Plan were reviewed and incorporated where applicable.

The specific plans, studies and reports used for informational purposes along with a discussion on how they were incorporated into the Plan, are listed below.

- Fort Bend County Levee Improvement District (FBCLID) No. 7 Emergency Action Plan (adopted in August 2017). This plan was used to understand the procedures and field operations that are to be undertaken by the District during events outside of normal operational parameters.
- Fort Bend County Hazard Mitigation Plan (HMP) Update (2018). The plan was used as a reference for hazards as they pertain to the District's jurisdictional area. The Mitigation Action worksheet used in the Fort Bend County HMP was used for Mitigation actions in the District's Plan so that all projects have the same format.

- **City of Sugar Land Hazard Mitigation Plan (2014).** The plan was used as a reference for hazards as they pertain to the District's jurisdictional area, and to identify key Stakeholders.
- Fort Bend County Flood Insurance Rate Map (FIRM 2014). The Flood Insurance Rate Maps (FIRMs) prepared by the Federal Emergency Management Agency (FEMA) offer the best overview of flood risks. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Fort Bend County FIRMs were reviewed and included in the Plan to develop a floodplain map identifying the 100-year floodplain.
- Fort Bend County Flood Insurance Study (FIS, 1997). The most recent FIS revised study is dated June 5, 1997. These studies were reviewed as part of the draft Plan. Information describing the flood hazards was added to Section 2.
- State of Texas Hazard Mitigation Plan Update (2013). The State HMP update was reviewed and considered while developing this Plan. The mitigation strategies and mitigation goals are referenced in Section 3.2 of this Plan.

#### **1.6** Plan Adoption and Continued Public Involvement

Upon adoption of this Plan, the public will be notified of any substantial changes to the document between 2018 and the next scheduled Plan update in 2023. Any changes proposed by the MPC considered significant will be distributed to the Stakeholders. The Stakeholders will be encouraged to review the changes and provide comments on any proposed plan revisions.

The District will involve the public in the plan maintenance process and during the next Plan update in 2023, using the same methods as the plan development. The public will be notified when the revision process is started and will be provided the opportunity to review and comment on changes to the Plan and prioritize action items. It is expected that a combination of informational public meetings, draft documents posted on the website, and public Board of Director meetings will be undertaken.

The District's Hazard Mitigation Plan will be posted on the District's website and notices of its availability will be distributed to the Federal and State agencies, Fort Bend County, all identified stakeholders, as well as in a public notice.

#### **1.7** Plan Monitoring, Evaluating and Updating

The MPC determined that monitoring and evaluation of the hazard mitigation process, and the Plan specifically, would be best accomplished with annual meetings. Upon adoption in 2018, the MPC will meet on an annual basis to discuss varying aspects of the hazard mitigation process, including assessing progress to date, reviewing the process for updating the Plan, the need for continued public involvement, risk assessment evaluation, and review of mitigation actions to determine if any significant changes are warranted. This will occur during a regular or special session of the Board of Directors, and include the general public and any interested stakeholders. In addition, the Chairman may convene a separate meeting of the appropriate District, City of Sugar Land, and County departments to discuss and determine progress, and to identify obstacles to progress, if any, related to the hazard mitigation process. Upon recommendation of the Board of Directors, the District's mitigation planning consultant will implement necessary additional planning actions, and/or updates to the Plan.

In addition to annual meetings, as another way to ensure the plan stays current, the Chairman will convene meetings after damage-causing natural hazard events to review the effects of such events. Based on those effects, updates to the mitigation priorities listed in **Table 12** may be made or additional event-specific actions identified.

In summary, the District will initiate Plan reviews and updates based on the following:

- 1. The recommendation of the Chairman or on its own initiative, the District Board may initiate a Plan review at any time;
- 2. At approximately the 1-year anniversary of the Plan's adoption, and every year thereafter;
- 3. After natural hazard events that appear to significantly change the apparent risk to District assets, operations, and/or citizens;
- 4. When activities of the District, County, or the State significantly alter the potential effects of natural hazards on District assets, operations and/or citizens. Examples include completed mitigation projects that reduce risk, or actions or circumstances that increase risk; or
- 5. When new mitigation opportunities or sources of funding are identified.

In addition to the circumstances listed above, revisions that warrant changing the text of this Plan or incorporating new information may be prompted by a number of circumstances, including identification of specific new mitigation projects, completion of several mitigation actions, or requirements for qualifying for specific funding.

Major comprehensive review of the hazard mitigation planning process and revisions to this Hazard Mitigation Plan will be considered on a 5-year cycle. To be adopted in 2018, the Plan will enter its next review cycle sometime in 2023. The MPC will be convened to conduct the comprehensive evaluation and revision. The MPC will also consider whether it is preferable to include the District as a participant in a regional Plan update (Fort Bend County or City of Sugar Land), instead of as a stand-alone Plan update.

## 1.8 Incorporating Mitigation Plan Requirements into Other Local Planning Mechanisms

The District intends to integrate this Hazard Mitigation Plan into other local planning efforts through the following process and framework.

For activities associated with District infrastructure, the District will plan for these activities during their standard annual budgeting process and within their existing planning mechanisms, including the District Capital Improvement Plan and Emergency Action Plan. The District will also work with the stakeholders identified in this planning effort to make sure elements of this plan are incorporated in any other plans that are outside the jurisdiction of the district such as Capital Improvement Plans, Master Drainage plans, Emergency Action Plans, etc. The District will designate specific Board meetings to discuss this ongoing effort and invite the Stakeholders to attend and participate in the process of integrating this Plan into the existing planning mechanisms. This includes participation by the District in other regional efforts related to the Brazos River and floodplain mapping and flood mitigation in Fort Bend County.

## 2 Hazard Assessment

#### 2.1 Overview of Risks

Natural hazards can cause damage and losses (including physical damage, indirect and economic losses, and injuries and deaths) when the hazard occurs or impacts people and property. Once hazards are identified, the level of risk exposure for people and property can be determined to show how "at risk" a planning area is. When the full range of possible natural hazards is reviewed, it becomes apparent that some events occur frequently and some are extremely rare. Some hazards impact large numbers of people to a limited degree, while others may cause significant damage to a small localized area.

The National Oceanic and Atmospheric Administration's (NOAA) and the National Centers for Environmental Information, (NCEI, formerly the National Climactic Data Center), collect and maintain certain hazard data in summary format, indicating injuries, deaths, and estimated damages. The data presented in this plan are for Fort Bend County, where the District is located, to demonstrate the potential for natural hazards in the District. According to a query of the NCEI database for "Fort Bend County, Texas", 304 weather events were reported between January 1950 and November 2017 (the most recent search date available). Fort Bend County has experienced:

- 99 significant severe thunderstorms with high winds (four of which had greater than 60 knot winds),
- 1 hurricane and 3 tropical storms,
- 37 floods/flash floods,
- 1 strong wind event,
- 2 heavy rain events,
- 6 winter weather/wind chill/ice events,
- 67 hail events,
- 15 lightning events,
- 57 tornadoes and funnel clouds,
- 3 severe droughts, and
- 8 extreme heat waves.

The NCEI estimates that the damage from these events totals \$16.4 billion.

#### 2.2 District Hazards

The District is susceptible to a range of hazards inherent to southeast Texas; however, for the reasons outlined below, the District has determined the most appropriate and useful approach to developing its Hazard Mitigation Plan is to eliminate certain hazards from the detailed risk assessment in the Plan. The three reasons for eliminating certain hazards are:

1) The eliminated hazards are not significant enough to warrant detailed vulnerability assessment and loss estimation;

2) The District's mission and jurisdictional authority are explicitly limited to activities related to drainage and levees (although the organization does have the authority to complete actions to protect and mitigate damage to its own facilities); and

3) Assets and populations that are potentially exposed to hazards are part of an existing mitigation plan with actions to address hazards outlined in their HMPs. Fort Bend County and the City of Sugar Land have the authority and the responsibility to sponsor mitigation activities for their constituent populations and communities. The District will continue to coordinate with the County and City to ensure mitigation actions are developed and implemented, aiming to reduce or eliminate any opposition or redundancy between the jurisdictions.

The District's specific assets considered in this Plan include: a reused water system, the levee along the west and south sides of the District, several channels (Ellis Creek, Ditch O), nine of the 12 lakes within the District, the storm water pump station and the external channel (including various flap gates and sluice gates). See **Figure 2** for the location of District assets. However, along with these fixed assets, the District also has responsibilities to provide proper drainage within the levee system as well as to maintain the levee's ability to provide flood protection. This plan will consider the impact of hazards on the District's ability to meet those responsibilities.



Figure 2 – Location of District Assets

2-2

The MPC evaluated the District's risk exposure to natural hazards and the ability of the District to regulate and prepare for such events, as outlined in **Section 1.2**. Based on the District's limited authority when it comes to managing hazards other than flood and the lack of occurrences and/or the limited effect that certain hazards have on the District's assets, the following hazards have been eliminated from consideration and no mitigation action items are associated with them:

- Severe Winter Storms,
- Earthquake,
- Land Subsidence,
- Wildfire,
- Coastal Erosion,
- Hailstorms,
- Extreme Heat,
- Expansive Soils,
- Drought,
- Tornado,
- Thunderstorm Winds,
- Lightning.

The District hazards addressed as part of this plan are:

- Hurricanes and Tropical Storms,
- Flood, and
- Levee Failure

The MPC reviewed each hazard and assigned a probability of occurrence based on the experience of the MPC members and an understanding of the hazards, as outlined in the hazard profiles in **Sections 2.5** through **2.8**. The probability categories are shown in **Table 3**.

#### Table 3 – Hazard Probability

# Probability: High: Event probable in next year. Medium: Event probable in next 5 years Low: Event possible in next 10 years.

#### 2.3 Geography, Climate, and Population

The District is located in southeast Texas within the boundaries of New Territory, a master-planned community and a Census Designated Place (CDP). The district consists of approximately 3.8 square miles which lies entirely within Fort Bend County. The City of Richmond is the Fort Bend County seat. The largest city in the county is the City of Sugar Land. In November 2016, the Sugar Land city council voted in favor of annexing New Territory. The annexation was effective December 12, 2017. **Figure 3** is a map identifying the boundary area for the District.



Figure 3 – Planning Area: Fort Bend County Levee Improvement District No. 7

Fort Bend County is located in the Texas Coastal Plain and is relatively flat. Ground surface elevations (not including the levees) across the district have little variance, with the highest elevations reaching 87 feet above sea level. Annual average rainfall in the county is 51 inches. The District is bordered on the north by US 90A, to the south by the Brazos River.

According to the United States Census Bureau, the estimated 2016 population within New Territory CDP was 15,843 residents. This is a 4.3 percent increase from the 2010 census data. **Table 4** summarizes the 2010 census population within the Plan area.

		Estimated V Sensitive P	2010 Population	
Jurisdiction	2010 Population	Elderly (Over 65)	Below Poverty Level	Density per square mile
New Territory (CDP)	15,186	457	683	3,996

#### Table 4 – 2010 Population of Plan Area

#### 2.4 Past Disaster Declarations

FEMA maintains records on Federally Declared Disasters, dating back to 1953. Data on Presidential Disaster Declarations characterize some natural disasters that have affected the area. In 1965, the Federal government began to maintain records of events determined to be significant enough to warrant declaration of a major disaster by the President of the United States. Presidential Disaster Declarations are made at the county level and are not specific to any one city or sub-area. Between 1983 and 2017 there were 17 disasters involving a severe storm, hurricane, or flooding declared in Fort Bend County; those disasters are listed in **Table 5**. The "Disaster Type" in **Table 5** is either EM (Emergency) or DR (Major Disaster).

Disaster Number	Declaration Date	Disaster Type	Title	Incident Begin Date	Incident End Date	Declared County/ Area
4332	8/25/2017	DR	HURRICANE HARVEY	8/23/2017	9/15/2017	Fort Bend County
4272	6/11/2016	DR	SEVERE STORMS AND FLOODING	5/22/2016	6/24/2016	Fort Bend County
4269	4/25/2016	DR	SEVERE STORMS AND FLOODING	4/17/2016	4/30/2016	Fort Bend County
4223	5/29/2015	DR	SEVERE STORMS, TORNADOES, STRAIGHT- LINE WINDS AND FLOODING	5/4/2015	6/22/2015	Fort Bend County
1791	9/13/2008	DR	HURRICANE IKE	9/7/2008	10/2/2008	Fort Bend County
3294	9/10/2008	EM	HURRICANE IKE	9/7/2008	9/26/2008	Fort Bend County
3290	8/29/2008	EM	HURRICANE GUSTAV	8/27/2008	9/7/2008	Fort Bend County
3277	8/18/2007	EM	HURRICANE DEAN	8/17/2007	9/5/2007	Fort Bend County
2639	5/26/2006	FM	LAKE OLYMPIA FIRE	5/26/2006		Fort Bend County
1624	1/11/2006	DR	EXTREME WILDFIRE THREAT	11/27/2005	5/14/2006	Fort Bend County

#### Table 5 – Declared Emergencies and Major Disasters in Fort Bend County (Source: FEMA, Disaster Declaration Summary Database)

Disaster Number	Declaration Date	Disaster Type	Title	Incident Begin Date	Incident End Date	Declared County/ Area
1606	9/24/2005	DR	HURRICANE RITA	9/23/2005	10/14/2005	Fort Bend County
3261	9/21/2005	EM	HURRICANE RITA	9/20/2005	10/14/2005	Fort Bend County
3216	9/2/2005	EM	HURRICANE KATRINA EVACUATION	8/29/2005	10/1/2005	Fort Bend County
1439	11/5/2002	DR	SEVERE STORMS, TORNADOES AND FLOODING	10/24/2002	11/15/2002	Fort Bend County
1379	6/9/2001	DR	TX-TROPICAL STORM ALLISON-06-06- 2001	6/5/2001	6/20/2001	Fort Bend County
3142	9/1/1999	EM	EXTREME FIRE HAZARDS	8/1/1999	12/10/1999	Fort Bend County
1257	10/21/1998	DR	TX-FLOODING 10/18/98	10/17/1998	11/15/1998	Fort Bend County
1239	8/26/1998	DR	TROPICAL STORM CHARLEY	8/22/1998	8/31/1998	Fort Bend County
1041	10/18/1994	DR	SEVERE THUNDERSTO RMS AND FLOODING	10/14/1994	11/8/1994	Fort Bend County
930	12/26/1991	DR	SEVERE THUNDERSTO RMS	12/20/1991	1/14/1992	Fort Bend County
689	8/19/1983	DR	HURRICANE ALICIA	8/18/1983	8/20/1983	Fort Bend County

#### 2.5 Hurricanes and Tropical Storms

There are three types of tropical cyclones defined by NOAA: hurricanes, tropical storms, and tropical depressions. **Table 6** lists the criteria for each classification.

2-6

Stage of Development	Criteria
Tropical Depression (development)	Maximum sustained surface wind speed is < 39 mph
Tropical Storm	Maximum sustained wind speed ranges 39 - <74 mph
Hurricane	Maximum sustained surface wind speed 74 mph+
Tropical Depression (dissipation)	Decaying stages of a cyclone in which maximum sustained surface wind speed has dropped below 39 mph

#### 2.5.1 Location of Hurricanes and Tropical Storms

The hazard of hurricanes and tropical storms is expected to affect the District uniformly. The District is on the Texas Gulf Coast; while it does not share a border with the Gulf, the southernmost part of the county is only 48 miles from the coastline. Past occurrences of hurricanes and tropical storms, including the list of previous hurricanes and tropical storms that have impacted the District are discussed in **Section 2.5.3**.

#### 2.5.2 Extent of Hurricanes and Tropical Storms

Hurricanes are classified into five categories according to the Saffir-Simpson Hurricane Wind Scale, as shown in **Table 7**.

Storm Category	Central Pressure	Sustained Winds	Storm Surge	Potential Damage
1	> 980 mbar	74 - 95 mph	4 – 5 feet	Minimal
2	965 – 979 mbar	96 - 110 mph	6 – 8 feet	Moderate
3	945 – 964 mbar	111 – 130 mph	9 – 12 feet	Extensive
4	920 – 944 mbar	131 – 155 mph	13 – 18 feet	Extreme
5	< 920 mbar	> 155 mph	> 18 feet	Catastrophic

#### Table 7 – Saffir/Simpson Hurricane Wind Scale

Tropical storms and hurricanes are common in the planning area, and storms of any magnitude are very likely to occur in any given year. The District should anticipate and prepare for Category 5 and Category 4 hurricanes.

Tropical storms tend to have longer durations, producing prolonged wet and saturated conditions, which can lead to flooding, and volumes of rain beyond the design capacity of drainage structures as was witnessed during Hurricane Harvey. **Figure 4** shows the precipitation predicted by the U.S. Geological Survey (USGS) for a 100-year storm (1% Annual Chance) with 7-day duration in Fort Bend County to be approximately 17-inches.



Figure 4 – Depth of Precipitation for 100-Year Storm for 7-Day Duration in Texas (Source: USGS Rainfall Atlas)

#### 2.5.3 Historical Hurricanes and Tropical Storms

Significant historical hurricane and tropical storm events that had a direct path through Fort Bend County are summarized in **Table 8**.

## Table 8 – Damage-Causing Historical Hurricane and Tropical Storm Events in Fort Bend County from 1998-2017

Year	Storm Name	Category	FBC Property Damage
1998	Frances	Tropical Storm	\$100,000
2001	Allison	Tropical Storm	\$7,740,000
2002	Fey	Tropical Storm	\$4,500,000
2008	lke	Category 2	\$400,000,000
2017	Harvey	Category 4	\$8,000,000,000
Totals			\$8,412,340,000

This information was extracted from the NCEI Storm Events Database, which summarizes "the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries,

significant property damage, and/or disruption to commerce". Other hurricanes and tropical storms have occurred in Fort Bend County but may not be listed in the database. Significant past events include:

- Hurricane Harvey, 2017. This hurricane was a Category 4 storm with estimated sustained winds of 130-mph at landfall. Fifty inches of rain is the high-end estimated rainfall total from the National Hurricane Center as Harvey passed over Texas. Some parts of Texas received nine days of continuous rainfall. Harvey produced numerous tornadoes and severe flooding over portions of Fort Bend County. Total damages of this storm in Fort Bend County, as reported by the NCEI database, were \$8 billion.
- **Hurricane Ike, 2008.** This hurricane made landfall on Galveston Island as a Category 2 hurricane with estimated sustained winds of 110 mph. An estimated 10-in to 20-in of rain fell across the southeast Texas region. At the time, Ike was the third-costliest of any Atlantic hurricane and resulted in \$37.5 billion in damages, with only hurricanes Sandy (2012) and Katrina (2005) estimated higher. There were pockets of damage from the storm in Fort Bend County, with eastern part of the county hardest hit. An estimated 200 roofs sustained damage, and there were three indirect fatalities due to carbon monoxide poisoning. The resulting damage from Hurricane Ike in Fort Bend County was estimated at \$400 million.
- **Tropical Storm Allison, 2001.** Allison moved inland less than 12 hours after forming just off the west end of Galveston Island. Allison made its initial landfall on Galveston Island during the evening of June 5, and during the next five days produced record rainfall that led to devastating flooding across portions of Southeast Texas. Heavy rain, totaling 8 to 12 inches, occurred over the Sugar Land-Stafford area of Fort Bend on June 7. The resulting damage from Allison in Fort Bend County was estimated at \$7.74 million.

Figure 5 shows hurricane tracks that have passed over Fort Bend County since 1871, according to NOAA.



Figure 5 – Historical Hurricanes and Tropical Storms in Fort Bend County

#### 2.5.4 Probability of Hurricanes and Tropical Storms

Based on historical data, the probability of the District being affected by hurricanes and tropical storms is medium.

#### Probability:

- □ High: Event probable in next year.
- Medium: Event probable in next 5 years
- □ Low: Event possible in next 10 years.

#### 2.5.5 Impact and Vulnerability related to Hurricanes and Tropical Storms

The District's mission and jurisdictional authority are explicitly limited to activities related to levee improvement, and protecting the integrity of the levees. Therefore, the District only has the authority to mitigate the effect of hurricanes and tropical storms on District-owned facilities and personnel. Hurricanes can cause a significant threat to buildings and equipment as they could be struck by flying debris, falling trees/branches, utility lines, and poles as well as sustain damage from the wind. District specific assets that are vulnerable to Hurricanes include the storm water pump station, the reclaimed water system, the outfall structure, and several detention facilities. However, considering the long warning time associated with Hurricanes and Tropical storms, the District will do its best to warn personnel, and coordinate protecting its equipment, if possible.

Since the District's main focus is on activities related to levees, the hazard of hurricanes and tropical storms has an emphasis on the secondary hazard of subsequent flooding that can occur during and after these events and the mitigation actions for flood will serve to mitigate the effects of all the hazards that contribute to flooding. The flood elements, including inundation depths experienced from severe storms, hurricanes, tropical storms, and other large rain events are discussed in **Section 2.6**.

#### 2.6 Flood

A flood is an overflow of a large amount of water, beyond its normal limits, over what is normally dry land.

The District's levee system protects the New Territory neighborhood from the Brazos River 100-year floodplain, which puts it at risk for a flood event. Flooding is a naturally occurring event, but becomes hazardous when the public, infrastructure, and property are affected. Historically, floods are, and continue to be the most frequent, destructive, and costly natural hazard facing the District.

#### 2.6.1 Types of Flooding

<u>Flash Flood Events</u> – According to the National Weather Service, a flash flood is flooding that begins within 6 hours, and often within 3 hours, of the heavy rainfall (or other cause). Flash floods can be caused by a number of things, but are most often due to extremely heavy rainfall from thunderstorms. Flash floods can occur due to dam or levee breaks, and/or mudslides (debris flow). The intensity of the rainfall, the location and distribution of the rainfall, the land use and topography, vegetation types and growth/density, soil type, and soil water-content all determine just how quickly the flash flooding may occur, and influence where it may occur. Urban areas are also prone to flooding in short time-spans and, sometimes, rainfall (from the same storm) over an urban area will cause flooding faster and more-severe than in the suburbs or countryside. The impervious surfaces in the urban areas do not allow water to infiltrate the ground, and the water runs off to the low spots very quickly. Flash flooding occurs so quickly that people are caught off-guard. Their situation may become dangerous if they encounter high, fast-moving water while traveling. If people are at their homes or businesses, the water may rise quickly and trap them, or cause damage to the property without them having a chance to protect the property.

<u>Riverine Flooding</u> – Riverine flooding occurs when water rises out of the banks of the waterway, which is a common cause of flooding in the District. Flooding along waterways is a function of both precipitation levels and water run off volumes that drain from larger watersheds which can often be predicted in advance. In the District's jurisdiction, the larger riverine systems will experience a flood crest 24 hours or longer after the storm event begins. Within the District, riverine flooding is caused by either tropical storms or large fronts moving across Texas. These systems can take more than a day to pass, giving ample opportunity for large amounts of rain to fall over large areas. It should be noted, that in instances of high water levels on the Brazos River, the District relies on its storm water pump station to control the level of floodwaters within the leveed areas.

<u>Flooding due to Levee Failure</u> – In the event of a levee breach or levee failure, the subsequent flooding would be disastrous and potentially far worse than any naturally occurring flood. The flooding could occur across the entire Levee Improvement District (LID) boundary, including over 4,600 residential lots. Aside from the flooding being expansive within the LID study area, due to the topography, the flooding duration would be on the order of days, rather than a typical flash flood or riverine flooding scenario.

<u>Pump Failure</u> – Pumps are operated and maintained by the District in order to prevent flooding during rain events when the Brazos River is high and gravity flow cannot occur. If the pumps experience any malfunction, or fail to operate, there could be resultant flooding within the LID Boundary. Similar to levee failure, the flooding duration would be on the order of days.

#### 2.6.2 Location of Flooding

The area within the levees is protected from riverine flooding as long as the water level in the Brazos River is lower than the elevation of the levee where it ties back to natural ground, and as long as the pump station is operational and not surcharged or damaged.

The Special Flood Hazard Area is an area studied and defined by FEMA as an area subject to flooding in the 100-year event. The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for the District shows the following flood hazard areas:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.
- Zone X: Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annualchance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percentannual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

Although the District is surrounded by the Brazos River 100-year flood plain, only the drainage ditches and amenity lakes within the District are designated as "at risk" during the 100-year event (Zone A). All remaining land within the District is designated as "area with reduced flood risk due to levee" by FEMA.

It is important to note that the DFIRM does not include all possible sources of flooding in the District, and therefore the DFIRM only helps understand a portion of the risk exposure for the District. Locations of flood zones in the District based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in **Figure 6** below. This map became effective as of April 2, 2014.



Figure 6 – FEMA Effective Floodplains

#### 2.6.3 Previous Occurrences of Flooding

The Effective FEMA Flood Insurance Study (FIS) for Fort Bend County, dated December 21, 2017, notes there have been several significant flood events from 1899 through 1998. Reports on historic flooding show that major storms or floods in the area occurred in 1899, 1900, 1913, 1915, and 1929. The flood of 1899 and the storm of 1900 caused much damage to Fort Bend County. Crops, stock, and lives were lost during these two events. The City of Richmond suffered some of the greater losses. Four to five feet of water was seen for several days, and in some places for a stretch of land seven miles wide. The floods of 1913 and 1929 left water covering large portions of the Cities of Rosenberg and Richmond. It was reported that during the 1913 flood, the waters of the Brazos, San Bernard, and Colorado Rivers met below Rosenberg. Some recent flood events noted in the FIS, as well as subsequent events include:

- August 26, 2017, Hurricane Harvey This hurricane was a Category 4 with estimated sustained winds of 130 mph at landfall. The main threat from Hurricane Harvey was flooding due to excessive precipitation. Fifty inches of rain is the top-end forecast rainfall amount mentioned by the National Hurricane Center with Harvey through its odyssey near/over Texas. Some parts of Texas received 9 days of rain. Interstates, critical facilities, infrastructure and hundreds of properties were flooded. Within the District, a few structures were damaged due to the pumps being unable to keep up with the rate and amount of precipitation accumulated within the LID boundary.
- May 27-June 10, 2016, Memorial Day Flooding After 20 inches of rain, the water level in the Brazos River reached record heights, and Fort Bend County was added to Presidentially-declared disaster DR-4272. Mostly low to moderate income areas (about 1,200 homes total) were impacted by the disaster.
- April 18-22, 2016, Tax Day Floods This storm front produced nine to 11 inches of rain in 12 hours. Within Fort Bend County, this incident caused flash and street flooding, Barker Reservoir flooding, and river flooding along the Brazos and San Bernard Rivers.
- May 29, 2015, Memorial Day Flood This storm front produced eight to ten inches of rainfall in the vicinity of Fort Bend County. Depending on the location in the Houston area, it ranged from a 2-year to a 500-year frequency storm. The water level in the Brazos River reached record heights.
- September 12-13, 2008, Hurricane Ike This hurricane made landfall on Galveston Island as a Category 2 hurricane with estimated sustained winds of 110 mph. An estimated 10-in to 20-in of rain fell across the southeast Texas region. At the time, Ike was the third-costliest of any Atlantic hurricane and resulted in \$37.5 billion in damages, with only hurricanes Sandy (2012) and Katrina (2005) damages estimated higher. The resulting damage from Ike in Fort Bend County was estimated at \$400 million. Total damages were estimated to be at least \$1.3 billion across southeast Texas.
- June 7, 2001, Tropical Storm Allison Allison moved inland less than 12 hours after forming just off the west end of Galveston Island. Allison made its initial landfall on Galveston Island during the evening of June 5, and during the next five days produced record rainfall that led to devastating flooding across portions of Southeast Texas. Heavy rain, 8 to 12 inches, occurred over the Sugar Land-Stafford area of Fort Bend on June 7. The resulting damage from Allison in Fort Bend County was estimated at \$7.74 million.
- October 1998, Southeast Texas Flood This flood event occurred across parts of south Texas and southeast Texas. The storm that caused it was one of the costliest in the recorded meteorological history of the United States, bringing rainfall of over 20 inches to some parts of southeast Texas, including the Sugar Land Area, and causing over \$750 million in damages.
- October 1994, Southeast Texas Flood This flood was the deadliest southeast Texas weather event since 1983's Hurricane Alicia. Heavy rains began falling late afternoon of October 16th across Burleson, Brazos, Grimes, and Washington counties. On the night of the 17<sup>th</sup> and on the 18<sup>th</sup>, rains continued to slide further south and began affection people in Jackson, Wharton, Matagorda, Brazoria, and portions of Fort Bend counties. Total rainfall from the entire storm generally ranged from 10 to 20 inches with Liberty recording 30.50 inches during the storm. Over 13,000 people had to be evacuated during the floods and over 22,000 homes received flood damage. Total damage to homes and businesses was approximately \$800 million while another \$100 million was done to roads and bridges throughout southeast Texas.

#### 2.6.4 Extent of Flooding

Flooding in Fort Bend County can result from the various types of flooding described in **Section 2.6.1**. Because of the flatness of the terrain, many inland areas are characterized by FEMA as shallow flooding during heavy rainfall. Flooding is most common after a short duration of heavy precipitation, with the typical rain total of nine inches for a 1% Annual Chance 6-hour rainfall, as shown in **Figure 7**. Flood magnitude is

measured by flood depth in feet or inches. Flooding in the event of a levee failure could result in flood depths up greater than 5 feet for the 100 year rain event. In the event of pump failure, depending on the storm event, flooding could be shallow and expansive, but lasting for days.



Figure 7 – Depth of Precipitation for 100-Year, 6-Hour Duration: Approximately 9 Inches (Source: USGS Rainfall Atlas)

#### 2.6.5 **Probability of Flooding**



Based on past events and the predicted precipitation, the probability of large rainfall events within the District's boundary is designated as highly likely. Fort Bend County has experienced 36 floods over a 10-year period, giving a frequency of three to four flood events per year. However, the protection provided by the levees and the pump stations make the probability of structural flooding within the District boundary relatively low.

#### 2.6.6 Impact and Vulnerability Related to Flooding

The impact of floods on the Plan area is not typical because of the protection provided by the levees. Typically, the District's flat topography and proximity to the Brazos River would make it prone to flooding. However, with the protection provided by the levees and internal pump station, the study area is likely only vulnerable if one of the following events were to occur:

- Levee failure due to breach;
- Levee failure due to river levels exceeding the elevation of the ends of the levee; or
- Failure or surcharge of the pump station.

The potential impacts of flooding include direct damages to structures and their contents, displacement of residents and businesses, and disruption of government services (including roads and infrastructure).

The District's vulnerability to floods is considered relatively high if one of the situations listed above occurs. If a flood event occurs, the entire study area could be inundated, including potentially several thousand residential structures. The District would be unable meet its responsibility to provide for the present and long term drainage needs in the planning area. **Table 9** shows the Critical Facilities protected by the District's levees and therefore vulnerable to flooding. Note that within the area protected by the District's levees, only one structure has ever been flooded; that incident occurred during Hurricane Harvey in 2017.

#### Table 9 – Critical Facilities Protected by the Levee in LID No. 7

Critical Facilities	Number
Schools	3
Banks	3
Grocery Stores	2
Gas Stations	2
Water and Wastewater Facilities	4

#### 2.6.7 NFIP Repetitive Loss structures

As of July 31, 2017, no Repetitive Loss (RL) structures were located within the boundary of the District.

#### 2.7 Levee Failure

A levee is a man-made structure; usually an earthen embankment designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide protection from temporary flooding.

Levee failure is a collapse or breach in the earthen structure resulting in the uncontrolled release of water, often resulting in floods that can exceed the 100-year floodplain boundaries. The breach may occur gradually or suddenly. The most dangerous breaches happen quickly, usually during high water. The District is bounded by a "u-levee" rather than a "ring levee". In this situation the levee could fail if water levels in the adjacent Brazos River or Bullhead Bayou are high enough to flow around the end of the levee.

Many factors could lead to the earthen levees being damaged, and therefore compromised. Examples include erosion from strong river currents, impacts from debris carried by floodwaters, and even impacts from large objects such as boats or barges that collide with and gouge the levee. Some animals are known to

burrow in levees, creating holes that enable water to pass through, and ultimately weakening the structure. Any of these weaknesses can lead to a levee breach.

#### 2.7.1 Levee Failure Location

The District is responsible for operation and maintenance of the levees protecting the District. The potential levee failure locations can be assumed to be anywhere along the levees shown in **Figure 8**. The levee within the study area is approximately 3.75 miles long and approximately nine feet high. Particular consideration should be given to the ends of the levees, where water from the adjacent river has the potential to flow around the levee and into the protected neighborhoods.

FINAL



Figure 8 – Location of Levees in the Vicinity of FBCLID No. 7.

NOTE: No levee on North Side.

#### 2.7.2 Extent of Levee Failure

The extent of levee failure can be determined by assessing the amount of area being protected by the levee, i.e. a greater amount of area being protected offers greater possibility for damage in the event of a failure. In the study area, there are more than 4,600 residences that could potentially be flooded if the levees failed, making the extent of flooding approximately 3.4 square miles. Flood magnitude is measured by flood depth in feet or inches. Based on existing models produced by the Brazos River Authority, the depth of flooding in the event of a levee failure can be expected to be greater than 5 feet throughout portions of the District.

#### 2.7.3 Probability and Historical Levee Failure

Probability:			
High: Event probable in next year.			
Medium: Event probable in next 5 years			
$\boxtimes$ Low: Event possible in next 10 years.			

There are no historical levee breaches on record associated with the District's levee system; however, this hazard is still considered a possibility, in particular because recent large storm events have caused significant erosion of the banks of the Brazos River, causing it to migrate closer to the levee. There is also concern about the lack of protection on the north side of the District. The u-shape of the existing levee causes vulnerability, since the area protected by the District levees would be inundated if the water level in the Brazos River or Bullhead Bayou were to rise far enough to flow into the neighborhood from the north side. Seasonal flooding as well as cyclical droughts can degrade the levee condition, and the ability to function as the primary flood protection measure.

#### 2.7.4 Impact and Vulnerability Related to Levee Failure

Levee failure is the most significant hazard for the District to assess and be prepared for, as it has the potential to make the highest impact on the District's jurisdiction, and study area. All 4,600 parcels are vulnerable to flood damage in the event of levee failure. As the District's responsibility is flood protection, levee failure presents a very substantial secondary hazard of flooding in the event of a levee failure. More details on subsequent flooding found in **Section 2.6.1**.

The Levees must maintain accreditation with FEMA in order for the area to be shown on the map as a Shaded Zone X, a non-special flood hazard area. The loss of accreditation would change the Zone X to a Zone A which would return the entire area to a FEMA "floodplain". Within the study area there are more than 4,600 resident parcels currently protected by the levee shown in **Figure 8**, above.

## 3 Mitigation Strategy

#### 3.1 District Mitigation Goals

State and federal guidance and regulations pertaining to mitigation planning require the development of a mitigation goal statement that is consistent with other goals, mission statements, and vision statements. To do so, the District reviewed FEMA's national mitigation goals, several examples of goal statements from other states and communities, and the State of Texas' Mitigation Goal.

#### 3.1.1 Mitigation Goal Statement

The mitigation goals of the District are:

- 1. To protect public health, safety, and welfare;
- 2. To reduce losses due to hazards by identifying hazards, minimizing exposure of citizens and property to hazards, and increasing public awareness and involvement;
- 3. To seek solutions to potential levee safety risks and existing flooding problems;
- 4. To have shovel ready projects prepared for implementation if/when funding is available through the FEMA Hazard Mitigation Grant Program.

#### 3.2 State of Texas Mitigation Goals

The Texas Division of Emergency Management is designated by the Governor as the State's coordinating agency for disaster preparedness, emergency response, and disaster recovery assistance. TDEM also is tasked to coordinate the State's natural disaster mitigation initiatives and administer grant funding provided by FEMA. A key element in that task is the preparation of the State of Texas Hazard Mitigation Plan. The State's 2007 plan includes a series of mitigation goals, which were augmented as part of the State of Texas' 2013 HMP update (Goal 5 and Goal 6 were added to their Plan Update).

- 1. Goal 1 Reduce or eliminate hazardous conditions that may cause loss of life;
- 2. Goal 2 Reduce or eliminate hazardous conditions that may inflict injuries;
- 3. Goal 3 Reduce or eliminate hazardous conditions that can cause property damages;
- 4. Goal 4 Reduce or eliminate hazardous conditions that degrade important natural resources;
- 5. Goal 5 Reduce or eliminate repetitive losses due to frequent probability of occurrence; and
- 6. Goal 6 Lessen economic impact within communities when hazards occur.

#### 3.3 Federal Mitigation Goal

The Federal Emergency Management Agency's mitigation strategy is set forth in a document originally prepared in the late 1990s. This strategy is the basis on which FEMA implements mitigation programs authorized and funded by the U.S. Congress. The national mitigation goal statement is as follows:

- To engender fundamental changes in perception so that the public demands safer environments in which to live and work; and
- To reduce, by at least half, the loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural disasters.

#### 3.4 **Previous Mitigation Actions**

This is the first iteration of the Hazard Mitigation Plan for the District. There are no previous mitigation actions to discuss.

#### 3.5 Identifying Priority Actions

Each action item identifies an appropriate lead agency for each action, cost effectiveness, a schedule for completion and suggested funding sources. For this Plan, the MPC considered the "STAPLEE" methodology to prioritize mitigation actions. STAPLEE assesses actions based on six general criteria: Social, Technical, Administrative, Political, Legal, Economic, and Environmental. The criteria for prioritization are listed on each individual Mitigation Action Worksheet, in **Appendix F**. **Table 10** describes the STAPLEE methodology.

#### Table 10 – STAPLEE Methodology

STAPLEE	Criteria Explanation
S – Social	Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values.
T – Technical	Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
A – Administrative	Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
P – Political	Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.
L – Legal	It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
E – Economic	Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.
E – Environmental	Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

#### 3.6 District Mitigation Actions

All District Mitigation Actions were reported on Mitigation Action Worksheets consistent with associated worksheets to provide further detail, seen in Appendix F. A summary table of all proposed mitigation actions is shown in **Table 11**. For more detailed descriptions and evaluation of each Mitigation Action, see worksheets in **Appendix F**.

Number	Mitigation Action	Hazard	Estimated Cost	Time (years)
1	Pump Station Electrical Improvements	Flood, Hurricane & Tropical Storms	\$100,000 - \$500,000	1 - 2 years
2	Northeast / Northwest Levee Improvements	Flood, Hurricane & Tropical Storms, Levee Failure	\$3,000,000	1 - 3 years
3	Outfall Channel Erosion Control Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$3,000,000	1 - 2 years

#### Table 11 – Proposed District Mitigation Actions

Number	Mitigation Action	Hazard	Estimated Cost	Time (years)
4	Procure Additional Temporary Pumping Capacity	Flood, Hurricane & Tropical Storms	<\$500,000	1 - 2 years
5	Maintain Ownership of Tiger Dams	Flood, Hurricane & Tropical Storms, Levee Failure	<\$500,000	1 - 2 years
6	Integrate Emergency Notification System through City of Sugar Land	Flood, Hurricane & Tropical Storms, Levee Failure	<\$100,000	1 - 2 years
7	Maintain Website to Disseminate Public Information	Flood, Hurricane & Tropical Storms, Levee Failure	<\$100,000	1 - 2 years
8	North Levee Closure Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$15,000,000	1 – 5 years
9	Pump Station Capacity Enhancement Project	Flood, Hurricane & Tropical Storms	\$7,000,000	1 – 5 years
10	Internal Detention Basin Project	Flood, Hurricane & Tropical Storms	\$7,000,000	1 – 5 years
11	Brazos River Erosion Control Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$55,000,000	1 – 5 years
12	Raise the Existing Levee	Flood, Hurricane & Tropical Storms, Levee Failure	\$25,000,000	5 – 10 years
13	Drainage System Capacity Restoration	Flood, Hurricane & Tropical Storms	\$3,000,000	5 – 10 years

The costs shown in **Table 11** are preliminary planning-level estimates of construction cost, and may not include all costs associated with each action. If and when each project advances, the actual costs of each action may increase or decrease. Providing that funding is available and with the approval of the Board of Directors, the Attorney and the Engineer will be responsible for administering and implementing the various proposed mitigation actions.

## APPENDIX A: PLANNING TEAM MEETINGS

#### FBCLID7 Hazard Mitigation Planning Kick-off meeting

#### Date: March 1, 2018

#### Attendees:

FBCLID7: Jim Grotte, Epi Salazar, Cindy Picazo, Chris Skinner, Matt Reed, Jeff Perry, Stephen Wilcox, Jon Vanderwilt, Michael Walker AECOM: Ross Gordon

Note that other stakeholders and numerous community residents were also in attendance and participated in the dialogue.

#### Agenda:

- I. Introductions
- II. Overview of Hazard Mitigation Planning Process
- III. Mitigation Planning Committee Composition
- IV. Stakeholder Committee Composition
- V. Review of greatest hazard concerns
- VI. Discussion of priority mitigation actions
- VII. Request for supporting data: enabling documents, Emergency Action Plan, list of assets, etc.
### FBCLID7 Hazard Mitigation Planning Workshop

### Date: April 5, 2018

### Attendees:

FBCLID7: Jim Grotte, Epi Salazar, Cindy Picazo, Chris Skinner, Matt Reed, Jeff Perry, Stephen Wilcox, Jon Vanderwilt, Michael Walker

AECOM: Ross Gordon

Note that other stakeholders and numerous community residents were also in attendance and participated in the dialogue.

### Agenda:

- I. Overview of hazard mitigation planning process and goals and objectives
- II. Detailed review of draft hazard mitigation plan (page by page)
- III. Finalization of stakeholders to include in outreach, including discussion of previous coordination with Fort Bend County
- IV. Discussion and development of mitigation actions to include in the plan.
- V. Discussion regarding schedule for the review process, public involvement process, and submittals to TDEM and FEMA.

### APPENDIX B: PUBLIC INVOLVEMENT

### FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7

### NOTICE OF PUBLIC MEETING

Notice is hereby given to all interested members of the public that the Board of Directors (the "Board") of the above captioned District will hold a public meeting at The Club of New Territory, 1200 Walker School Road, Sugar Land, Fort Bend County, Texas 77479, said address being a meeting place of the District.

### The meeting will be held on Thursday, March 1, 2018, at 5:00 P.M.

The Board shall consider and discuss the following matters and take any action necessary or appropriate with respect to such matters:

- 1. Review and approve the minutes of the January 24, 2018, February 1, 2018, and February 12, 2018, Board meetings;
- 2. Matters related to Directors Election to be held on May 5, 2018;
- 3. Matters related to Bond Authorization Election to be held on May 5, 2018, including:
  - a. Community outreach preparations and planning, including review of proposal from Community Awareness Services, Inc.;
- 4. Engineer's report:

a.

- Authorization of the design, advertisement for bids and/or award of construction contracts or concurrence in the award of a contract for the construction of facilities within the District and acceptance of TEC Form 1295, including status of repairs;
  - (ii) Status of construction contract approval of any change orders and/or acceptance of facilities for operation and maintenance purposes District and acceptance of TEC Form 1295; and
  - (iii) Acceptance of site and/or easement conveyances for facilities constructed or to be constructed for the District;
- b. Status of Bond Application Report in connection with the District's proposed Bond Issue No. 13; authorize any action necessary in connection therewith;
- c. Stormwater Drainage Improvements Projects, including:
  - (i) Status of hydraulic and hydrologic modeling of the District;
  - (ii) Status of peer review of hydraulic and hydrologic modeling of the District by AECOM, Inc. ("AECOM");

- (iii) Status of proposed detention facilities project;
- (iv) Status of planned pumping station improvements and/or proposed new pumping station; and
- (v) Acquisition of real property rights for construction of improvements;
- d. North Levee Improvements Projects, including:
  - (i) Status of revised Preliminary Engineering Report;
  - (ii) Acquisition of real property rights for construction of improvements; and
  - (iii) Status of investigation regarding viability of regional levee project;
- e. Brazos River Bank Erosion Control Project, including:
  - (i) Status of Preliminary Engineering Report; and
  - (ii) Status of construction of joint Erosion Control Wall with the Fort Bend Grand Parkway Toll Road Authority;
- f. Discuss External Drainage Channel Erosion Control Project, including:
  - (i) Project design, permitting matters and project financing; and
  - (ii) Acquisition of real property rights for the natural channel design improvements;
- g. Drainage Improvements to relieve flooding at 318 High Meadows Drive and in the High Meadows Subdivision in Fort Bend County Municipal Utility District No. 68 ("No. 68") during heavy rain events, including:
  - (i) Status of Design and Advertisement for Bids of Drainage Improvements; and
  - (ii) Acquisition of real property rights for construction of improvements;
- h. Status of communications with City of Sugar Land, Texas (the "City") and Fort Bend County, Texas, regarding the City's assumption of Floodplain Administrator Role for New Territory; and
- i. Interlocal Agreement between the City and the District related to access to storm water drainage outfalls by the City;
- 5. Status of Emergency Application to TCEQ for Approval of Change in Use of Expenditure of Bond Proceeds and Construction Funds to reimburse the General Operating Fund for the purchase of Tiger Dams;

- 6. Status of financing, design, construction and operation of planned New Territory reclaimed water system, including legal matters related to obtaining the necessary permits and/or authorizations from the TCEQ in connection with said system and other related project matters and acceptance of TEC Form 1295:
  - a. First Amendment to the Reclaimed Water Supply Agreement between the District and the NTRCA to amend the definition of "User Expenses";
  - b. Status of acquisition of real property interests in connection with the planned New Territory reclaimed water system and other related transactional matters; authorize any action necessary in connection therewith;
    - (i) Reclaimed Water Line Easements from NTRCA; and
  - c. Discussion regarding landscaping of Reclaimed Water Plant Site;
- 7. Operations and maintenance report:
  - a. Status of operation and maintenance of levees and pump station; authorize any action necessary in connection therewith;
  - b. Status of storm drain inspections; authorize any action necessary in connection therewith; and
  - c. Status of installation of lights under Highway 99 overpass along the Ellis Creek drainage ditch;
    - (i) Review and approval of Permit For Attachment of Lighting Fixtures to Right-of-Way by and between the District and Fort Bend County Grand Parkway Toll Road Authority ("FBGPTRA");
- 8. Status of requests for financial public assistance from governmental agencies, including:
  - a. FEMA for expenses incurred in connection with high-river events in 2016 and Hurricane Harvey in 2017 and potentially the Brazos River Bank Erosion Control Project;
  - b. Status of preparation of Hazard Mitigation Plan;
  - c. USDA Natural Resources Conservation Service in connection with the Brazos River Bank Erosion Control Project and the External Drainage Channel Erosion Control Project; and
  - d. Rebuild Texas for the Brazos River Bank Erosion Control Project;

- 9. Bookkeeper's report, including financial and investment reports and authorizing the payment of invoices presented; status of establishment of reserve account for capital improvements;
- 10. Adoption of amended operating budget for the District's fiscal year ending August 31, 2018;
- 11. Authorize consultants to research unclaimed property and consider authorizing bookkeeper to prepare Unclaimed Property Report as of March 1, 2018;
- 12. Tax Assessor-Collector report, including status of delinquent tax accounts, authorizing the payment of invoices presented, approving tax refunds and approving the moving of accounts to the uncollectible roll;
- 13. Report and legal action taken by the District's delinquent tax collection attorneys, including authorizing foreclosure proceedings, installment agreements, and the filing of proofs of claim;
- 14. Status of compliance with the EPA Phase II Small MS4 General Permit; any training that is necessary under the Storm Water Management Plan; and the taking of any action required in connection therewith;
- 15. Report regarding activities of the Fort Bend Flood Management Association;
- 16. Status of website for District and other community communications matters;
- 17. Public Comments;
- 18. Attorney's Report;
- 19. Closed Session pursuant to Open Meetings Act, Texas Government Code, Sections 551.071 to consult with the District's attorney regarding matters protected by attorney-client privilege, and/or Section 551.072 to discuss acquisition of real property interests, if necessary;
- 20. Reconvene in Open Session and authorize any action resulting from matters discussed in Closed Session; and
- 21. Matters for possible placement on future agendas.



Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact the District's attorney at (713) 623-4531 at least three business days prior to the meeting so that appropriate arrangements can be made.

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### FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7

### NOTICE OF PUBLIC MEETING

Notice is hereby given to all interested members of the public that the Board of Directors (the "Board") of the above captioned District will hold a public meeting at the City Hall of The City of Sugar Land, Texas, 2700 Town Center Boulevard, Sugar Land, Fort Bend County, Texas, 77479, said address being a meeting place of the District.

### The meeting will be held on Thursday, April 5, 2018, at 5:00 P.M.

The Board shall consider and discuss the following matters and take any action necessary or appropriate with respect to such matters:

- 1. Review and approve the minutes of the March 1, 2018, Board meeting;
- 2. Matters related to Directors Election to be held on May 5, 2018;
- 3. Matters related to Bond Authorization Election to be held on May 5, 2018, including preparations and planning for Community outreach event to be held on April 24, 2018, at the Club at New Territory;
- 4. Engineer's report:
  - a. (i) Authorization of the design, advertisement for bids and/or award of construction contracts or concurrence in the award of a contract for the construction of facilities within the District and acceptance of TEC Form 1295, including status of repairs;
    - (ii) Status of construction contract approval of any change orders and/or acceptance of facilities for operation and maintenance purposes District and acceptance of TEC Form 1295; and
    - (iii) Acceptance of site and/or easement conveyances for facilities constructed or to be constructed for the District;
  - b. Status of Bond Application Report in connection with the District's proposed Bond Issue No. 13; authorize any action necessary in connection therewith;
  - c. Stormwater Drainage Improvements Projects, including:
    - (i) Status of hydraulic and hydrologic modeling of the District;
    - (ii) Status of peer review of hydraulic and hydrologic modeling of the District by AECOM, Inc. ("AECOM");
    - (iii) Status of proposed detention facilities project;
    - (iv) Status of planned pumping station improvements and/or proposed new pumping station; and

- (v) Acquisition of real property rights for construction of improvements;
- d. North Levee Improvements Projects, including:
  - (i) Status of revised Preliminary Engineering Report;
  - (ii) Acquisition of real property rights for construction of improvements; and
  - (iii) Status of investigation regarding viability of regional levee project;
- e. Brazos River Bank Erosion Control Project, including:
  - (i) Status of Preliminary Engineering Report; and
  - (ii) Status of construction of joint Erosion Control Wall with the Fort Bend Grand Parkway Toll Road Authority;
- f. Discuss External Drainage Channel Erosion Control Project, including:
  - (i) Project design, permitting matters and project financing; and
  - (ii) Acquisition of real property rights for the natural channel design improvements;
- g. Drainage Improvements to relieve flooding at 318 High Meadows Drive and in the High Meadows Subdivision during heavy rain events, including:
  - (i) Status of Design and Advertisement for Bids of Drainage Improvements; and
  - (ii) Acquisition of real property rights for construction of improvements;
- h. Status of communications with City of Sugar Land, Texas (the "City") and Fort Bend County, Texas, regarding the City's assumption of Floodplain Administrator Role for New Territory;
- i. Interlocal Agreement between the City and the District related to access to storm water drainage outfalls by the City; and
- j. Discussion regarding financing of projects through the Texas Water Development Board's Clean Water State Revolving Fund program;
- 5. Status of Emergency Application to TCEQ for Approval of Change in Use of Expenditure of Bond Proceeds and Construction Funds to reimburse the General Operating Fund for the purchase of Tiger Dams;

- 6. Status of financing, design, construction and operation of planned New Territory reclaimed water system, including legal matters related to obtaining the necessary permits and/or authorizations from the TCEQ in connection with said system and other related project matters and acceptance of TEC Form 1295:
  - a. Status of acquisition of real property interests in connection with the planned New Territory reclaimed water system and other related transactional matters; authorize any action necessary in connection therewith;
    - (i) Reclaimed Water Line Easements from NTRCA; and
  - b. Discussion regarding landscaping of Reclaimed Water Plant Site;
- 7. Operations and maintenance report:
  - a. Status of operation and maintenance of levees and pump station; authorize any action necessary in connection therewith;
  - b. Status of storm drain inspections; authorize any action necessary in connection therewith; and
  - c. Status of installation of lights under Highway 99 overpass along the Ellis Creek drainage ditch;
    - (i) Review and approval of Permit For Attachment of Lighting Fixtures to Right-of-Way by and between the District and Fort Bend County Grand Parkway Toll Road Authority ("FBGPTRA");
- 8. Status of requests for financial public assistance from governmental agencies, including:
  - a. FEMA for expenses incurred in connection with high-river events in 2016 and Hurricane Harvey in 2017 and potentially the Brazos River Bank Erosion Control Project;
  - b. Status of preparation of Hazard Mitigation Plan;
  - c. USDA Natural Resources Conservation Service in connection with the Brazos River Bank Erosion Control Project and the External Drainage Channel Erosion Control Project; and
  - d. Rebuild Texas for the Brazos River Bank Erosion Control Project;
- 9. Bookkeeper's report, including financial and investment reports and authorizing the payment of invoices presented; status of establishment of reserve account for capital improvements;

- 10. Tax Assessor-Collector report, including status of delinquent tax accounts, authorizing the payment of invoices presented, approving tax refunds and approving the moving of accounts to the uncollectible roll;
- 11. Report and legal action taken by the District's delinquent tax collection attorneys, including authorizing foreclosure proceedings, installment agreements, and the filing of proofs of claim;
- 12. Adoption of Resolution Authorizing an Additional Penalty on Delinquent Real Property Taxes and authorize the delinquent tax attorney to pursue the collection of delinquent real property taxes beginning July 1, 2018, including the filing of lawsuits, as necessary;
- 13. Status of compliance with the EPA Phase II Small MS4 General Permit; any training that is necessary under the Storm Water Management Plan; and the taking of any action required in connection therewith;
- 14. Report regarding activities of the Fort Bend Flood Management Association;
- 15. Status of website for District and other community communications matters;
- 16. Public Comments;
- 17. Attorney's Report;
- 18. Closed Session pursuant to Open Meetings Act, Texas Government Code, Sections 551.071 to consult with the District's attorney regarding matters protected by attorney-client privilege, and/or Section 551.072 to discuss acquisition of real property interests, if necessary;
- 19. Reconvene in Open Session and authorize any action resulting from matters discussed in Closed Session; and
- 20. Matters for possible placement on future agendas.



SCHWARTZ, PAGE & HARDING, L.L.P.

Christopher T.

Christopher T. Skinner Attorney for the District

Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact the District's attorney at (713) 623-4531 at least three business days prior to the meeting so that appropriate arrangements can be made. 485788\_1

### Lambert, Sarah

Subject: Location:	REMINDER: FBCLID7 HMP Stakeholder WebEx Online WebEx
Start: End:	Thu 4/19/2018 9:00 AM Thu 4/19/2018 10:00 AM
Recurrence:	(none)
Meeting Status:	Meeting organizer
Organizer: Required Attendees:	Lambert, Sarah Lambert, Sarah; executivedirector@newterritory.org; Gordon, Ross; jalba@sugarlandtx.gov; csteubing@sugarlandtx.gov; dbrinkley@sugarlandtx.gov; phughes@sugarlandtx.gov; jeff.braun@fortbendcountytx.gov; doug.barnes@fortbendcountytx.gov; richard.stolleis@fortbendcountytx.gov; mark.vogler@fortbendcountytx.gov; mikestone@mikestoneassociates.com; fbclid17@gmail.com; jring@odysseyeg.com; information@brazos.org; davidc@brazos.org; MUD121@riverparkwestonline.org; cskinner@sphllp.com; j.perry@leveemanagementservices.com; mreed@sphllp.com; swilcox@costelloinc.com; jvanderwilt@costelloinc.com; simon@tritoncg.com; ops_man2005 @hotmail.com; Michael Willett
Optional Attendees:	Jason Kelly; Ashley Ramos; Greg Baird

### All,

Fort Bend County Levee Improvement District No. 7 ("The District") is in the process of creating a Hazard Mitigation Plan. The Plan will assist the District in its preparedness for natural hazards, and in mitigating damages that can result therefrom. Additionally, the Plan will allow the District to become eligible for federal and state funding in the event of natural disasters, in particular related to Hurricane Harvey.

Our Mitigation Planning Committee would like to invite you to attend a Hazard Mitigation Plan Stakeholder Meeting scheduled for Thursday April 19, 2018 at 9:00 a.m. The meeting will be held online, using WebEx. Information for logging into the meeting can be found below.

The goal of the planning meeting, which is not expected to last more than one hour, is to update you on the District's hazard mitigation planning efforts, including specific projects the District is considering, and to explore opportunities for coordination between entities. This input will be incorporated into the District's official planning document.

Please let me know by replying to this invite if you are able to participate in the District's Hazard Mitigation Plan online stakeholder meeting. We greatly appreciate your consideration of this request and involvement in this process. Thank you!

Sincerely,

#### Sarah Lambert, PE, CFM

Project Manager, Water D +1-281-675-1789 M +1-832-891-7693 sarah.lambert@aecom.com

### AECOM

19219 Katy Freeway Suite 100 Houston, Texas 77094, USA T +1-281-646-2400 aecom.com

### Imagine it. Delivered.

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### Join WebEx meeting

Meeting number (access code): 591 224 731 Host key: 221866 Meeting password: NxvHSQM2

Join from a video system or application Dial 591224731@aecom.webex.com

### Join by phone

+1 602 585 0123 US Toll

1 844 712 3247 US Toll Free

Global call-in numbers | Toll-free calling restrictions

Note: Not all invitees were able to attend the meeting. The following people attended the meeting:

- Sarah Lambert (AECOM)
- Ross Gordon (AECOM)
- Stephen Wilcox (Costello District Engineer)
- Doug Barnes (Fort Bend County OEM)
- Michael Willett (Triton)
- Pat Hughes (City of Sugar Land OEM)
- Pamela and Kathy Dominguez (Brazos River Authority)
- Jim Grotte (Director, LID 7)
- Matt Reed (Attorney for the District)
- Michael Walker (New Territory Residential Community Association)
- Greg Baird (MUD 121)
- David Gornet (LID 17)
- Simon Vandyk (Triton)



# Fort Bend County Levee Improvement District No. 7 Hazard Mitigation Plan Stakeholder Meeting

April 19, 2018

## INTRODUCTIONS



- Fort Bend County Levee Improvement District No. 7 (LID 7)
- Participating Stakeholders



# **GOALS FOR MEETING**

- Notify stakeholders of LID 7's hazard mitigation planning efforts
- Update stakeholders on projects under consideration by LID 7
- Discuss opportunities for coordination or collaboration
- Review schedule for remaining hazard mitigation planning steps



# **RECENT DISASTERS**

- Hurricane Harvey (2017)
- Tax Day Flood (2016)
- Memorial Day Floods (2015 and 2016)





# HAZARD MITIGATION PLAN (HMP) CREATION

- HMP Needed To Establish
  Eligibility For FEMA Funding
- Plan to include the following hazards:
  - Flooding
  - Hurricane/Tropical Storm
  - Levee Failure
- Identifies potential mitigation activities to be considered
- Must be integrated into broader regional hazard mitigation efforts



Local Mitigation Planning Handbook

March 2013

🕅 FEMA



# POTENTIAL MITIGATION ACTIVITIES

### **Capital Projects**

- Brazos River Bank Stabilization
- North Levee Closure
- Pump Station / Detention Improvements
- External Channel Erosion Repair

### **Other Activities**

- Communication Improvements
- Temporary Protection Measures





# POTENTIAL MITIGATION ACTIVITIES



ΑΞϹΟΜ

## SCHEDULE

- Finalize HMP Draft April / May
- First Public Meeting May 15<sup>th</sup>, 2018 5 pm (tentative)
- Second Public Meeting June 12<sup>th</sup>, 2018 5 pm (tentative)
- Finalize HMP and Submit to TDEM June / July



# **OPPORTUNITIES FOR INPUT**

- Discussion today
- Separate discussion with AECOM or LID 7 Directors
- Review and comment on Draft HMP (to be posted on the LID 7 website)
- Discussion at Public Meeting #1
- Discussion at Public Meeting #2



# **DISCUSSION / QUESTIONS**

sarah.lambert@aecom.com ross.gordon@aecom.com

http://www.fbclid7.com/



### FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7

### NOTICE OF SPECIAL PUBLIC MEETING

Notice is hereby given to all interested members of the public that the Board of Directors (the "Board") of the above captioned District will hold a special public meeting at the City Hall of The City of Sugar Land, Texas, 2700 Town Center Boulevard, Sugar Land, Fort Bend County, Texas, 77479, said address being an official meeting place of the District.

### The meeting will be held on Tuesday, May 15, 2018, at 5:00 P.M.

The Board shall consider and discuss the following matters and take any action necessary or appropriate with respect to such matters:

- 1. Acceptance of Qualification Statements, Bonds, Oaths of Office, Affidavits of Current Director, and Elections Not to Disclose Certain Information of elected Directors;
- 2. Election of officers of Board of Directors;
- 3. Authorize preparation and maintenance of a local government officers list in connection with statutory changes in conflict of interest disclosure requirements;
- 4. Approval of updated District Registration Form relative to election of Directors;
- 5. Discussion regarding training requirements for new Directors pursuant to the Texas Open Meetings Act and the Texas Public Information Act, and the procedures for compliance with same;
- 6. Discuss conflicts disclosure statement reporting requirements memorandum for new Directors;
- 7. Approval and execution of an Amendment to the District Information Form relative to bond authorization;
- 8. Public hearing on creation of Hazard Mitigation Plan;
- 9. Discussion regarding scheduling and subject matter of Director education workshops;
- 10. Public comments;
- 11. Attorney's Report;
- 12. Closed Session pursuant to Open Meetings Act, Texas Government Code, Sections 551.071 to consult with the District's attorney regarding matters protected by attorney-client privilege, and/or Section 551.072 to discuss acquisition of real property interests, if necessary;

- 13. Reconvene in Open Session and authorize any action resulting from matters discussed in Closed Session; and
- 14. Matters for placement on future agendas. SCHWAPTZ, PAGE & HARDING, L.L.P. (SEALING, L.U.P.) (SEALING, L.U.P.) BUILD BU

Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact the District's attorney at (713) 623-4531 at least three business days prior to the meeting so that appropriate arrangements can be made.

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### Fort Bend County Levee Improvement District No. 7 Notice of Public Hearing on Hazard Mitigation Plan Creation

The purpose of Fort Bend County Levee Improvement District No. 7 ("LID 7") is to construct and maintain certain levee and drainage improvements to provide protection to the land and improvements of residential and commercial property owners in New Territory from flooding from the Brazos River. LID 7 is in the process of creating the District's Hazard Mitigation Plan. The plan will identify local policies and actions for reducing risk and future losses from natural hazards. To remain eligible for certain federal funding associated with natural hazards, the plan must be created, approved, and updated every five years.

Numerous other local governmental stakeholders are assisting LID 7 in the Hazard Mitigation Plan. However, it is also vital and very helpful that LID 7 have public input regarding the creation of the Hazard Mitigation Plan in all respects, including the identification of natural hazards, mitigation goals, strategies and possible mitigation actions.

LID 7 is inviting the public to participate and provide input into the creation of the Hazard Mitigation Plan in one or both of the following ways:

- 1. By reviewing the Hazard Mitigation Plan Update that can be found on the LID 7 website: <u>http://www.fbclid7.com/</u>
- 2. By attending a Public Hearing that is scheduled for Tuesday, May 15, 2018 at 5:00 p.m. at the Sugar Land City Hall, 2700 Town Center Blvd N, Sugar Land, TX 77479. At the Public Hearing there will be an opportunity for any member of the public to review the draft Hazard Mitigation Plan, and to discuss mitigation strategies.

LID 7 appreciates and thanks all persons and other local governmental entities who are assisting and providing input in regard to the creation of the LID's Hazard Mitigation Plan.

Fort Bend County	
HOME NEWS DOCUMENTS ELECTION DISTRICT (/) (/NEWS) (/PUBLIC DOCS)	CONTACT (/CONTACT- US)

Back

# Notice of Public Hearing on Hazard Mitigation Plan Creation

Posted: 2 days ago

# Notice of Public Hearing on Hazard Mitigation Plan Creation

Fort Bend County Levee Improvement District No. 7

The purpose of Fort Bend County Levee Improvement District No. 7 ("LID 7") is to construct and maintain certain levee and drainage improvements to provide protection to the land and improvements of residential and commercial property owners in New Territory from flooding from the Brazos River. LID 7 is in the process of creating the District's Hazard Mitigation Plan.

The plan will identify local policies and actions for reducing risk and future losses from natural hazards. To remain eligible for certain federal funding associated with natural hazards, the plan must be created, approved, and updated every five years.

Numerous other local governmental stakeholders are assisting LID 7 in the Hazard Mitigation Plan. However, it is also vital and very helpful that LID 7 have public input regarding the creation of the Hazard Mitigation Plan in all respects, including the identification of natural hazards, mitigation goals, strategies and possible mitigation actions.

### A copy of the draft can be found here: Hazard Mitigation Plan Draft (/files/shares/documents/DRAFT-%20Hazard Mitigation Plan - FBCLID7.pdf)

LID 7 is inviting the public to participate and provide input into the creation of the Hazard Mitigation Plan in one or both of the following ways:

- 1. By reviewing the Hazard Mitigation Plan Update that can be found on the LID 7 website: http://www.fbclid7.com/ (http://www.fbclid7.com/)
- 2. By attending a Public Hearing that is scheduled for Tuesday, May 15, 2018 at 5:00 p.m. at the Sugar Land City Hall, 2700 Town Center Blvd N, Sugar Land, TX 77479 (https://goo.gl/maps/eXdoP8za42r). At the Public Hearing there will be an opportunity for any member of the public to review the draft Hazard Mitigation Plan, and to discuss mitigation strategies.

LID 7 appreciates and thanks all persons and other local governmental entities who are assisting and providing input in regard to the creation of the LID's Hazard Mitigation Plan.

IMPORTANT NOTICE: PLEASE READ THESE TERMS CAREFULLY BEFORE USING THIS WEBSITE. THIS WEBSITE IS PROVIDED BY FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7 (THE "DISTRICT") FOR GENERAL BACKGROUND PURPOSES ONLY. THE DISTRICT ASSUMES NO DUTY TO UPDATE THIS WEBSITE OR ANY INFORMATION IT CONTAINS AT ANY TIME. THE DISTRICT DOES NOT REPRESENT OR GUARANTEE THAT THIS WEBSITE OR ANY INFORMATION IT CONTAINS IS COMPLETE, ACCURATE OR CURRENT. NO PERSON SHOULD RELY UPON THIS WEBSITE OR ANY INFORMATION IT CONTAINS FOR PURPOSES RELATIVE TO SECURITIES DISCLOSURE, THE DISTRICT'S FINANCIAL CONDITION, THE BONDS OF THE DISTRICT OR PROPERTY WITHIN THE DISTRICT. NO PERSON SHOULD RELY UPON THIS WEBSITE OR ANY INFORMATION IT CONSIDERING WHETHER TO BUY, SELL OR HOLD BONDS ISSUED BY THE DISTRICT OR WHETHER TO BUY, SELL OR HOLD PROPERTY WITHIN THE DISTRICT. THE DISTRICT FILES OFFICIAL CONTINUING DISCLOSURE INFORMATION AS PROVIDED BY REGULATIONS OF THE SECURITIES AND EXCHANGE COMMISSION.

© 2018 Fort Bend County Levee Improvement District No. 7 WEBSITE BY **TRITON CONSULTING GROUP (http://tritoncg.com)** 

ADDRESS ADDRES	Improv Memory 210 22/0 22/0 22/0 52/0
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PUBLIC MEETING SIGN-IN SHEET



# Fort Bend County Levee Improvement District No. 7 Hazard Mitigation Plan Public Meeting

May 15, 2018

## INTRODUCTIONS



- Fort Bend County Levee Improvement District No. 7 (LID 7)
- Participating Stakeholders



# **GOALS FOR MEETING**

- Notify the public of LID 7's hazard mitigation planning efforts
- Update the public on mitigation actions under consideration by LID 7
- Solicit input from the public
- Review schedule for remaining hazard mitigation planning steps



# **RECENT DISASTERS**

- Hurricane Harvey (2017)
- Tax Day Flood (2016)
- Memorial Day Floods (2015 and 2016)





# HAZARD MITIGATION PLAN (HMP) CREATION

- Supports better understanding of hazards and risks
- HMP needed to establish eligibility for FEMA funding
- Plan includes the following hazards:
  - Flooding
  - Hurricane/Tropical Storm
  - Levee Failure
- Identifies potential mitigation activities to be considered
- Created in consultation with the public and relevant stakeholders
- Establishes procedures for continually reassessing risks and re-evaluating necessary mitigation actions



Local Mitigation Planning Handbook

March 2013





## LID 7 HAZARD MITIGATION PLAN



FBCLID7

2018 Hazard Mitigation Plan

3-3

#### Table 11 – Proposed District Mitigation Actions

Number	Mitigation Action	Hazard	Estimated Cost	Time (years
1	Pump Station Electrical Improvements	Flood, Hurricane & Tropical Storms	\$100,000 - \$500,000	1 - 2 years
2	Northeast / Northwest Levee Improvements	Flood, Hurricane & Tropical Storms, Levee Failure	\$3,000,000	1-3 years
3	Outfall Channel Erosion Control Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$3,000,000	1 - 2 years
4	Procure Additional Temporary Pumping Capacity	Flood, Hurricane & Tropical Storms	<\$500,000	1 - 2 years
5	Maintain Ownership of Tiger Dams	Flood, Hurricane & Tropical Storms, Levee Failure	<\$500,000	1 - 2 years
6	Integrate Emergency Notification System through City of Sugar Land	Flood, Hurricane & Tropical Storms, Levee Failure	<\$100,000	1 - 2 years
7	Maintain Website to Disseminate Public Information	Vaintain Website to Disseminate Public Information Flood, Hurricane & Tropical Storms, Levee Failure		1 - 2 years
8	North Levee Closure Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$15,000,000	1 – 5 years
9	Pump Station Capacity Enhancement Project	Flood, Hurricane & Tropical Storms	\$7,000,000	1 – 5 years
10	Internal Detention Basin Project	Flood, Hurricane & Tropical Storms	\$7,000,000	1 – 5 years
11	Brazos River Erosion Control Project	Flood, Hurricane & Tropical Storms, Levee Failure	\$55,000,000	1 – 5 years
12	Raise the Existing Levee	Flood, Hurricane & Tropical Storms, Levee Failure	\$25,000,000	5 – 10 years
13	Drainage System Capacity Restoration	Flood, Hurricane & Tropical Storms	\$3,000,000	5 - 10 years

DRAFT

May 2018


## POTENTIAL MITIGATION ACTIVITIES

## **Capital Projects**

- Brazos River Bank Stabilization
- North Levee Closure
- Pump Station / Detention Improvements
- External Channel Erosion Repair

### **Other Activities**

- Communication Improvements
- Temporary Protection Measures





## POTENTIAL MITIGATION ACTIVITIES





## HMP – PROJECT FUNDING

### Funding Process For Potential Mitigation Projects



AECOM

## SCHEDULE

- Public Meeting May 15<sup>th</sup>, 2018 5 pm
- Revise HMP according to public and stakeholder comments May/June
- Finalize HMP and Submit to TDEM June / July



## **OPPORTUNITIES FOR PUBLIC INPUT**

- Review and comment on Draft HMP (posted on the LID 7 website)
- Discussion / comment cards at Public Meeting (today)
- Discussion with LID 7 Directors or the Planning Team
- Continued discussion at Board Meetings until Final HMP is officially adopted





# **DISCUSSION / QUESTIONS**

sarah.lambert@aecom.com ross.gordon@aecom.com

http://www.fbclid7.com/



APPENDIX C: ADOPTION RESOLUTION FOR THE DISTRICT

#### CERTIFICATE FOR

#### RESOLUTION OF THE BOARD OF DIRECTORS OF FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7 ADOPTING THE 2018 HAZARD MITIGATION PLAN

I, the undersigned Secretary Pro Tempore of the Board of Directors (the "Board") of Fort Bend County Levee Improvement District No. 7 (the "District"), hereby certify as follows:

1. The Board convened in special session, open to the public, on November 20, 2018, at the City Hall of The City of Sugar Land, 2700 Town Center Boulevard, Sugar Land, Fort Bend County, Texas, and the roll was called of the members of the Board, to-wit:

James R. Grotte, Chairman Cindy Picazo, Vice Chairman Gerald Kazmierczak, Secretary Jeff Hanig, Assistant Secretary Michael Pincomb, Director/Secretary Pro Tempore

All of the members of the Board were present, with the exception of Directors Kazmierczak and Hanig, thus constituting a quorum. Whereupon, among other business, the following was transacted at such meeting: A written

#### RESOLUTION OF THE BOARD OF DIRECTORS OF FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7 ADOPTING THE 2018 HAZARD MITIGATION PLAN

was duly introduced for the consideration of the Board. It was then duly moved and seconded that such Resolution be adopted, and, after due discussion, such motion, carrying with it the adoption of such Resolution, prevailed and carried by the following vote:

AYES: 3 NOES: 0

2. A true, full and correct copy of the aforesaid Resolution adopted at the meeting described in the above and foregoing paragraph is attached to said minutes and to this certificate; such Resolution has been duly recorded in the Board's minutes of such meeting; the above and foregoing paragraph is a true, full and correct copy excerpt from the Board's minutes of such meeting pertaining to the adoption of such Resolution; the persons named in the above and foregoing paragraph are the duly chosen, qualified and acting officers and members of the Board as indicated therein; each of the officers and members of the Board was duly and sufficiently notified officially and personally, in advance, of the time, place and purpose of such meeting; and such meeting was open to the public, and public notice of the time, place and purpose of such meeting was given, all as required by Chapter 551, Texas Government Code and Section 49.063, Texas Water Code, as amended.

SIGNED AND SEALED this 20th day of November, 2018.



Secretary Pro Tempore Board of Directors

506585\_1

#### RESOLUTION OF THE BOARD OF DIRECTORS OF FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7 ADOPTING THE 2018 HAZARD MITIGATION PLAN

**WHEREAS**, Fort Bend County Levee Improvement District No. 7 (the "District") recognizes the threat that natural hazards, especially flood hazards, may detrimentally impact people and property in the District; and

**WHEREAS**, the District's Mitigation Planning Committee has created the District's Hazard Mitigation Plan, dated November 20, 2018, pursuant to the Flood Mitigation Assistance Program (44 CFR 78.6), the Hazard Mitigation and Pre-Disaster Mitigation Programs (44 CFR Parts 201 and 206), the process outlined in materials prepared by the Federal Emergency Management Agency, and under the authority derived from Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; and

**WHEREAS**, the District's Hazard Mitigation Plan, dated November 20, 2018, identifies mitigation goals and actions to reduce or eliminate long term risk to people and property within the District from the impacts of possible future hazards and disasters; and

**WHEREAS**, adoption of the Hazard Mitigation Plan by the District demonstrates its commitment to hazard mitigation and achieving the goals outlined in the District's Hazard Mitigation Plan, dated November 20, 2018.

**NOW, THEREFORE, BE IT RESOLVED** by the Board of Directors of Fort Bend County Levee Improvement District No. 7 that the attached Fort Bend County Levee Improvement District No. 7 Hazard Mitigation Plan dated November 20, 2018, be and hereby is adopted.

**SECTION 2.** The District hereby finds and declares that written notice of the date, hour, place and subject of the meeting at which this Resolution was adopted was properly and timely posted, and that such meeting was open to the public as required by law at all times during which this Resolution and the subject matter hereof were discussed, considered and formally acted upon, all in accordance with and as required by the Open Meetings Act, Chapter 551, Texas Government Code, as amended.

PASSED AND ADOPTED this the 20<sup>th</sup> day of November, 2018.

#### FORT BEND COUNTY LEVEE IMPROVEMENT DISTRICT NO. 7

By: <u>/s/ James R. Grotte</u> Chairman, Board of Directors

ATTEST:

By:<u>/s/ Michael Pincomb</u> Secretary, Pro Tempore Board of Directors

### APPENDIX D: FEMA APPROVAL LETTER

U.S. Department of Homeland Security FEMA Region 6 800 North Loop 288 Denton, TX. 76209-3698



December 6, 2018

David Jackson, State Hazard Mitigation Officer Texas Division of Emergency Management P.O. Box 4087 Austin, TX 78773-0220

#### RE: Approval of the Fort Bend County Levee Improvement District #7, Texas Single Jurisdiction Hazard Mitigation Plan.

Dear Mr. Jackson:

This office has concluded its review of the referenced plan and we are pleased to provide our approval of this plan in meeting the criteria set forth by 44 CFR Part 201.6. By receiving this approval, eligibility for the Hazard Mitigation Assistant Grants will be ensured for five years from the date of this letter, expiring on December 5, 2023.

This approval does not demonstrate approval of projects contained in the plan. This office has provided the enclosed Local Hazard Mitigation Planning Tool with reviewer's comments, to further assist the community in refining the plan going forward. Please advise the referenced community of this approval.

If you have any questions, please contact Bart Moore, HM Community Planner, at (940) 898-5363.

Sincerely,

Diarothe

Ronald C. Wanhanen Chief, Risk Analysis Branch

RECEIVED DEC 19 2018 MITIGATION SECTION

Enclosure

cc: Jeffrey Brewer, R6-MT-HM

### LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The <u>Regulation Checklist</u> provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The <u>Plan Assessment</u> identifies the plan's strengths as well as documents areas for future improvement.
- The <u>Multi-jurisdiction Summary Sheet</u> is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Fort Bend County	Title of Plan: Fort Bend County	Date of Plan:				
Levee Improvement District No. 7	Levee Improvement District No. 7	May 29, 2018				
	Hazard Mitigation Plan					
Local Point of Contact:	Address:					
Jim Grotte	c/o Schwartz, Page, & Harding, L.L.P					
Title:	1300 Post Oak Boulevard, Suite 1400					
Chairman	Houston, TX					
Agency:	77056					
Fort Bend County LID 7						
Phone Number:	E-Mail: c/o Chris Skinner, Attorney for the District					
713-623-4531	cskinner@sphllp.com					

State Reviewer:	Title: Date:			
Natalie Johnson	Hazard Mitigation Planner	11/28/2018		

FEMA Reviewer: David Reiff	Title:Date:HM Community Planner12/6/2018					
Date Received in FEMA Region 6 Plan Not Approved	December 3, 2018					
Plan Approvable Pending Adoption						
Plan Approved	December 6, 2018					

#### SECTION 1:

#### **REGULATION CHECKLIST**

**INSTRUCTIONS:** The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

<b>1. REGULATION CHECKLIST</b> Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it	Section 1		
was prepared and who was involved in the process for each		Х	
jurisdiction? (Requirement §201.6(c)(1))			
A2. Does the Plan document an opportunity for neighboring	Section 1.3		
communities, local and regional agencies involved in hazard			
mitigation activities, agencies that have the authority to regulate		X	
development as well as other interests to be involved in the planning			
process? (Requirement §201.6(b)(2))			
A3. Does the Plan document how the public was involved in the	Section 1.4		
planning process during the drafting stage? (Requirement		X	
§201.6(b)(1))			
A4. Does the Plan describe the review and incorporation of existing	Section 1.5		
plans, studies, reports, and technical information? (Requirement		X	
§201.6(b)(3))			
A5. Is there discussion of how the community(ies) will continue	Section 1.6		
public participation in the plan maintenance process? (Requirement		X	
§201.6(c)(4)(iii))			
A6. Is there a description of the method and schedule for keeping the	Section 1.7 and		
plan current (monitoring, evaluating and updating the mitigation plan	Section 1.8	X	
within a 5-year cycle)? (Requirement §201.6(c)(4)(i))			

#### **ELEMENT A: REQUIRED REVISIONS**

<b>1. REGULATION CHECKLIST</b> Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSM	ENT		
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 2	x	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 2	x	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 2	x	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 2.6.7	x	
ELEMENT B: REQUIRED REVISIONS			

<b>1. REGULATION CHECKLIST</b> Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 1.2	х	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 1.2	Х	

### LOCAL MITIGATION PLAN REVIEW TOOL

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 3.1.1	x	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Sections 3.5 and 3.6	x	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 3 and Appendix F	x	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 1.8	x	
ELEMENT C: REQUIRED REVISIONS		· ·	

1. REGULATION CHECKLIST	Location in Plan	Met	Not
Regulation (44 CFR 201.6 Local Mitigation Plans)	(section and/or page		Met
	number)		
<b>ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEME</b>	NTATION (applicable to	plan upda	<u>tes</u>
<u>only)</u>			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	N/A	N/A	N/A
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	N/A	N/A	N/A
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	N/A	N/A	N/A
ELEMENT D: REQUIRED REVISIONS			<u>.</u>
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix C	x	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))		N/A	
ELEMENT E: REQUIRED REVISIONS			·
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (optional	for State reviewers only; n	ot to be	
completed by FEMA)			

### LOCAL MITIGATION PLAN REVIEW TOOL

<b>1. REGULATION CHECKLIST</b> Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
F1.			
F2.			
ELEMENT F: REQUIRED REVISION			

#### SECTION 2:

PLAN ASSESSMENT

**INSTRUCTIONS:** The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

- 1. Plan Strengths and Opportunities for Improvement
- 2. Resources for Implementing Your Approved Plan

*Plan Strengths and Opportunities for Improvement* is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

**Resources for Implementing Your Approved Plan** provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

### LOCAL MITIGATION PLAN REVIEW TOOL

#### A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

#### **Element A: Planning Process**

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);
- Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);
- Diverse methods of participation (meetings, surveys, online, etc.); and
- Reflective of an open and inclusive public involvement process.

#### Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

- 1) A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;
- 2) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and
- 3) A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;
- Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);
- Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;

- Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and
- Identification of any data gaps that can be filled as new data became available.

#### **Element C: Mitigation Strategy**

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- Key problems identified in, and linkages to, the vulnerability assessment;
- Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;
- Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;
- An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);
- Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;
- Integration of mitigation actions with existing local authorities, policies, programs, and resources; and
- Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.

#### Element D: Plan Update, Evaluation, and Implementation (Plan Updates Only)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- Status of previously recommended mitigation actions;
- Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;
- Documentation of annual reviews and committee involvement;
- Identification of a lead person to take ownership of, and champion the Plan;
- Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;
- An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);
- Discussion of how changing conditions and opportunities could impact community resilience in the long term; and

### LOCAL MITIGATION PLAN REVIEW TOOL

• Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.

#### **B. Resources for Implementing Your Approved Plan**

This section provides examples of possible resources plan implementation.

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?
- What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?
- What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?
- Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?
- What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?

FEMA Mitigation grants are available to eligible applicants. Search grants.gov for additional resources for implementing mitigation actions.

LOCAL MITIGATION PLAN REVIEW TOOL

SECTION 3:

MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption requirements for those Elements (A through E).

		<b>*</b>	<b>6</b>	2	ო	4	ഹ	9	7	∞	თ	10
		Jurisdiction Name										
		Jurisdiction Type (city/borough/ township/ village, etc.)										
		Plan POC										
MULT		Mailing Address										
I-JURISDI		Email										
CTION SU		Phone										
JMMARY		<u>A.</u> Planning Process										
SHEET	Re	<u>B.</u> <u>Hazard</u> Identification <u>&amp; Risk</u> <u>Assessment</u>										
	quiremen	<u>C.</u> Mitigation Strategy										
	ts Met (Y/N)	<u>D.</u> <u>Plan Review,</u> <u>Evaluation &amp;</u> Implementation										
		E. Plan Adoption										
		E <u>.</u> State <u>Require-</u> ments										

## APPENDIX E: SOURCES

### Sources<sup>1</sup>

Table 4 – 2010 Population of Plan Area: US Census Bureau

Table 5 – Declared Emergencies and Major Disasters in Fort Bend County: FEMA, Disaster Declaration Summary Database

Table 6 - Classification of Tropical Cyclones: NCEI Storm Events Database

Table 7 – Saffir/Simpson Hurricane Scale: NCEI Storm Events Database

Table 8 – Historical Hurricane and Tropical Storm Events in Fort Bend County from 1998-2017: NCEI Storm Events Database

- Figure 4 Depth of Precipitation for 100-Year Storm for 7-Day Duration in Texas: USGS Rainfall Atlas
- Figure 5 Historical Hurricanes and Tropical Storms in Fort Bend County: NOAA
- Figure 6 Effective Floodplains: FEMA
- Figure 7 Depth of Precipitation for 100-Year, 6-Hour Duration: USGS Rainfall Atlas

Note <sup>1</sup> - If a source is not listed in this appendix, it is assumed that the Table or Figure was created based on District data and created specifically for this plan.

### APPENDIX F: MITIGATION ACTION WORKSHEETS

Mitigation Action #1					
Proposed Action:	Existing Pump Station Electrical Improvements				
BACKGROUND INFORMATION					
Jurisdiction/Location:	FBCLID7				
Risk Reduction Benefit:	Flood risk reduction for benefitted properties				
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Projects				

MITIGATION ACTION DETAILS			
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms		
Effect on New/Existing Buildings:	Reduce risk to existing and future structures		
Priority (High, Moderate, Low):	High		
Estimated Cost:	\$100,000 - \$500,000		
Potential Funding Sources:	Bond Funds / Operating Funds		
Lead Agency/Department Responsible:	FBCLID7		
Implementation Schedule:	1 - 2 years		

The purpose of this mitigation action is to improve the existing pump station that is situated behind the levee and ensures that the internal drainage system in the community functions effectively. The action would make electrical upgrades which, among other things, would allow the on-site generator to power all four pumps, instead of three, in the event of a power outage. This will increase the resiliency of the pump station during adverse conditions.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Mitigation Action #2		
Proposed Action:	Northeast / Northwest Levee Improvements	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$3,000,000
Potential Funding Sources:	Bond Funds / Operating Funds / Grant Funding
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 3 years

The purpose of this mitigation action is to reduce the risk of flood waters entering the community at the northeast and northwest corners of the district during a severe flood event. The proposed action would construct levees or floodwalls at the northeast and northwest corners of the district, tying into the existing levees which currently terminate at US-90A.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Mitigation Action #3		
Proposed Action:	Outfall Channel Erosion Control Project	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$3,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 2 years

High flows in the outfall channel during recent storm events, including Hurricane Harvey in 2017, have caused significant erosion in the downstream section of the outfall channel, prior to its discharge into the Brazos River. Continued erosion of the channel could cause damage to the adjacent levee. This action will serve to repair the damage from Harvey and protect the channel from erosion during future high-flow events using natural channel design principles.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Mitigation Action #4		
Proposed Action:	Procure Additional Temporary Pumping Capacity	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	< \$500,000
Potential Funding Sources:	Operating Funds / Grant Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 2 years

The district currently has two temporary pumps on call which can be deployed in the event of an emergency. Temporary pumping capacity has proven to be a valuable and cost effective approach to managing risk during severe events. The proposed action would procure an additional four temporary pumps which can be deployed if needed during a severe flood event. These pumps would be placed within areas of the community known to flood most frequently.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Mitigation Action #5		
Proposed Action:	Maintain Ownership of Tiger Dams	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	< \$500,000
Potential Funding Sources:	Grant Funding / Operating Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 2 years

During Hurricane Harvey, the District procured Tiger Dams to provide an additional layer of protection along the north side of the community. Tiger Dams are portable temporary flood barriers (water filled bladders), which can be connected together to seal off areas which may be at risk for flooding. The proposed action would maintain ownership of these Tiger Dams, storing them in a nearby storage facility, for continued use in future flood events as needed.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Mitigation Action #6	
Proposed Action:	Integrate Emergency Notification System through City of Sugar Land
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	< \$100,000
Potential Funding Sources:	Grant Funding / Operating Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 2 years

The purpose of this action is to allow emergency notifications relevant to FBCLID7 to be deployed or published through the existing City of Sugar Land emergency notification system. This will ensure wide distribution of the notifications as most residents already subscribe to the City of Sugar Land alerts. It is more cost effective than developing a second emergency alert system for the District alone. This will build upon existing distribution systems currently utilized through the New Territory Residential Community Association.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Mitigation Action #7	
Proposed Action:	Maintain Website to Disseminate Public Information
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	< \$100,000
Potential Funding Sources:	Grant Funding / Operating Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 2 years

It is of key importance to the District to maintain clear and open communication with its constituents and to engage them in the mitigation planning and preparation process. The creation of a website to be used to provide and receive information to and from community residents is a vital part of that effort. This proposed action would support creation of the website and continued maintenance and operation of the website.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 5; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5

Mitigation Action #8	
Proposed Action:	North Levee Closure Project
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$15,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 5 years

The existing levee system surrounds the community on three sides, but the fourth (north) side does not have levee protection as it ties into higher ground. In an extreme event it is possible that the water level in the Brazos River or Bullhead Bayou could rise enough that water could begin to spill around the ends of the existing levee, resulting in potential flooding in the community. This proposed action would construct levees or flood walls along the entire north side of the community to close the levee system and protect the community on all sides. Alternatives approaches to preventing water from entering the community on the north side would also be considered

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 3; Administratively Possible = 3; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Mitigation Action #9	
Proposed Action:	Pump Station Capacity Enhancement Project
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$7,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 5 years

The District proposes to construct a second pump station to improve performance of the internal drainage system in events where gravity discharge is restricted, and the community relies on pumping capacity to keep internal water levels at an acceptable level. This would reduce street ponding and the potential for structural flooding during externe events

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 3; and Environmentally Sound = 4

Mitigation Action #10	
Proposed Action:	Internal Detention Basin Project
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$7,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 5 years

The District proposes to construct new detention capacity within the community. This could be in the form of a new detention basin, or by increasing storage capacity within existing channels or lakes. This would reduce street ponding and potential for structure flooding during extreme events.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Mitigation Action #11	
Proposed Action:	Brazos River Erosion Control Project
BACKGROUND INFORMATION	
Jurisdiction/Location:	FBCLID7
Risk Reduction Benefit:	Flood risk reduction for benefitted properties
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$55,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	1 - 5 years

Significant erosion of the Brazos River bank has occurred near the Grand Parkway bridge during recent storm events. The current minimum distance from the bank to the levee is approximately 200 feet, and over 180 feet of bank has been lost in the past 3 years. This mitigation action would prevent future erosion and loss of river bank that could lead to levee failure and the potential for flooding throughout New Territory during a future extreme flood event on the Brazos River. The action will utilize river training structures, engineered scour protection, and armored slopes to divert energy away from the outer bank, reduce scour potential, and prevent continued bank erosion.

#### Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 3; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4
Mitigation Action #12		
Proposed Action:	Raise the Existing Levee	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	5 - 10 years

## COMMENTS

At some point in the future, it may be necessary to consider raising the elevation of the existing levee system. This could be driven by future revisions to FEMA floodplain maps and hydraulic models, which may necessitate a higher levee elevation to meet recommended freeboard requirements.

## Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 3; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Mitigation Action #13		
Proposed Action:	Drainage System Capacity Restoration	
BACKGROUND INFORMATION		
Jurisdiction/Location:	FBCLID7	
Risk Reduction Benefit:	Flood risk reduction for benefitted properties	
<b>Type of Action</b> (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure projects	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane & Tropical Storms, Levee Failure
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$3,000,000
Potential Funding Sources:	Grant Funding / Bond Funds
Lead Agency/Department Responsible:	FBCLID7
Implementation Schedule:	5 - 10 years

## COMMENTS

At some point in the future, it may be necessary to remove sediments deposited within the existing conveyance system. This deposition occurs naturally over time, but can lead to reduced conveyance capacity which can impact performance of the drainage system. Removal of these sediments would improve performance of the drainage system.

## Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 3