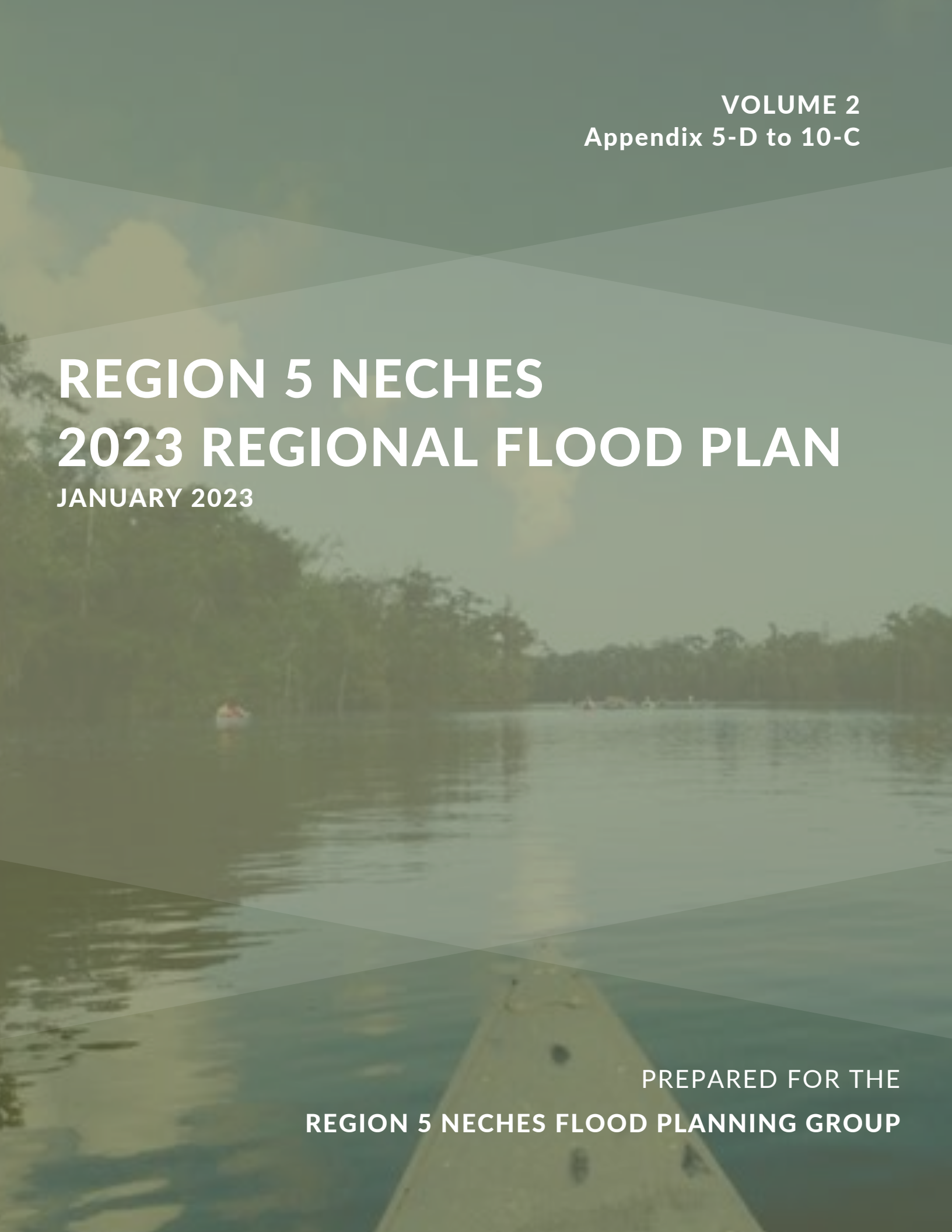

VOLUME 2
Appendix 5-D to 10-C

REGION 5 NECHES
2023 REGIONAL FLOOD PLAN

JANUARY 2023

PREPARED FOR THE

REGION 5 NECHES FLOOD PLANNING GROUP

APPENDIX 5-D
RECOMMENDED FLOOD MITIGATION PROJECT (FMP) DETAILS

Texas Water Development Board

	General Project Data												
Project Name	**FMP**	**Project Description:**	**Flood Region**	**Project Type**	**FIUP Project Category**	**Project Watershed**	**Rural Applicant**	**Project Cost**	**Benefit Cost Ratio**	**Cost per Structure Removed**	**Pre-Project Level-of-Service**	**Post-Project Level-of-Service**	**# of Structures in 1% Annual Chance FP (Pre-Project)**	**Project Status**
Bayou Din Detention Basin	053000001	Construct a new detention basin with nearby channel and crossing improvements in the vicinity of Bayou Din.	Neches	Detention Pond	3	Sabine Lake	N	$ 85,000,000	4.9	$ 442,708	Unknown	Project will be designed to the 500-YR event with an estimated project useful life of 75 years.	534	Design
Bessie Heights Drainage Ditch Extension Project	053000002	Expand the Bessie Heights Drainage Ditch to address flooding risk to residential properties in the area.	Neches	Channel	2	Lower Neches	N	$ 4,250,000	0	$ 531,250	Unknown	Project will be designed to reduce impact from the 100-YR event.	139	Planning
Channel 100-A Concrete Repair	053000003	Conduct repairs and install improvements to Channel 100-A located within the city of Beaumont.	Neches	Channel	2	Sabine Lake	N	$ 39,570,866	11.21	$ 1,978,543	Unknown	Project will be designed to the 500-YR event with an estimated project useful life of 75 years.	1622	Design
Port Arthur and Vicinity Coastal Storm Risk Management Project	053000004	Construct levees, floodwalls, pump stations, drainage structures, and other flood mitigation infrastructure to reduce adverse flood impact in the vicinity of the city of Port Arthur.	Neches	Comprehensive	3	Lower Neches, Sabine Lake	N	$ 119,900,000	4.6	$ 163,708	Unknown	Project will be designed to reduce impact from the 500-YR event.	23310	Design
Orange County Coastal Storm Risk Management Project	053000005	Construct levees, floodwalls, pump stations, drainage structures, and other flood mitigation infrastructure to reduce adverse flood impact in Orange County.	Neches	Comprehensive	2	Lower Neches, Lower Sabine, Sabine Lake	N	$ 2,400,000,000	1.2	$ 193,387	Unknown	Project will be designed to reduce impact from the 500-YR event.	3872	Design

Texas Water Development Board

	Score 1: Severity - Pre-Project Average Depth of Flooding (100-year)				Score 2: Severity - Community Need (% Population)						Score 3: Flood Risk Reduction			
Project Name	**Average Flood Depth (100yr)**	**Notes**	**Severity Ranking: Pre-Project Average Depth of Flooding (100-year)**	**Score 1**	**Communities Served by Project**	**Community Population Served**	**Flood Plain Population**	**Notes 2**	**Severity Ranking: Community Need (% Population)**	**Score 2**	**# of Structures Removed from 1% Annual Chance FP**	**Notes 3**	**Flood Risk Reduction**	**Score 3**
Bayou Din Detention Basin	1.48	From 100-YR depth raster acquired from HEC-RAS models	Baseline average flood depth > 1ft	6	City of Beaumont	115282	1297	1%	<25% of project community affected	1	101	19% of structures removed from 1% ACE Flood Risk	Reduced risk to <50% of structures in floodplain	4
Bessie Heights Drainage Ditch Extension Project	1.13	From 100-YR depth raster acquired from HEC-RAS models	Baseline average flood depth > 1ft	6	City of Bridge City	9546	207	2%	<25% of project community affected	1	8	6% of structures removed from 1% ACE Flood Risk	Reduced risk to <10% of structures in floodplain	1
Channel 100-A Concrete Repair	2.67	From 100-YR depth raster calculated from WSEL raster acquired from HEC-RAS models	Baseline average flood depth > 2ft	8	City of Beaumont	115282	7388	6%	<25% of project community affected	1	10	~1% of structures removed from 1% ACE Flood Risk	Reduced risk to <10% of structures in floodplain	1
Port Arthur and Vicinity Coastal Storm Risk Management Project	N/A	Flood depth data not available from USACE	Baseline average flood depth < 0.5ft	2	City of Port Arthur, City of Nederland, City of Port Neches, City of Groves	105922	49671	47%	25%-50% of project community affected	4	3275	14% of structures removed from 1% ACE Flood Risk	Reduced risk to <50% of structures in floodplain	4
Orange County Coastal Storm Risk Management Project	N/A	Flood depth data not available from USACE	Baseline average flood depth < 0.5ft	2	City of Bridge City, Orange County	9546	6708	This project's extents are split between the Sabine and Neches regions; the area in the Neches region is used for this instance.	>75% of project community affected (by population)	10	201	5% of structures removed from 1% ACE Flood Risk	Reduced risk to <10% of structures in floodplain	1

	Score 4: Flood Damage Reduction						Score 5: Critical Facilities Damage Reduction				Score 6: Life and Safety			
Project Name	**# of Structures with Reduced 1% Annual Chance Flood Risk**	**Pre-Project Damage $**	**Post-Project Damage $**	**Notes 4**	**Flood Damage Reduction**	**Score 4**	**# of Critical Faciliites Removed from 1% Annual Chance FP**	**Notes 5**	**Reduction in Critical Facilities Flood Risk**	**Score 5**	**Adjusted Injury Risk (%)**	**Notes 6**	**Life and Safety Ranking (Injury/Loss of Life)**	**Score 6**
Bayou Din Detention Basin	97			18% of structures have reduced impact from 1% ACE Flood Risk	Flood damage reduction < 25%	2	4		Reduced risk for <10% of critical facilities in floodplain	1	N/A			
Bessie Heights Drainage Ditch Extension Project	3			2% of structures have reduced impact from 1% ACE Flood Risk	Flood damage reduction < 25%	2	0		Reduced risk for 0 structures in floodplain	0	N/A			
Channel 100-A Concrete Repair	452			28% of structures have reduced impact from 1% ACE Flood Risk	Flood damage reduction > 25%	4	0		Reduced risk for 0 structures in floodplain	0	N/A			
Port Arthur and Vicinity Coastal Storm Risk Management Project	441			2% of structures have reduced impact from 1% ACE Flood Risk	Flood damage reduction < 25%	2	71		Reduced risk for <10% of critical facilities in floodplain	1	N/A			
Orange County Coastal Storm Risk Management Project	175			5% of structures have reduced impact from 1% ACE Flood Risk	Flood damage reduction < 25%	2	0		Reduced risk for 0 structures in floodplain	0	N/A			

	Score 7: Water Supply						Score 8: Social Vulnerability				Score 9: Nature-Based Solution			
Project Name	**Water Supply Benefit in Acre-Feet**	**SourceID**	**WMS_ID**	**Notes 7**	**Water Supply Yield Ranking**	**Score 7**	**SVI Score**	**Notes 8**	**Social Vulnerability Ranking**	**Score 8**	**% Nature Based Solution by Cost**	**Notes 9**	**Nature-Based Solutions Ranking**	**Score 9**
Bayou Din Detention Basin	N/A				No impact on water supply	0	0.21314375		SVI between 0.01-0.25 (low vulnerability)	1	0		<25% of the project cost is nature-based	1
Bessie Heights Drainage Ditch Extension Project	N/A				No impact on water supply	0	0.1558259		SVI between 0.01-0.25 (low vulnerability)	1	0		<25% of the project cost is nature-based	1
Channel 100-A Concrete Repair	N/A				No impact on water supply	0	0.72570948		SVI between 0.5-0.75 (moderate to high vulnerability)	7	0		<25% of the project cost is nature-based	1
Port Arthur and Vicinity Coastal Storm Risk Management Project	N/A				No impact on water supply	0	0.57444668		SVI between 0.5-0.75 (moderate to high vulnerability)	7	0		<25% of the project cost is nature-based	1
Orange County Coastal Storm Risk Management Project	N/A				No impact on water supply	0	0.16443804		SVI between 0.01-0.25 (low vulnerability)	1	0		<25% of the project cost is nature-based	1

	Score 10: Multiple Benefits				Score 11: O&M				Score 12: Admin, Regulatory Obstacles			Score 13: Environmental Benefit		
Project Name	**Multiple Benefits Description**	**Notes 10**	**Multiple Benefit Ranking**	**Score 10**	**O&M Cost (Annual)**	**Notes 11**	**Operations and Maintenance Ranking**	**Score 11**	**Notes 12**	**Administrative, Regulatory and Other Obstacle Ranking**	**Score 12**	**Notes 13**	**Environmental Benefit Ranking**	**Score 13**
Bayou Din Detention Basin	Annual ecosystem services benefits of $20,673,627.		Project delivers benefits in 3 wider benefit categories	7	15000		Project requires regular, ongoing operation and maintenance; and/or O&M requirements are well defined (Regular);	7		Project has a typical number of administrative, regulatory and limitations / requirements	6		Project will deliver a moderate level of environmental benefits (2-3 categories)	6
Bessie Heights Drainage Ditch Extension Project			Project delivers benefits in only 1 wider benefit category	1		O&M information unavailable for the project				Project has a typical number of administrative, regulatory and limitations / requirements	6		Project will deliver a low level of environmental benefits (1 category)	3
Channel 100-A Concrete Repair	Annual ecosystem services benefits of $1,944,072.		Project delivers benefits in 2 wider benefit categories	4	15000		Project requires regular, ongoing operation and maintenance; and/or O&M requirements are well defined (Regular);	7		Project has a typical number of administrative, regulatory and limitations / requirements	6		Project will deliver a moderate level of environmental benefits (2-3 categories)	6
Port Arthur and Vicinity Coastal Storm Risk Management Project			Project delivers benefits in 2 wider benefit categories	4	195000		Project will require ongoing operation and maintenance outside of the owner's regular maintenance practices; long-term O&M requirements are undefined; and/or high annual O&M cost > 1% of project (high);	4		Project has a high number of administrative, regulatory and limitations / requirements	2		Project will deliver a moderate level of environmental benefits (2-3 categories)	6
Orange County Coastal Storm Risk Management Project			Project delivers benefits in 2 wider benefit categories	4	4565000		Project will require ongoing operation and maintenance outside of the owner's regular maintenance practices; long-term O&M requirements are undefined; and/or high annual O&M cost > 1% of project (high);	4		Project has a high number of administrative, regulatory and limitations / requirements	2		Project will deliver a moderate level of environmental benefits (2-3 categories)	6

	Score 14: Environmental Impact			Score 15: Mobility				Score 16: Regional		
Project Name	**Notes 14**	**Environmental Impact Ranking**	**Score 14**	**Traffic Count for LWC Project**	**Notes 15**	**Mobility Ranking**	**Score 15**	**Project Count**	**Regional Ranking**	**Score 16**
Bayou Din Detention Basin		Project has no adverse environmental impacts	10			Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas	4	5	Project region has recommended <10% of total projects	10
Bessie Heights Drainage Ditch Extension Project		Project has no adverse environmental impacts	10			Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas	4	5	Project region has recommended <10% of total projects	10
Channel 100-A Concrete Repair		Project has no adverse environmental impacts	10			Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas	4	5	Project region has recommended <10% of total projects	10
Port Arthur and Vicinity Coastal Storm Risk Management Project		Project has no adverse environmental impacts	10			Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas	4	5	Project region has recommended <10% of total projects	10
Orange County Coastal Storm Risk Management Project		Project has no adverse environmental impacts	10			Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas	4	5	Project region has recommended <10% of total projects	10

APPENDIX 5-E
SUPPORTING DOCUMENTATION FOR RECOMMENDED FLOOD MITIGATION PROJECTS

TECHNICAL MEMORANDUM

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TO:	Karen Stewart, Chief Business Officer JCDD6
FROM:	Dane Schneider, P.E., ENV SP Matt Lewis, P.E., CFM
SUBJECT:	Bayou Din Drainage Improvements
PROJECT:	JFC21835
DATE:	November 28, 2022

11-28-2022

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

1.00 STUDY PURPOSE

Bayou Din and Kidd Gully have a history of coming out of bank during heavy rain events and causing flooding damage and major flooding problems. Typically, major flooding is associated with tropical systems or hurricanes resulting in heavy rainfall. However even smaller more frequent events have the potential to cause flooding damage to the undersized channels, restrictive crossing and rapid development within portion of the watershed. To reduce flood damages improvements to localized drainage infrastructure and large-scale detention has been investigated and found to be effective at reducing water surface elevations and potential damages.

2.00 PROJECT DESCRIPTION

Existing channels and many crossings (bridges or culverts) are undersized for the amount of water that drains through the Bayou Din/Kidd Gully system. Drainage improvements are proposed throughout the area to reduce the risk of flooding damages structures, reducing risk to life, and improving emergency response and transit throughout the area during flooding events. The proposed project will improve channel conveyance through widening and correcting channel impairments along Bayou Din and Kidd Gully. Approximately 3339 acre-feet of detention is planned to be included near the confluence of Bayou Din and Kidd Gully. This detention will provide regional detention that will reduce water surface elevations along both streams. The detention provided will additionally provide mitigation for the channel conveyance improvements preventing any adverse impact downstream of the improvements.

The basins will be designed to function during both low flow and high flow events in a way that allows all flood events up to the 500-year storm event to pass through the system with no adverse impacts. In high flow events the basin intake structures consisting of overflow weirs will activate and take on flows during the peak of the storm reducing maximum water surface elevations throughout the benefit area. In addition to channel conveyance improvements there are 14 bridges or culverts that are undersized or in a state of disrepair that prohibits sufficient flow capacity. **Figure 1** provides a summary of the proposed conveyance and detention

improvements. Four pipelines are anticipated to be relocated to allow the proposed drainage improvements to be constructed.

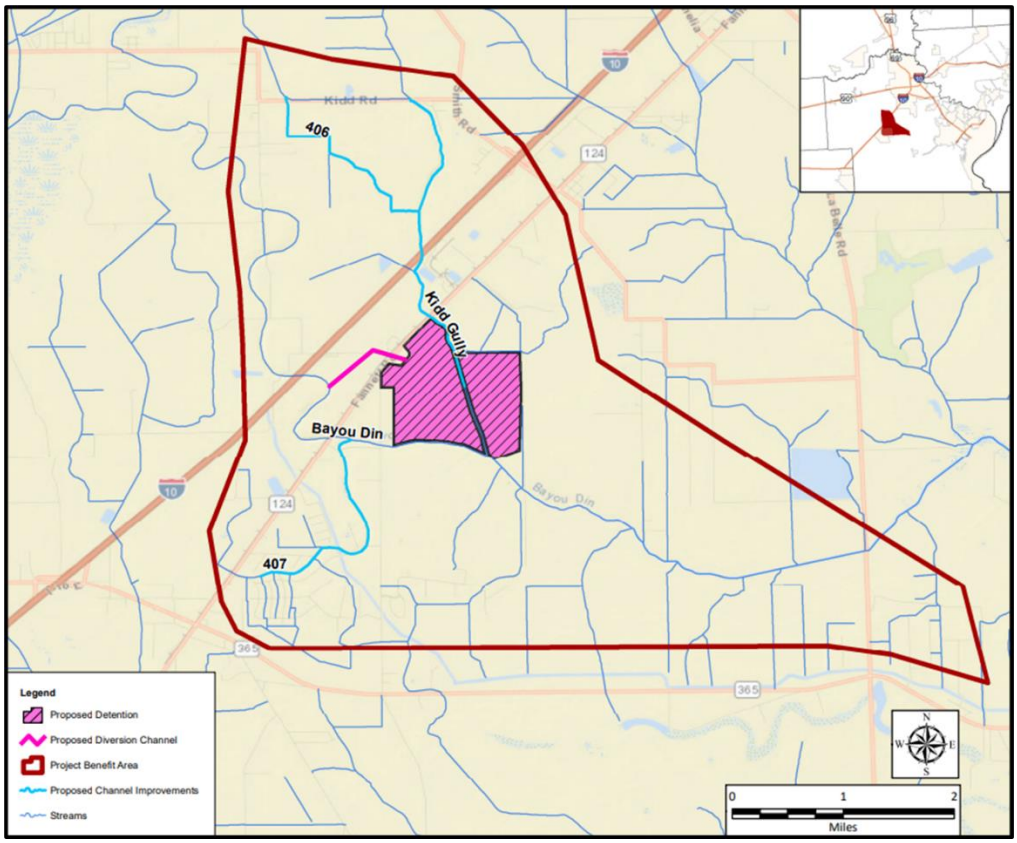

Figure 1: Project Location Map

3.00 H&H METHODOLOGY

3.01 HYDROLOGY

Atlas 14 rainfall totals were collected from the NOAA server for the project area. The 24-hour rainfall totals used in this analysis are listed below in **Table 1** below. Rainfall was directly applied to the hydraulic model for this analysis. Therefore, only minor adjustments to the hydrology were required. A HEC-HMS v4.8 model was prepared to subtract expected infiltration losses from the rainfall prior to becoming runoff. The amount of rainfall that becomes runoff is then applied across the hydraulic model. Infiltration losses were based on NRCS soil groups, the project area is fully covered by group D soils.

Table 1: Atlas 14 24-Hour Rainfall Totals

	Frequency Events						
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
24-HR Total (inches)	5.5	7.4	9.3	12.3	15	18.2	27.6

3.02 HYDRAULICS

To evaluate the existing flood risk and analyze potential flood risk reduction projects A 2D hydraulic model was created in HEC-RAS v6.0. This model utilized the rain-on-grid functionality of HEC-RAS to apply the rainfall calculated across the entire model extents. Topographic features that control the flow of water across the landscape were noted and included within the model using breaklines or 2D structures. This includes bridges, culverts, berms, roadways, canals, railroads and other notable features. This allows for a more realistic tracking of water as it falls as rain and flows towards and into streams. The extent of the hydraulic model was extended beyond the limits shown in Figure 1 to capture the full contributing area of Bayou Din and Kidd Gully as seen in **Figure 2**.

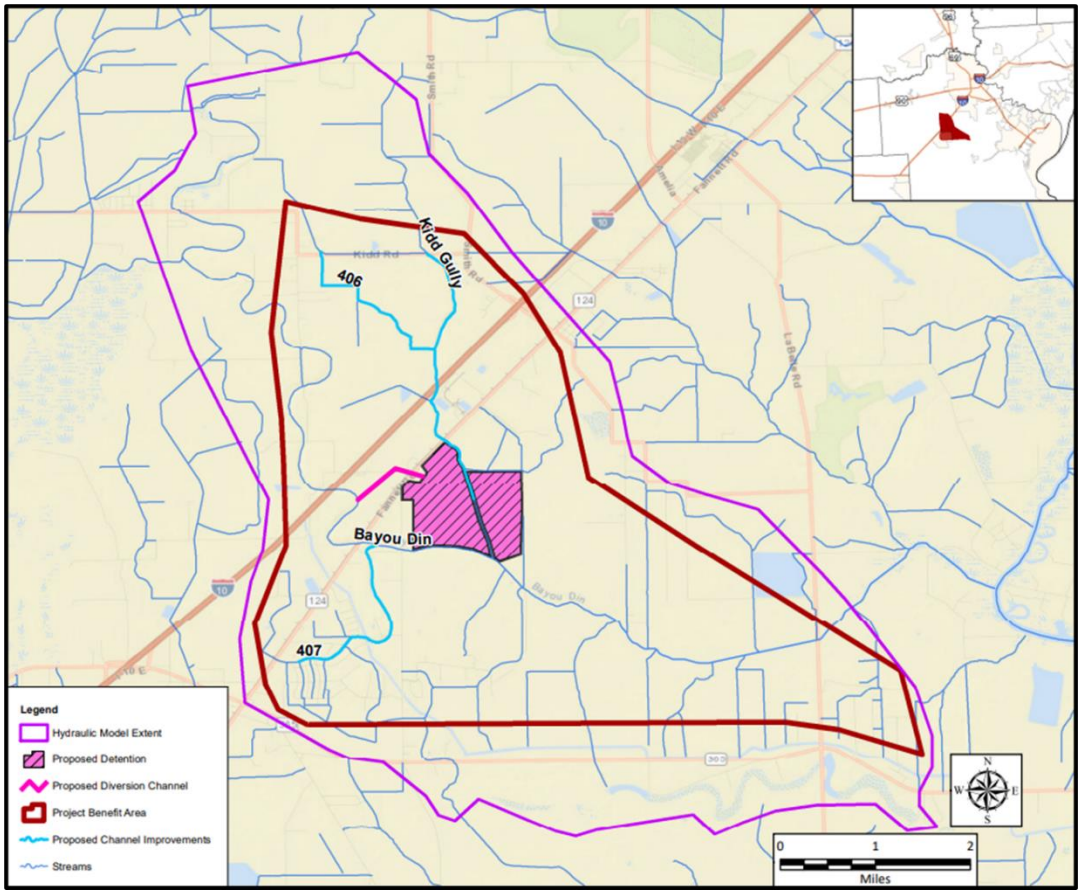

Figure 2: Hydraulic Model Extents

The existing condition model was run for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-YR storm events. The existing floodplain is wide along Bayou Din starting near the confluence with Kidd Gully and Kidd Gully north of the confluence with Bayou Din also has a wide deep floodplain at various points. **Figure 3** show the existing 100-year flood depths. **Figure 3** additionally highlights major damage centers in red boxes. Improvements focused on reducing flooding at these locations is expected to reduce the flooding experienced by residents and businesses in the area.

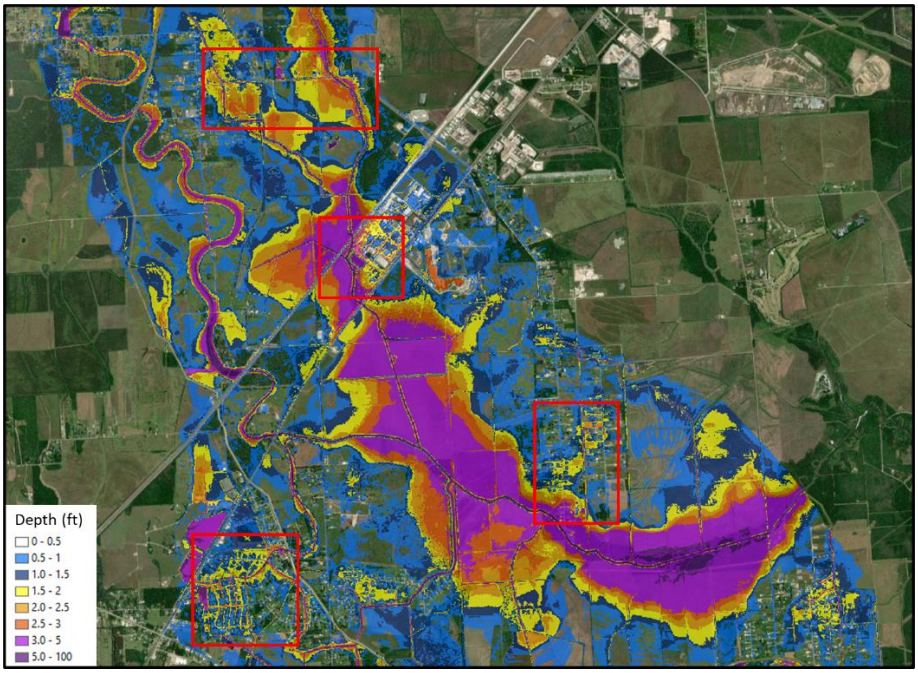

Figure 3: Existing Flood Depths

Figure 4 highlights the potential improvement locations that were investigated to identify a flood reduction project. Using a combination of increased channel conveyance and large regional detention the floodplain width is reduced and depth is reduced across much of the area.

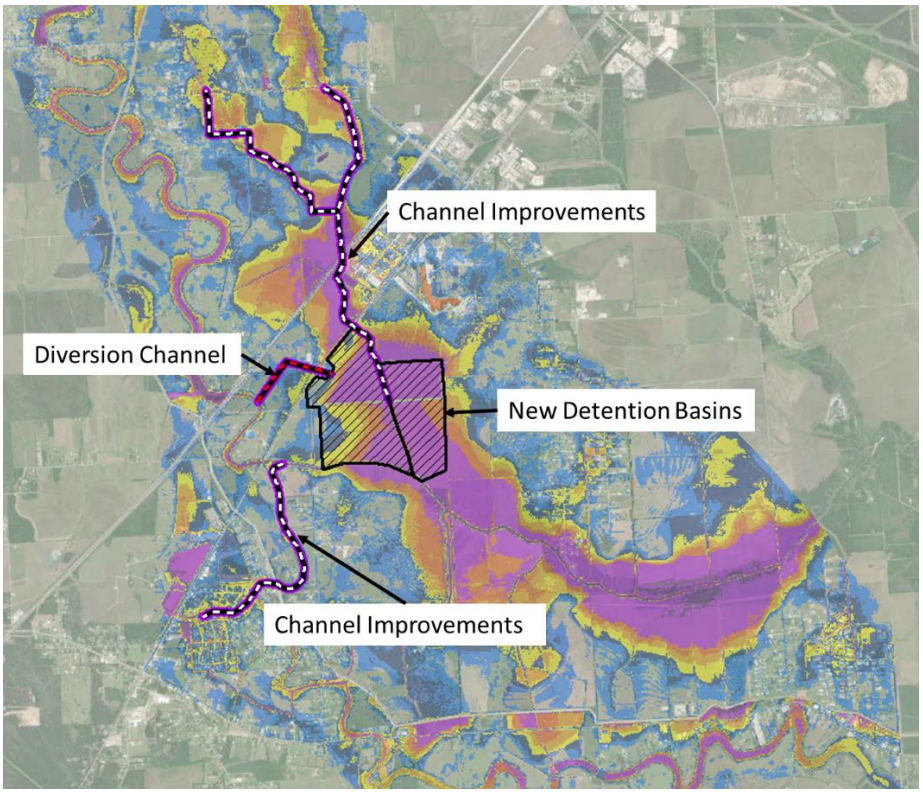

Figure 4: Proposed Improvement Areas

After analyzing the areas experiencing flood damages a proposed hydraulic model was created that included large regional detention basins, hydraulic structure replacements or modifications, and channel conveyance improvements along multiple streams and a diversion channel on Bayou Din that outfalls directly to the detention basins. Multiple geometries were studied to find an alternative that resulted in lowered water surface elevations throughout the project while also not resulting in any adverse impacts.
A typical section of the proposed channel improvements can be seen in **Figure 5**.

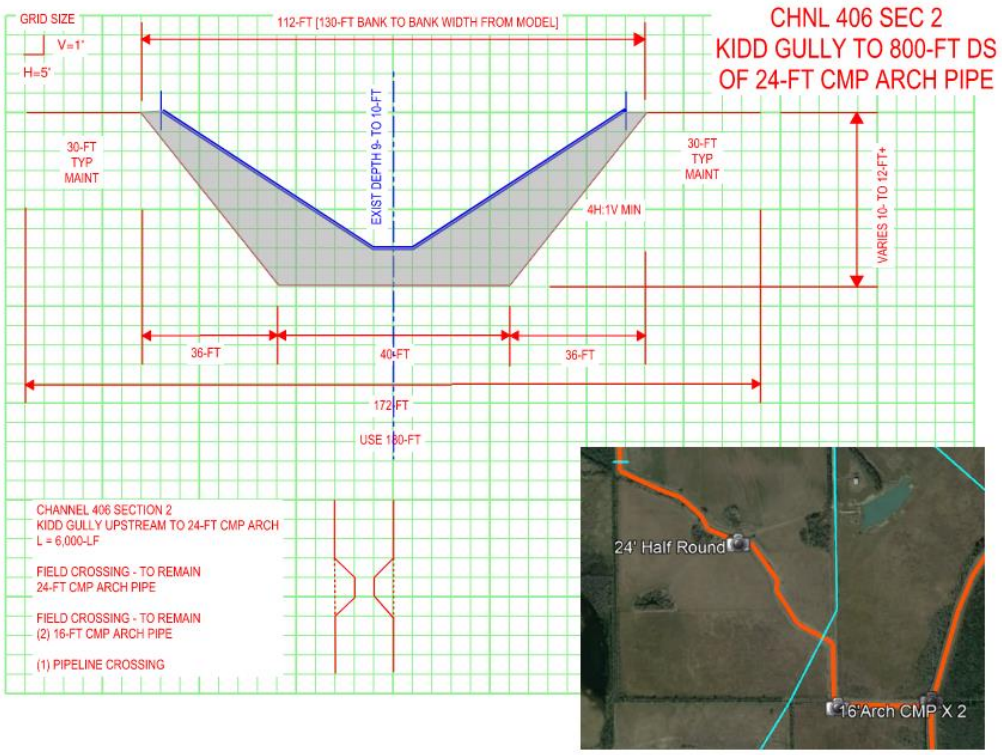

Figure 5: Typical Channel Improvement

The recommended alternative is summarized in **Figure 6** below while **Figure 7** displays the delta in water surface elevations across the project because of the proposed improvements.

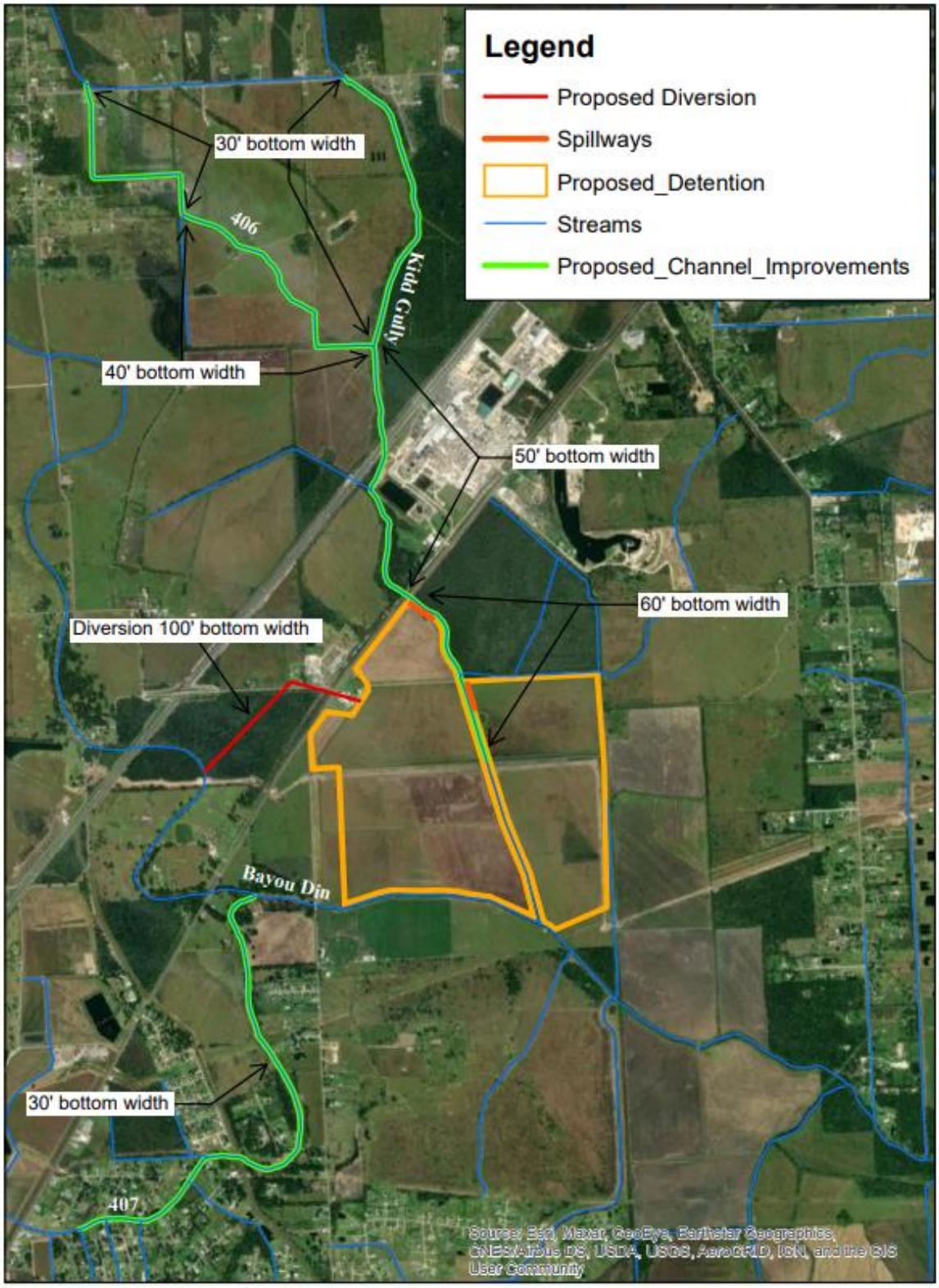

Figure 6: Proposed Drainage Improvements Summary

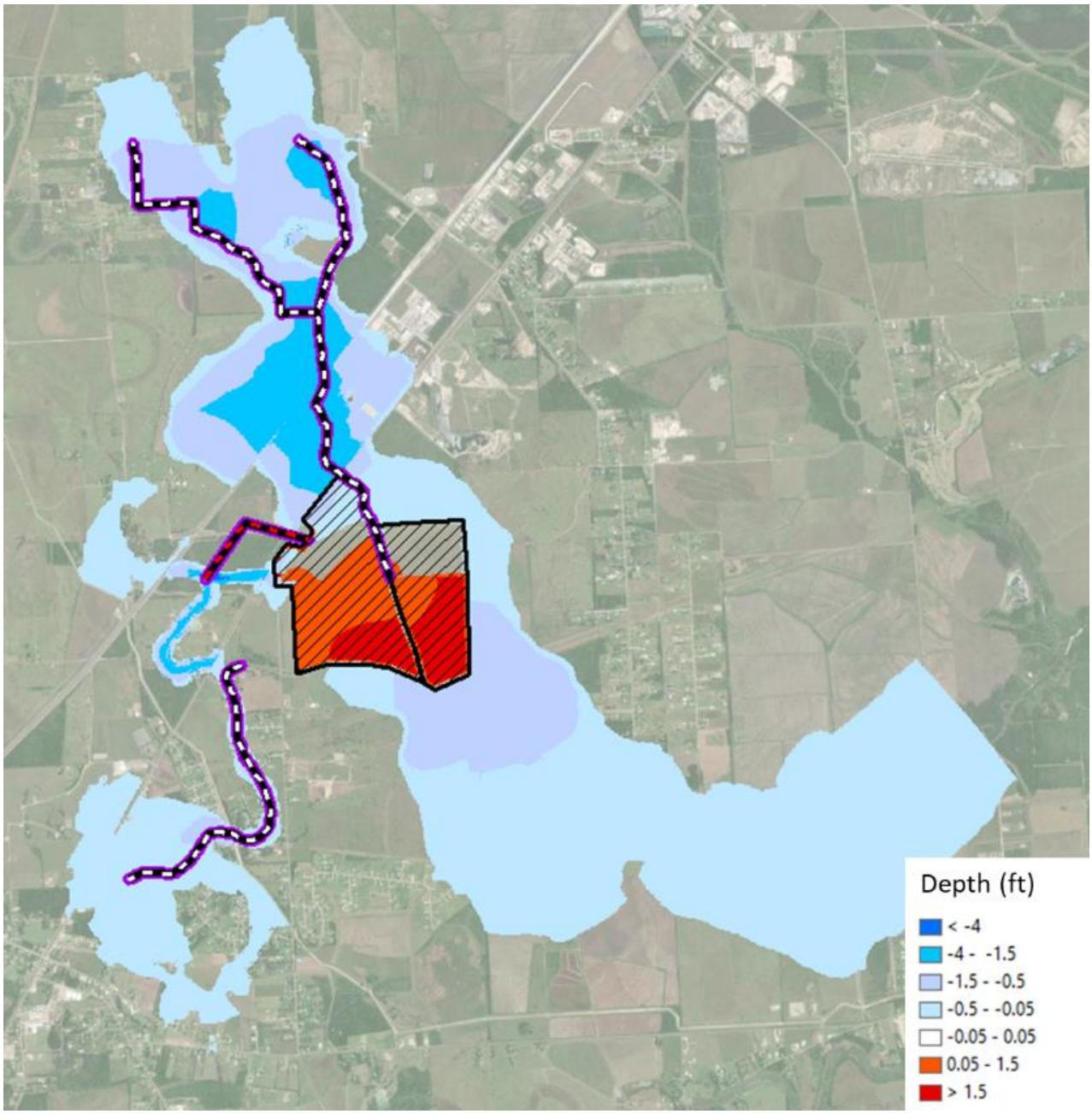

Figure 7: Water Surface Elevation Decreases – Post Project

4.00 BCA METHODOLOGY

4.01 METHODOLOGY

FEMA's BCA v6.0.0 toolkit, as well as FEMA procedures, and guidelines were followed to generate the BCA. The BCA is intended to compare annualized damages with and without a proposed project to determine the benefits provided by a proposed project on its financial costs. The Benefit-Cost Ratio (BCR) is determined by dividing the project benefit by the total project cost.

For this analysis, data was gathered from available sources including 2022 Jefferson County appraisal district data, 2018 LiDAR, and desktop analysis of street level imagery. Building replacement values were calculated using the default value of $100/sf was used in conjunction with livable square footage obtained from county appraisal district information. The generic USACE riverine damage curves obtained from FEMA were used to calculate damages. The specific damage curve used for each residential structure was based on the classification given to the structure by the Jefferson County Appraisal District. Structures fell into four categories, 1-story without basement, 2-story without basement, mobile home, or split level. For this analysis only residential structures were considered, any commercial or industrial structures were not considered.

JCDD6 additionally collected FFE information via survey at 431 residential structures. This information was used to determine an estimated FFE at the benefitting structures throughout the area by comparing the estimated LiDAR value versus the known FFEs obtained via survey. Two classifications were set for estimated FFEs depending on the structure type mentioned above.

Table 2: LiDAR to FEE conversation for structures not surveyed

Structure Class	Elevation added to LiDAR value
Mobile Home	1.5
Residential (1-Story, 2-Story, Split-Level)	0.75

The existing condition flood extents and proposed flood extents were modeled using HEC-RAS to generate water surface elevation information across the study area. Many structures will benefit from lowered water surface elevations in smaller, more frequent events such as the 2-year, 5-year or 10-year flood events.

4.02 BCA WORKBOOK

A structural inventory was developed for this project to calculate the damages to existing structures in existing conditions and with the proposed project constructed. Structures benefiting were limited to only residential structures, commercial and industrial were removed from the inventory for a more conservative analysis. The building replacement value of each structure was based on the default value of $100/sf. All values for damages were set using default values.

4.03 BCA TOOLKIT

Water surface elevations at each structure were determined using the HEC-RAS model results and the summation of damages for each storm event from the 2-year to the 500-year event were calculated to input into the BCA toolkit. Damages for structures, contents and displacement were calculated based on the generic USACE riverine damage curves. Social benefits were calculated by including the number of impacted workers based on 2016-2020 American Community Survey (ACS).

5.00 CONCULSION

The H&H analysis of the Bayou Din drainage improvements indicates that by providing detention, improving channel conveyance, and constructing a diversion channel many structures throughout the area can benefit from lower future flood risk and less damage. There are no adverse impacts as a result of the proposed improvements in any storm events up to and including the 500-year event. The BCA analysis using the BCA toolkit calculates an overall BCR of 1.55 indicating that project is cost effective.

LJA ENGINEERING

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4 May 2022

Orange County Drainage District
Attn: Mr. Don Carona
Mr. Doug Manning
8081 Old Highway 90
Orange, Texas 77630

Re: Orange County Drainage District's Flood Management Projects; Engineer's Certification Regarding No Negative Impact

To: Orange County Drainage District

Pursuant to the request of the Orange County Drainage District (the "OCDD"), I have reviewed the projects identified below for the purpose of determining whether the design and construction of the identified projects will create a negative impact on surrounding properties. The OCDD projects that I have reviewed are as follows:

PROJECT	SRFPG ID
* Cow Bayou #1 Detention Pond	043000001
* Cow Bayou #2 Detention Pond	043000002
* Terry Gully #1 Detention Pond	043000003
* Terry Gully #2 Detention Pond	043000004
* Terry Gully #3 Detention Pond	043000005
* Terry Gully #4 Detention Pond	043000006
* Cole Creek #1 Detention Pond	043000007
* Adams Bayou #1 Detention Pond	043000008
* Adams Bayou #2 Detention Pond	043000009
* Adams Bayou #3 Detention Pond	043000010
* Adams Bayou #4 Detention Pond	043000011
* Sabine River Relief Ditch Improvement and Extension Project	043000013
* Tiger Creek Detention Pond	043000020
* Lawrence Road Detention Pond	043000021
* Bridge City Drainage Outfall Improvement Project	043000023

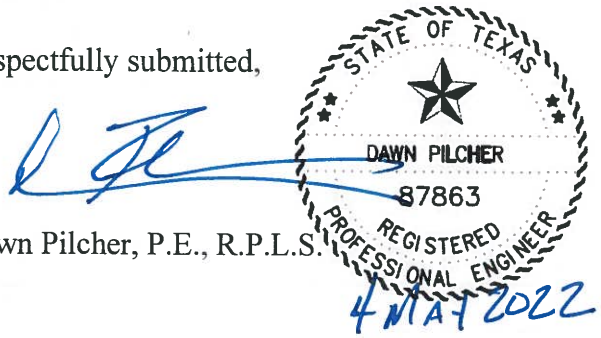
*	Bessie Heights Drainage Ditch Extension Project	Not Yet Assigned
*	Elevation of Feeder Road Bridge Along IH-10 at Cole Creek	Not Yet Assigned
*	Installation of New Culverts along FM 1442 (Bridge City) at the Colonial Outfall Ditch	Not Yet Assigned
*	Orange County Coastal Storm Risk Management Project (Levee, Floodwalls and Pump Stations)	Not Yet Assigned

I have reviewed, and I am familiar with the Technical Guidelines issued by the Texas Water Development Board ("TWDB") for determining whether or not a project creates a "negative impact", defined to be an increase in flood risk to surrounding properties. The Technical Guidelines further note that the increase in flood risk must be measured by the 1 percent (1%) annual chance event assuming a given water surface elevation and peak discharge, and that a determination of no negative impact can be established if stormwater does not increase inundation of infrastructure such as residential and commercial buildings and structures.

As Orange County is located on the north end of Sabine Lake, at the confluence of the Neches River and Sabine River, with no other county located downstream, projects developed to improve drainage within the county have no negative impact on any other county. Furthermore, the OCDD has a strict policy, as documented in its Drainage Criteria Manual and Regulations, that no development (residential subdivision, commercial, governmental or industrial) may have an adverse impact on the drainage of another area. This policy of no adverse impact is evaluated and strictly enforced for all drainage improvement projects planned and constructed within Orange County or by the OCDD.

I have evaluated all of the above-referenced projects submitted by OCDD for inclusion in the Sabine Regional Flood Plan, and hereby certify that none of the proposed projects identified herein will negatively impact the existing drainage conditions of any other area, as defined and described in the TWDB Technical Guidelines.

Respectfully submitted,



Dawn Pilcher, P.E., R.P.L.S.

LJA ENGINEERING

3600 W Sam Houston Pkwy S, Suite 600, Houston, Texas 77042
t 713.953.5200 LJA.com TBPE F-1386 TBPLS 10110501

November 29, 2021

Mr. Don Carona, General Manager
Orange County Drainage District
8081 Old Highway 90
Orange Texas 77630

RE: Drainage Analysis (H&H Letter Report) for Bessie Heights Drainage Ditch Extension Project at the Nelda Stark Unit of the Lower Neches WMA

Dear Mr. Carona

This report presents the results of the drainage analysis for a proposed drainage project serving the Bessie Heights Area in Orange County, Texas. There is significant flooding in the area due to its location on the Gulf Coastal plain and influence from the adjacent Cow Bayou watershed. Characteristics of the project area that significantly contribute to the flooding issues include the relatively flat terrain, frequent intense rainfall events, fluctuating tidal influence, and restricted capacity of the existing Bessie Heights Drainage Ditch. The proposed project is designed help reduce structural flooding in residential developments within the project area. The project consists of the construction of an extension channel to improve discharge from the existing Bessie Heights Drainage Ditch, improvements to the existing Bessie Height Drainage Ditch south of FM 1442, and a short extension of the BH Road Ditch to connect it to the proposed Bessie Heights Drainage Ditch extension.

The project is located within Orange County on the northwest side of Bridge City, Texas as shown in the attached **Vicinity Map** exhibit. The analyzed system is located in the lower portion of the Neches River watershed. The proposed modification will improve the conveyance of stormwater runoff from developments located within the Bessie Heights subbasin to the open water areas of the marsh, in route to the Neches River. This improved conveyance will decrease flood levels experienced in residential developments and neighborhoods within the project area.

The models used as the basis for the analysis were developed as part of the US Army Corps of Engineers study of internal drainage for the Sabine Pass to Galveston Bay Hurricane Flood Protection Program. The hydraulic models used are Rain-on-Grid two-dimensional models developed in HEC-RAS 6.0. and the terrain is based on LiDAR data available from the Texas Natural Resource Information System (TNRIS).

With recent climate changes and more frequent/more severe rainfall events, the National Weather Service (NWS) recently updated its statistical precipitation probability tables which resulted in the statistical “100-year” rainfall event for Orange County changing from approximately 12 inches of precipitation in 24 hours to over 17 inches of rain in the same 24 hour period. The latest NWS

models are referred to as “NOAA Atlas-14” rainfall data, and this data set was used in the development of the precipitation runoff models for this study. For this study, the recurrence intervals of interests were the 10 year, 25 year, 50 year, and 100 year events.

The following Table summarizes the data applied to drainage models associated with this project:

TABLE 5-5: RAINFALL DATA FOR ORANGE COUNTY
NOAA Atlas 14, volume 11, Version 2, Orange, TX

Recurrence Interval (years)	Rainfall Depth (inches) for Given Duration								
	5 MIN	15 MIN	30 MIN	1 HR	2 HR	3 HR	6 HR	12 HR	24 HR
2	0.61	1.23	1.76	2.35	2.97	3.35	4.04	4.80	5.62
5	0.75	1.51	2.16	2.90	3.77	4.33	5.32	6.36	7.48
10	0.87	1.74	2.47	3.35	4.45	5.19	6.50	7.85	9.29
25	1.02	2.05	2.90	3.95	5.41	6.43	8.26	10.1	12.1
50	1.15	2.26	3.19	4.37	6.15	7.43	9.73	12.0	14.5
100	1.25	2.49	3.50	4.82	6.95	8.54	11.4	14.3	17.3
500	1.56	3.11	4.41	6.19	9.30	11.7	16.1	20.8	25.8

Several configurations of proposed conveyance improvements were analyzed.

A base project was first developed which considered only the construction of an extension of the Bessie Heights Drainage Ditch, without including improvements to the existing Bessie Heights Drainage Ditch. The best design for the Bessie Heights Drainage Ditch extension consists of a trapezoidal channel with a 50 to 60-foot bottom width and varying side slopes. In addition to the Bessie Heights Drainage Ditch extension, improvement and extension of the BH Road Ditch were evaluated. The optimum design for the BH Road Ditch, which draws additional run-off from residential areas and currently discharges to the vegetated marsh, involves extending the existing BH Road Ditch to the proposed Bessie Heights Drainage Ditch Extension. The proposed BH Road Ditch extension is a trapezoidal channel with a 20-foot bottom width and 3:1 side slopes, approximately 3’ deep routed from the current termination of the BH Road Ditch to meet the proposed Bessie Heights Drainage Ditch extension west of the power line corridor.

With a full understanding of the impacts of the proposed Bessie Heights Drainage Ditch extension, additional improvements were considered on the existing Bessie Heights Drainage Ditch upstream from the proposed extension to the FM 1442 bridge crossing. The channel improvements from FM 1442 to the proposed ditch extension would expand the existing Bessie Heights Drainage Ditch to a trapezoidal channel with a 40-foot bottom width and 3:1 side slopes. For this evaluation, the Bessie Heights Drainage Ditch extension and the BH Road Ditch remain the same size and geometry as previously described for the base project in the previous paragraph.

While the Bessie Heights Drainage Ditch extension provides significant benefits in the form of reduced water surface elevations at each level of storm evaluated, when coupled with improvements to the existing Bessie Heights Drainage Ditch from FM 1442 to the proposed extension, the upstream benefits are further increased without adverse impacts to any of the

nearby residential properties.

The best combined scenario for the ditch system resulted in the following configurations:

Ditch/Location	Bottom Width	Flowline Elevation through TPWD Property	Side Slopes
BH Road Ditch	20’	-1.5’	3:1
Bessie Heights Ditch, FM 1442 to Relief Ditch	40’	-2’	3:1
Bessie Heights Ditch Extension, EAST of power line corridor	50’	-2’ to -2.5’	3:1
Bessie Heights Ditch Extension, WEST of power line corridor	60’	-2.5’ to -3’	4:1

As the drainage outfalls progress further into the marsh area, flatter side slopes are necessary to accommodate slope stability in the soft, saturated soils conditions.

As shown in the maps on following pages, the above-described ditch improvements result in the following water surface elevation reductions within the area of interest:

Storm Event Annual Exceedance Probability (Statistical Return Interval)	Anticipated Water Surface Reductions depending on location (see maps)
10% (10 year)	~3” to >6” reduction
4% (25 year)	~3” to >6” reduction
2% (50 year)	~3” to >6” reduction
1% (100 year)	~3” to >6” reduction

The following tables show the comparison of water surface elevations for the alternatives. The locations where the comparisons are made is shown in the **Bessie Heights Cross Section Data** exhibit.

Improved Bessie Heights Ditch Between FM 1442 and Proposed Extension			
Annual Exceedance Probability	With Existing Conditions	With Ditch Extension and Improvements South of FM 1442	WSE Change from Existing to Proposed Conditions
Evaluated Storm	WSE (Feet)	WSE (Feet)	Change in WSE
10% (10-yr)	6.09	5.39	-0.70’ (-8.4”)
4% (25-yr)	6.51	5.89	-0.62’ (-7.4”)
2% (50-yr)	6.82	6.25	-0.57’ (-6.8”)
1% (100-yr)	7.12	6.58	-0.54’ (-6.5”)

Existing Bessie Heights Ditch South of Proposed Extension (no excavation)			
Annual Exceedance Probability	With Existing Conditions	With Ditch Extension and Improvements South of FM 1442	WSE Change from Existing to Proposed Conditions
Evaluated Storm	WSE (Feet)	WSE (Feet)	Change in WSE
10% (10-yr)	5.30	4.65	-0.65' (-7.8")
4% (25-yr)	5.62	5.04	-0.58' (-7.0")
2% (50-yr)	5.85	5.32	-0.53' (-6.4")
1% (100-yr)	6.08	5.57	-0.51' (-6.1")

Proposed Bessie Heights Ditch Extension, between Improved Section of Bessie Heights Ditch and BH Road Ditch			
Annual Exceedance Probability	With Existing Conditions	With Ditch Extension and Improvements South of FM 1442	WSE Change from Existing to Proposed Conditions
Evaluated Storm	WSE (Feet)	WSE (Feet)	Change in WSE
10% (10-yr)	5.51	4.75	-0.76' (-9.1")
4% (25-yr)	5.86	5.18	-0.68' (-8.2")
2% (50-yr)	6.12	5.48	-0.64' (-7.7")
1% (100-yr)	6.37	5.76	-0.61' (-7.3")

BH Road Ditch near Proposed Bessie Heights Ditch Extension			
Annual Exceedance Probability	With Existing Conditions	With Ditch Extension and Improvements South of FM 1442	WSE Change from Existing to Proposed Conditions
Evaluated Storm	WSE (Feet)	WSE (Feet)	Change in WSE
10% (10-yr)	3.97	3.52	-0.45' (-5.4")
4% (25-yr)	4.15	3.86	-0.29' (-3.5")
2% (50-yr)	4.30	4.07	-0.23' (-2.8")
1% (100-yr)	4.46	4.26	-0.20' (-2.4")

As shown in the above tables, the proposed improvements provide a reduction in water surface elevation (WSE) for all storm frequencies. The overall extent of the reductions can be seen in the attached Water Surface Comparison exhibits.

If you have any questions or need any additional information, please do not hesitate to contact me at dpilcher@lja.com or at 409.284.8581.

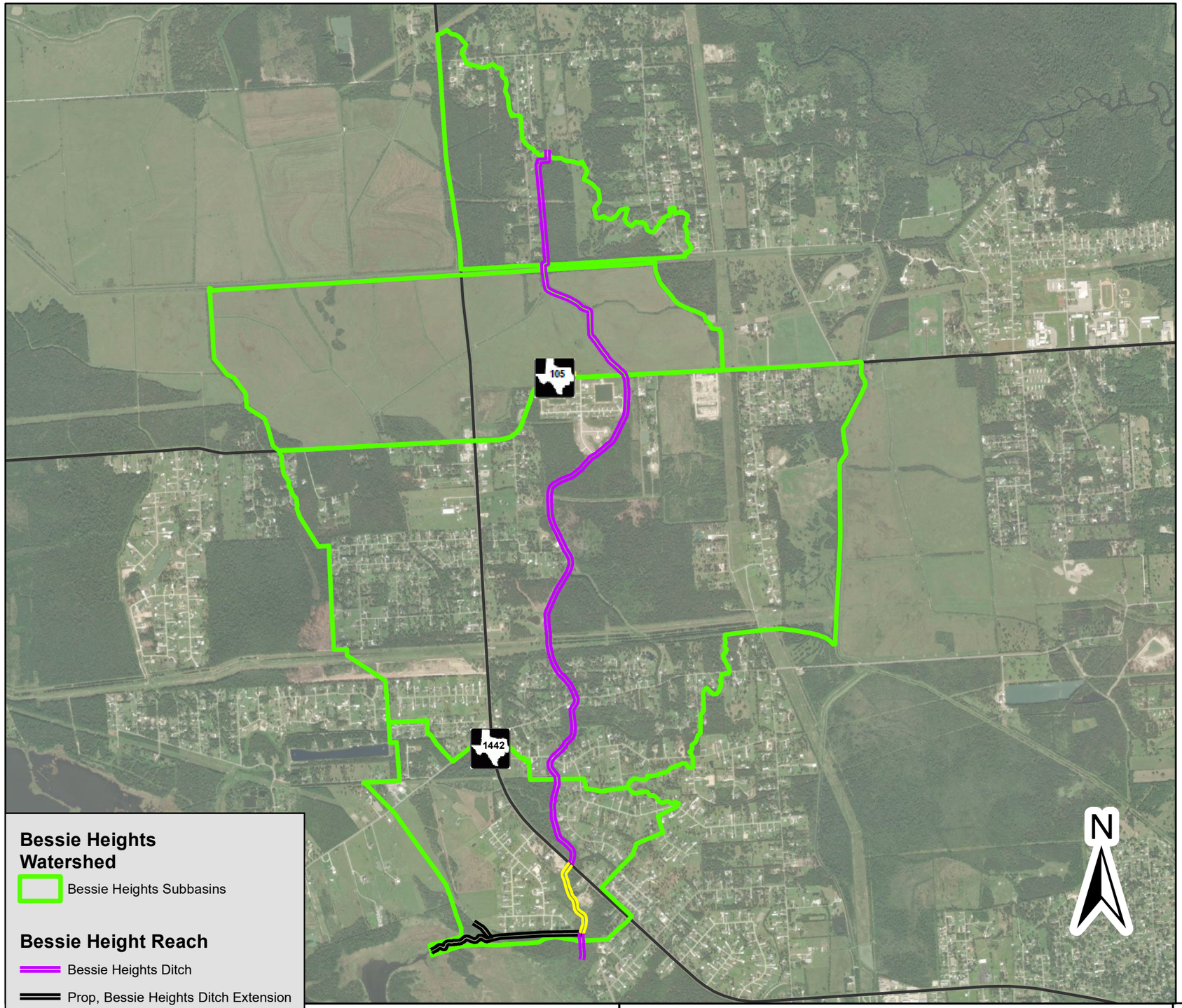
Sincerely,

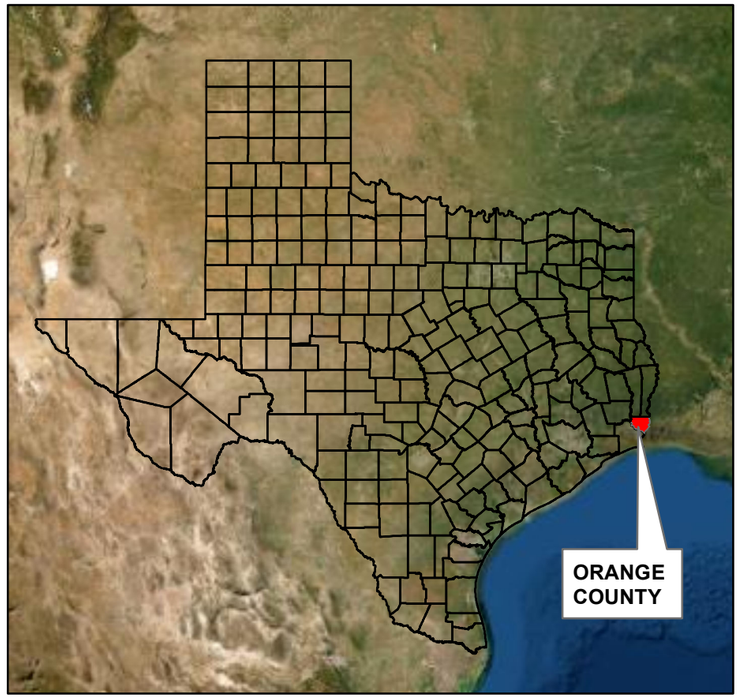
29 November 2021

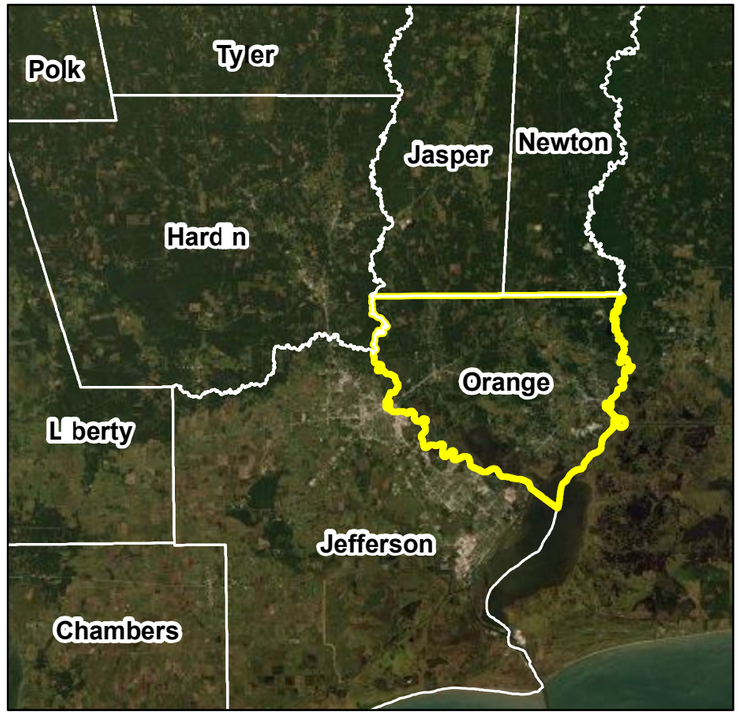
Dawn Pilcher, PE
Sr. Project Manager

ATTACTMENTS:

Vicinity Map
Bessie Heights Cross Section Locations
10-YR WSE Comparison
25-YR WSE Comparison
50-YR WSE Comparison
100-YR WSE Comparison







Bessie Heights Watershed

Bessie Heights Subbasins

Bessie Height Reach

Bessie Heights Ditch

Prop, Bessie Heights Ditch Extension

Additonal Channel Improvements Upsteam of Ditch Extension

TxDOT

0 1,100 2,200 4,400 Feet

1 inch = 2,200 feet

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Fax: 713-953-5026
TBPE F-1386 | TBPLS 10110501

HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

VICINITY MAP

ORANGE COUNTRY DRAINAGE DISTRICT (OCDD)

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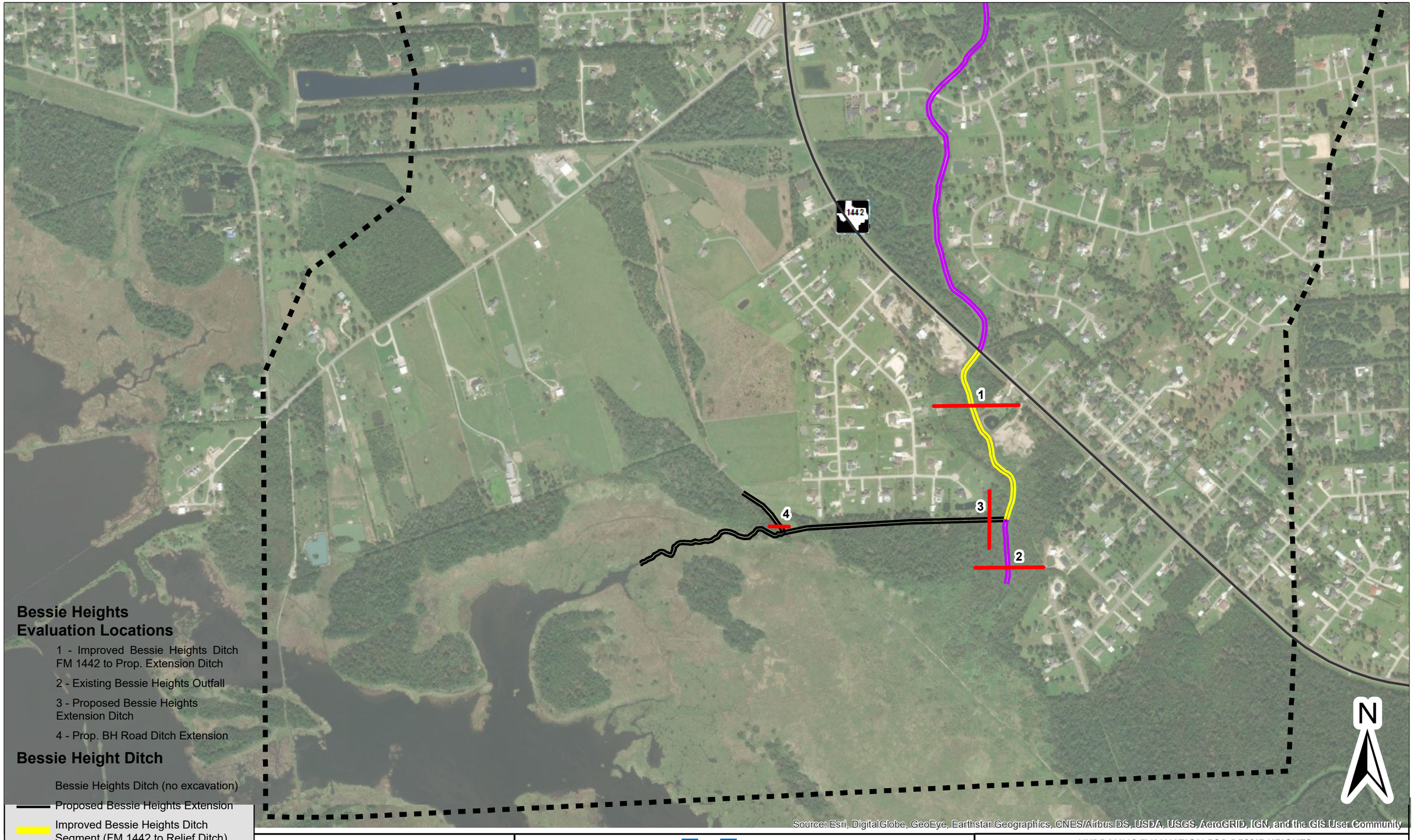

Bessie Heights Evaluation Locations

1 - Improved Bessie Heights Ditch FM 1442 to Prop. Extension Ditch

2 - Existing Bessie Heights Outfall

3 - Proposed Bessie Heights Extension Ditch

4 - Prop. BH Road Ditch Extension

Bessie Height Ditch

Bessie Heights Ditch (no excavation)

Proposed Bessie Heights Extension

Improved Bessie Heights Ditch Segment (FM 1442 to Relief Ditch)

TxDOT Roadway (FM 1442)

HECRAS 2D Flow Area

0 375 750 1,500 Feet

1 inch = 750 feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

BESSIE HEIGHTS CROSS SECTION LOCATIONS

ORANGE COUNTRY DRAINAGE DISTRICT (OCDD)

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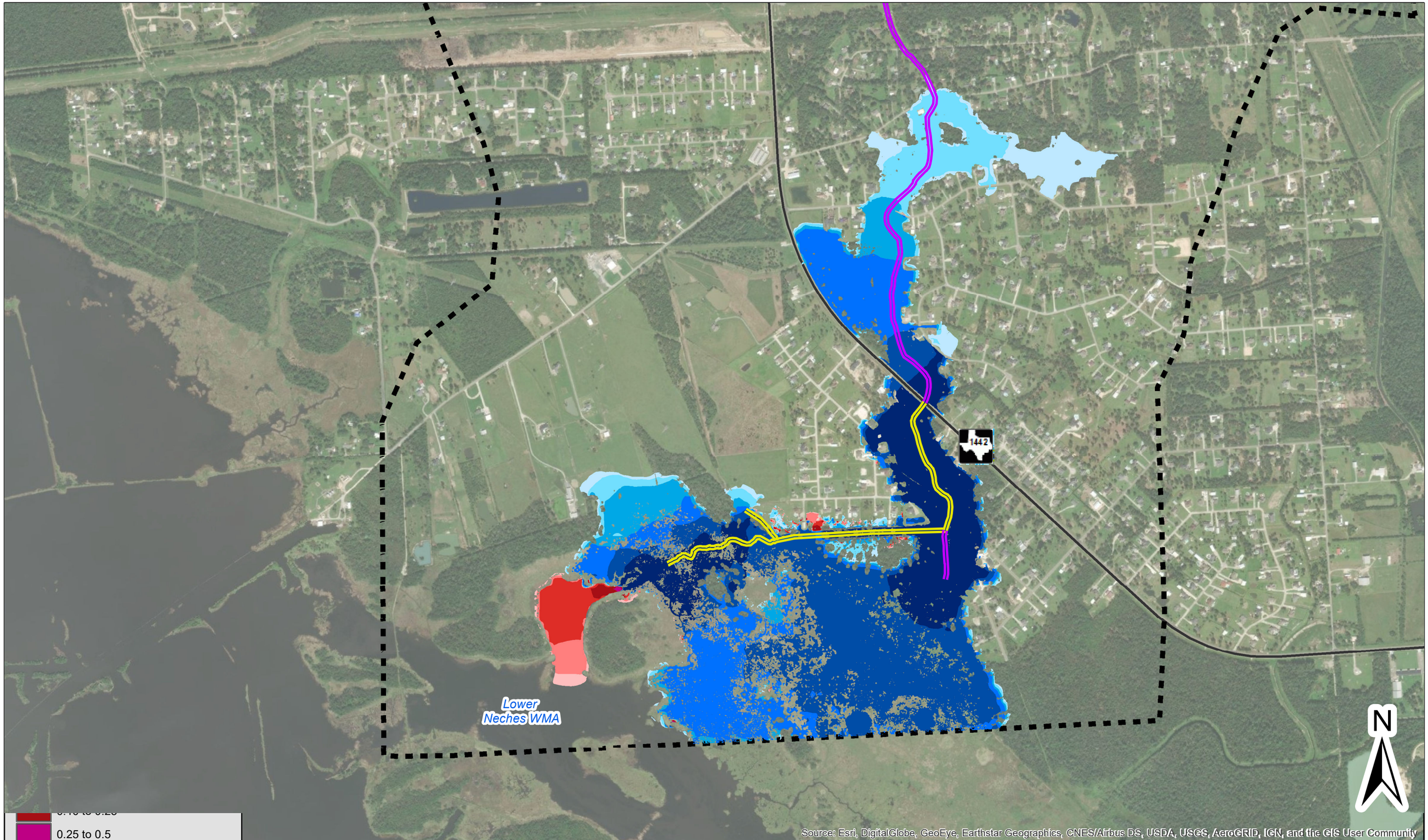

0.25 to 0.5

> 0.50

HECRAS 2D Flow

TxDOT

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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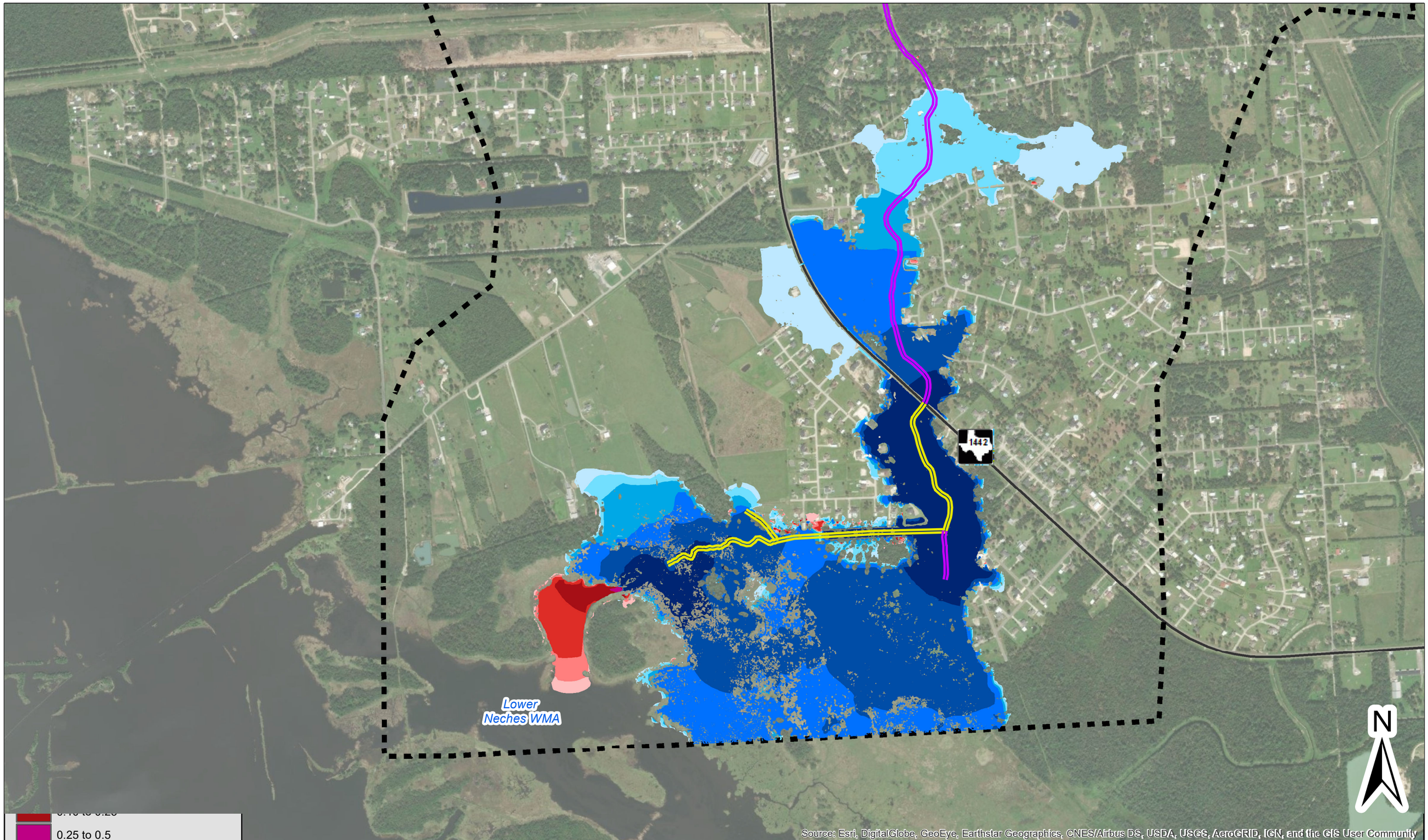
HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

EXISTING VS PROPOSED 10-YR WSE COMPARISON

S:\B1-Data\Projects\Projects LJA 8000 - 8XXX\B881-1003 Emergency Flood Response Support\4D Bessie Heights\GIS\Exhibits\10_12-2021 LATEST EXHIBITS\11_2021 Proposed Exhibit Alternative 2 (Updated)\10yr WSE Comparison - Alternative 2.mxd



0.25 to 0.5

> 0.50

HECRAS 2D Flow

TxDOT

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

EXISTING VS PROPOSED 25-YR WSE COMPARISON

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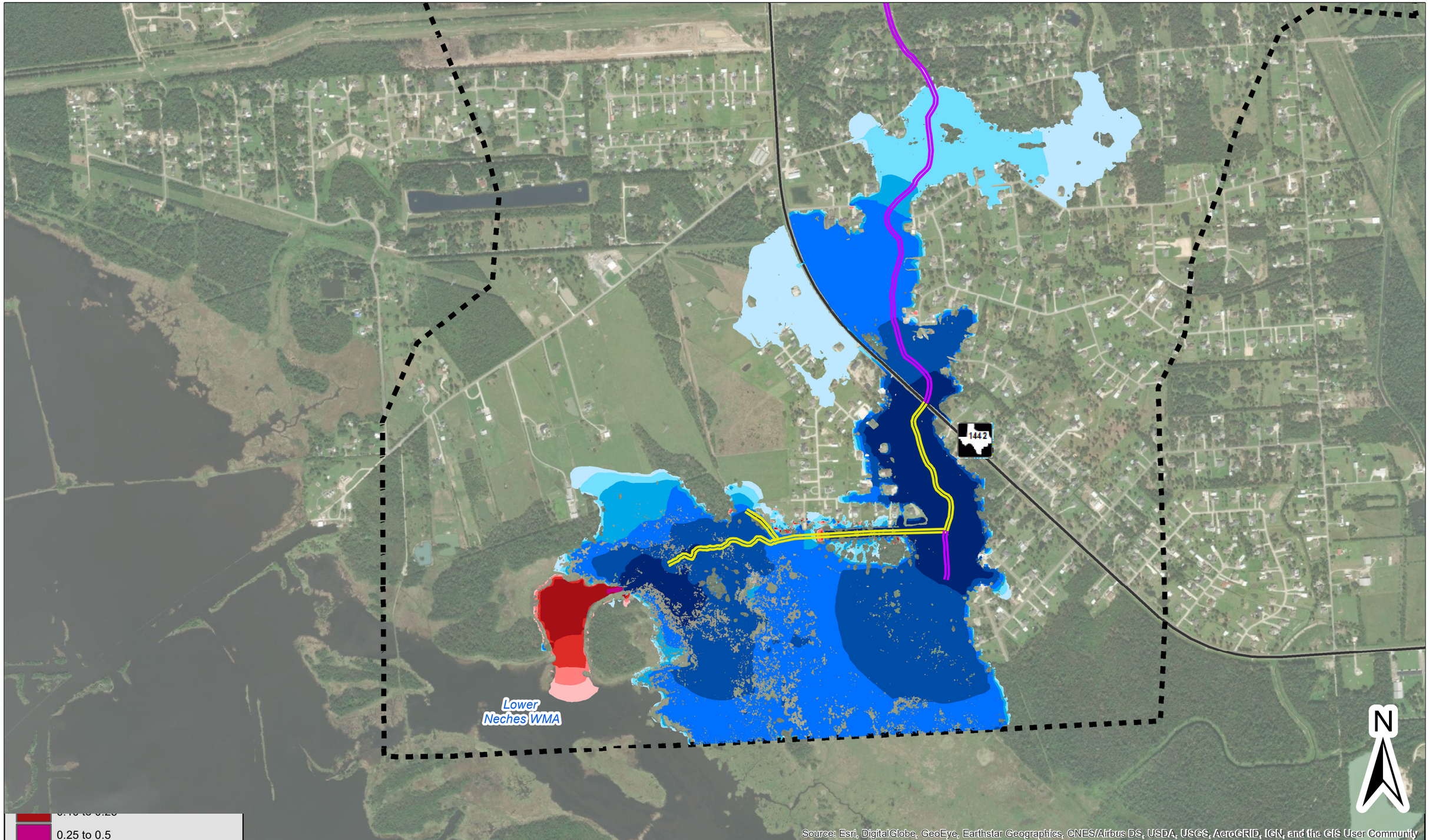

0.25 to 0.5

> 0.50

HECRAS 2D Flow Area

TxDOT

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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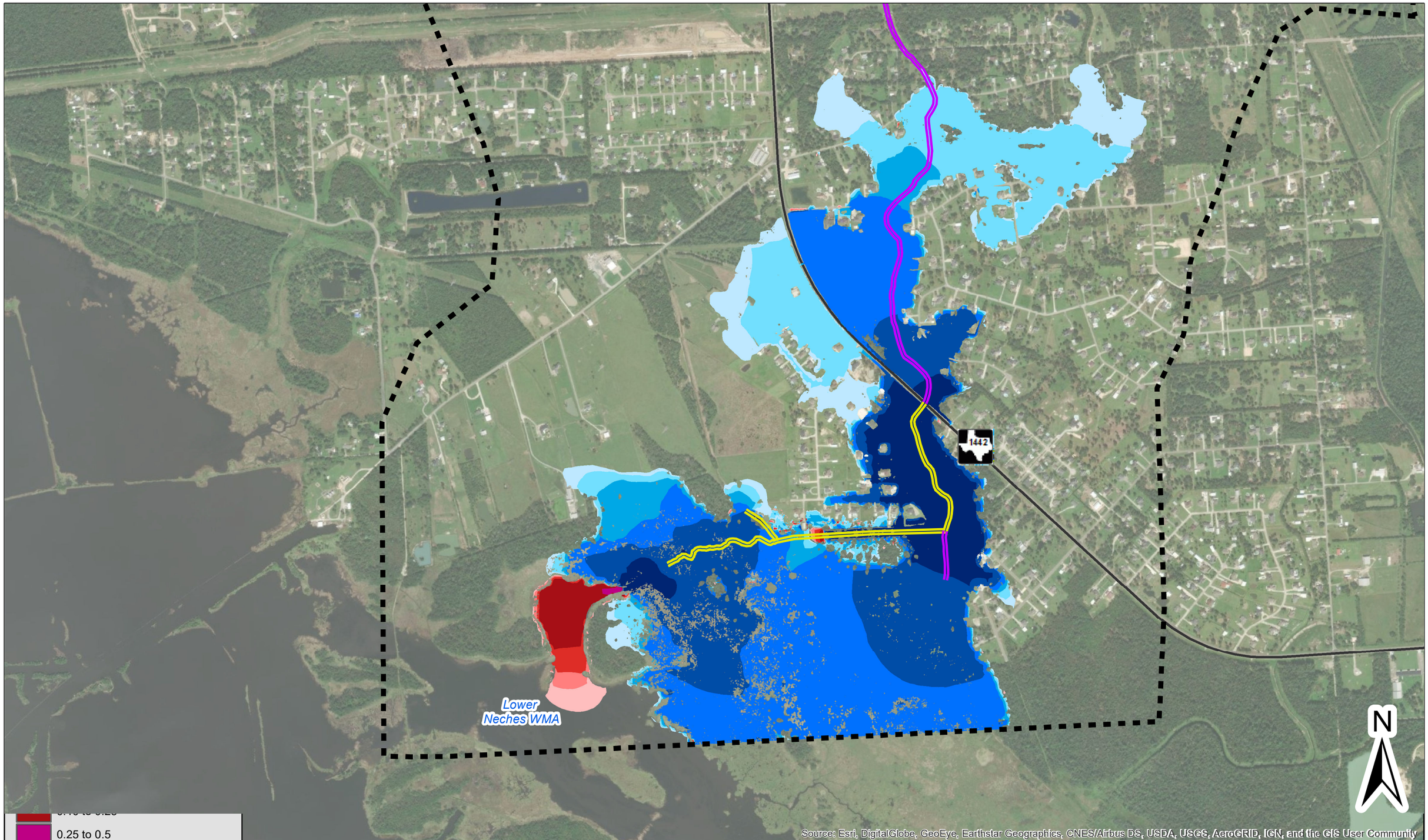
HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

EXISTING VS PROPOSED 50-YR WSE COMPARISON

S:\EBI-Data\Projects\Projects LJA 8000 - 8XXX\B881 - OCD\B881-1003 Emergency Flood Response Support\40 Bessie Heights\GIS\ArcHub\1to1_12-2021 LATEST EXHIBITS\11_2021 Proposed Exhibit Alternative 2 (Updated)\50yr WSE Comparison - Alternative 2.mxd



0.25 to 0.5

> 0.50

HECRAS 2D Flow Area

TxDOT

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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HYDRAULIC EVALUATION FOR BESSIE HEIGHTS DRAINAGE IMPROVEMENTS

B881-1003

EXISTING VS PROPOSED 100-YR WSE COMPARISON

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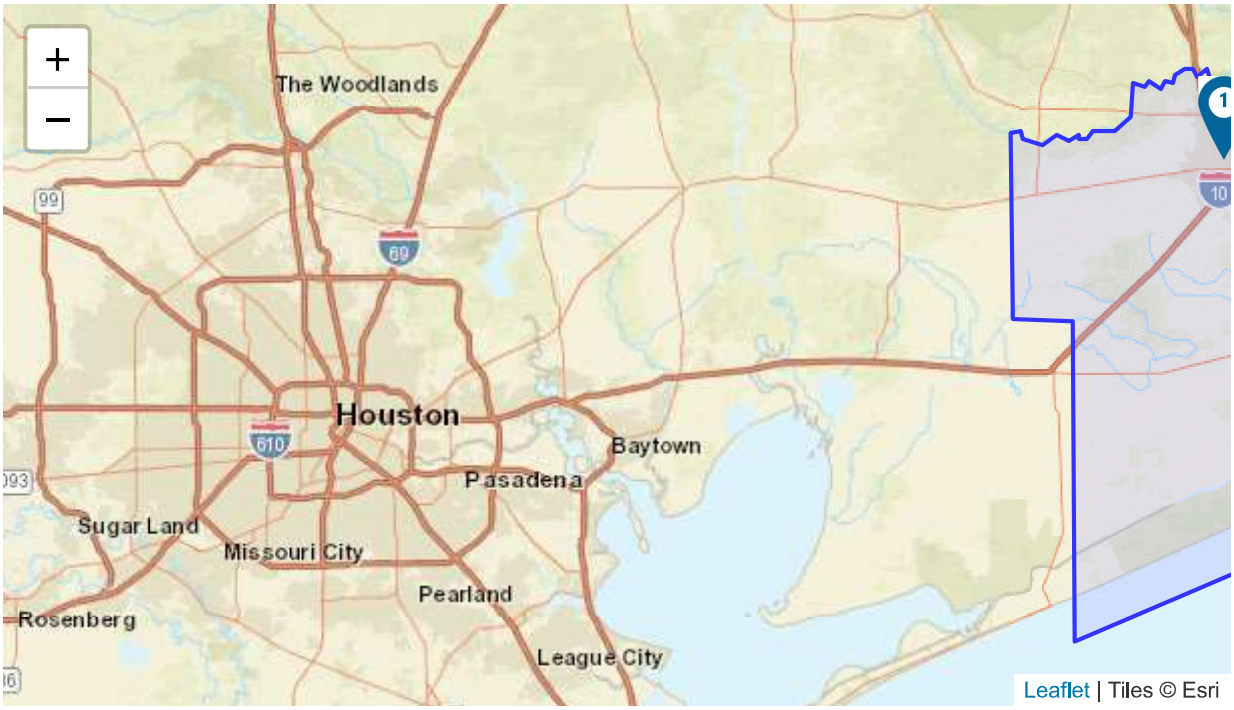
FEMA Benefit-Cost Calculator

V.6.0 (Build 20220513.1658 | Release Notes)

Benefit-Cost Analysis

Project Name: Channel 100-A [Jefferson County Drainage District No. 6]



Map Marker ▲	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)
1	Drainage Improvement @ 30.0818340; -94.1487680		DFA - Riverine Flood	$ 445,896,483	$ 39,783,811	11.21
TOTAL (SELECTED)				**$ 445,896,483**	**$ 39,783,811**	**11.21**
TOTAL				**$ 445,896,483**	**$ 39,783,811**	**11.21**

Property Configuration

Property Title:	Drainage Improvement @ 30.0818340; -94.1487680
Property Location:	77707, Jefferson, Texas
Property Coordinates:	30.0818340, -94.1487680
Hazard Type:	Riverine Flood
Mitigation Action Type:	Drainage Improvement
Property Type:	Residential Building
Analysis Method Type:	Professional Expected Damages

Cost Estimation
Drainage Improvement @ 30.0818340; -94.1487680

Project Useful Life (years):	75
Project Cost:	$39,570,866
Number of Maintenance Years:	75 Use Default:Yes
Annual Maintenance Cost:	$15,000

Comments

-

Project Useful Life:

Default value for storm sewer infrastructure is 50-years with concrete lined flood control channels up to 75-years.

-

Mitigation Project Cost:

Total Project Cost worksheet is attached FEMA GO application.

-

Annual Maintenance Cost:

Approx. $5,000 per year for mowing new concrete lined channel - to be done up to three (3) times per year.

Damage Analysis Parameters - Damage Frequency Assessment
Drainage Improvement @ 30.0818340; -94.1487680

Year of Analysis Conducted:	2020
Year Property was Built:	1950
Analysis Duration:	71 Use Default:Yes

Professional Expected Damages Before Mitigation

Drainage Improvement @ 30.0818340; -94.1487680

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Structural Value ($)	Contents Value ($)	Displacement ($)	Number of Volunteers	Number of Days	Damages ($)
10	0	814,461	700,469	460,951	0	0	1,975,881
25	0	20,295,455	35,526,395	5,714,282	0	0	61,536,132
50	0	67,347,485	104,661,309	18,568,842	0	0	190,577,636
100	0	130,276,898	195,322,723	39,432,846	0	0	365,032,467
500	0	248,639,357	345,973,979	83,943,258	0	0	678,556,594

Comments

-

Damages Before Mitigation:

DDF worksheet attached to FEMA GO application.

Annualized Damages Before Mitigation

Drainage Improvement @ 30.0818340; -94.1487680

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
10	1,975,881	661,602
25	61,536,132	2,165,863
50	190,577,636	2,637,556
100	365,032,467	3,981,519
500	678,556,594	1,357,045
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,297,678,710	10,803,585

Professional Expected Damages After Mitigation

Drainage Improvement @ 30.0818340; -94.1487680

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Structural Value ($)	Contents Value ($)	Displacement ($)	Number of Volunteers	Number of Days	Damages ($)
10	0	375,745	281,468	215,939	0	0	873,152
25	0	17,686,935	27,336,481	5,907,410	0	0	50,930,826
50	0	60,312,061	95,636,581	16,461,755	0	0	172,410,397
100	0	127,095,388	190,255,843	38,612,817	0	0	355,964,048
500	0	248,179,288	345,859,338	83,943,258	0	0	677,981,884

Annualized Damages After Mitigation

Drainage Improvement @ 30.0818340; -94.1487680

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
10	873,152	400,117
25	50,930,826	1,874,140
50	172,410,397	2,477,335
100	355,964,048	3,930,086
500	677,981,884	1,355,896
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,258,160,307	10,037,574

Standard Benefits - Ecosystem Services

Drainage Improvement @ 30.0818340; -94.1487680

Total Project Area (acres):	1,950
Percentage of Green Open Space:	12.00%
Percentage of Riparian:	0.00%
Percentage of Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Marine Estuary:	0.00%
Expected Annual Ecosystem Services Benefits:	$1,944,072

Comments

-

Percent Green Open Space:

undeveloped tracts of land

Additional Benefits - Social

Drainage Improvement @ 30.0818340; -94.1487680

Number of Workers:	3,654
Expected Annual Social Benefits:	$43,220,219

Comments

-

Number of Workers:

https://www.census.gov/quickfacts/fact/table/beaumontcitytexas/LND110210 in civilian labor force, total, percent of population age 16 years+, 2015-2019

Benefits-Costs Summary

Drainage Improvement @ 30.0818340; -94.1487680

Total Standard Mitigation Benefits:	$402,676,264
Total Social Benefits:	$43,220,219
Total Mitigation Project Benefits:	$445,896,483
Total Mitigation Project Cost:	$39,783,811
Benefit Cost Ratio - Standard:	10.12
Benefit Cost Ratio - Standard + Social:	11.21

CESWG-Z 26 APRIL 2021

MEMORANDUM FOR RECORD

SUBJECT: HYDRAULIC DESIGN CRITERIA FOR THE INTERIOR AREA OF THE SABINE PASS TO GALVESTON BAY ORANGE CSRM LEVEE

References

i. Public Law 115-270. Section 1401 (3)3., Water Resources Development Act of 2018

ii. *USACE. Chief's Report-Sabine Pass to Galveston Bay, Texas, Coastal Storm Risk Managementand Ecosystem Restoration Study* 2017

iii. USACE, *Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration Final Integrated Feasibility Report – Environmental Impact Statement*, May 2017

iv. TxDOT, *New Rainfall Coefficients -- Including tools for estimation of intensity and hyetographs inTexas,* 2015

v. TxDOT, *Hydraulic Design Manual* 2019

vi. Orange County Drainage District, *Drainage Criteria Manual* October 6, 2020

vii. U.S. Geological Survey, *Water-Resources Investigations Report 96–4307 USGS Regional Equations for Estimation of Peak-Streamflow Frequency for Natural Basins in Texas,* 1996

viii. Galveston Coastal Services, *Interior Drainage – Progress Summary andObservations* – 05 FEB 2021

ix. USACE *Hydrologic Analysis for Interior Areas EM 1110-2-1413,* 2018

x. USACE *CECW-PA MEMORADUM SUBJECT: Policy Guidance Letter No. 37, CostSharing of Interior Drainage Facilities,* No Date

xi. USACE and UCF, *Assessing the Potential for Compound Flooding in Parts the Sabine And Brazoria River Basins: Joint probability analysis of high river discharge and storm surge.* No Date

1. The purpose of this memo is to establish the design criteria for the interior drainage area of theOrange CRSM levee for the Sabine Pass to Galveston Bay Project and how results of the performance of the design criteria will be determined and implemented.

2. The Sabine Pass to Galveston Bay Project was authorized in Section 1401 of the Water Resources Development Act of 2018 (P.L. 115-270) (Ref. i). The authorization states that the Sabine to Galveston Project will be carried out substantially in accordance with the plans and subject to the conditions described in the Chief's Report (Ref ii). The Chief's Report details the Orange CSRM plan which will build seven pump stations, 56 drainage structures, and 32 closuregates located at road and railway crossings to mitigate interior flooding during surge events. Twonavigable sector gates with adjacent vertical lift floodgates for normal channel flows would be constructed in Adams and Cow Bayous to reduce surge penetration.

3. The development of the interior drainage analysis in support of the study was summarized in the Sabine Pass to Galveston Bay Integrated Feasibility and Environmental Analysis Report (Ref iii). The analysis documented in the report is based on the USACE standard

covered in Ref ix which governs Hydrologic Analysis for Interior Areas. Ref ix requires that the minimum facilities design event be based on the local drainage system design event, which is published by Orange County Drainage District (Ref vi). A hydrologic analysis using the Rational Method determined the frequency-discharge values for small watersheds and regression equations were used to determine the frequency-discharge values of large watersheds. The rainfall intensity parameters used for the Rational Method were based on rainfall estimates published in 2015 by TxDOT (Ref. iv). TxDOT has since updated their Hydraulic Design Manual (Ref. v) with new parameters which are published in the current Orange County Drainage District Design Criteria Manual and Regulation (Ref. vi). For large watersheds, discharges were conservatively chosen based on the higher results of two regressions equations published by TxDOT (Ref. v) and the USGS (Ref. vii).

4. In the Feasibility Study, drainage provided by culverts through the design levee were placed in areas of known flow paths and sized to allow the 100-year discharge plus a 10% increase for climate change to pass without backwater effects. No pumps were required or anticipated for the "open gate" condition. As a result, it was assumed that there were no interior flood impacts for low exterior, or "open gate" conditions. Under a surge conditions or "closed gate conditions", it was assumed that the gravity drained flood waters equivalent to a 25-year storm behind the interior would be pumped over the levee. Pump sizes were reduced based on a Joint Probability Analysis(JPA) on the nearby Neches River due to the assumed non-coincident nature of riverine and costal surge events.

5. Due to the simplistic methods used to generate interior hydrology (Regression Equations and Rational Method) and the assumptions on culvert performance, a more detailed analysis was recommended for PED. There is concern that the interior drainage design will not perform as well as in feasibility. Reasons for reduced performance for drainage could be attributed to an increase in runoff due to application of NOAA Atlas14 precipitation values and reduced culvertperformance due to inclusion of tailwater conditions and frictional losses.

6. With any changes to the design, the hydraulic performance must meet the minimum facility requirement stated in multiple USACE guidance documents (Refs. ix, x). Minimum interior drainage facilities are defined as the measures required to provide interior drainage relief such that, during low exterior stages, the local storm drainage system will function as it did without the line-of-protection in place to accommodate the flows from the storm water system design storm. Minimum facilities may also include higher storm water design standards than accommodated by the local storm water system if these higher standards are mandated by validly promulgated Federal, State or local regulations. The current standard to which the minimum facilities is to be based on is defined in the Orange County Drainage District Drainage Criteria Manual and Regulation (Ref. vi).

7. Orange County Drainage District Drainage Criteria Manual has developed separate criteria forwhat is referred to as "primary" and "secondary" drainage features. Primary drainage facilities include open channels, bridges, culverts, and enclosed drainage systems (i.e., open channel thathas been enclosed). Secondary drainage facilities include storm sewer systems, roadside ditchesand associated structures, and other facilities such as sheet flow swales, small culverts, local detention facilities, and other structures which typically serve relatively small drainage areas, as well as lot grading and drainage requirements.

8. Primary features adopt a 100-year level of protection for future primary drainage facilities. Channels shall be designed to convey 100-year peak flow rates with a minimum freeboard of 1 foot. These channels should also be analyzed using a 10-year design storm event to ensure the channel has adequate capacity to accept and convey a more frequent and more intense storm of shorter duration which could cause "flash flooding". For open channel studies involving FederalEmergency Management Agency (FEMA) submittals, the 10-year, 50-year, 100-year, and 500- year storm frequencies must be analyzed. Other criteria existing beyond these critical regulationsare within the Orange County Drainage Manual. Conversations with the local stakeholders clarified the residual flooding requirement to mean 0.0 ft rise in water surface elevation for areas inundated by the 50% CL 100-year 24-hour storm defined in NOAA Atlas 14.

9. The minimum requirement does not address a surge or "closed gate" condition. However, the intent of the feasibility design performance was to size pump stations to pass the 25-year interiorflood over the levee. The closed condition should evaluate a design to meet this performance goal under updated inputs (NOAA Atlas 14) and methods (computational modeling using HEC-HMS and HEC-RAS). Ultimately, the closed condition should be evaluated under a coincident inland flood event to a condition or event that necessitates a "closed gate" condition, including a predicted coastal flood event. This information is resolved by developing a JointProbability Analysis. The Joint Probability Analysis should determine the coupled surge/interior flood conditions and assign a frequency probability to them. A recent JPA analysis was conducted on the Adams and Cow Bayou by USACE and UCF (Ref. xi) following the FeasibilityStudy. The analysis provided return periods for compounding flood events. For the Cow Bayou,a relationship between the Cow Bayou discharge gage at the Mauriceville and surge levels at Sabine Pass Tidal Gage were developed. For Adams Bayou, due to a lack of gage data, a relationship was developed between precipitation the weather station at Orange and surge levels at the Sabine Pass Tidal Gage. The relationships were developed by investigated correlations in the data sets and applying best-fit distributions and copulas. The results are shown in the Figures1 and 2.

10. Measures to solve residual interior flooding may include larger capacity outlets, diversion structures, pressure conduits, excavated detention storage, ponding areas, pumping plants andnonstructural solutions. Residual flooding will be analyzed using risk informed analysis, which

includes delineation of multiple storm events from the 2 year to the 500 year.

11. To summarize, the Government, during design, will follow this procedure to finalize the interior drainageanalysis:
    a. Under open gate low exterior conditions, the interior design must meet the minimum design facility standard. Evaluation will be for eight flood frequency (i.e.., 2-, 5-, 10-, 25-, 50-, 100- and 500-year) events. The final system will be designed for the NOAA Atlas 14 100-year, 24-hour, 50% CL precipitation. The Joint Venture scope will be developed to address the local residual flooding requirement of 0.0 ft rise in water surface elevation by analyzing 2 alternatives; 1) an alternative that eliminates increased water level on the interior of the system and, 2) an alternative that minimizes, but may not eliminate, increased water level on the interior of the system.
    b. Under a closed gate condition for surge events, the interior drainage system including pump stations and minimum pump capacity will be designed for the greater of the minimum facility design, or a design sized for the NOAA Atlas 14 25-year 24 hour 50% CL precipitation event (as authorized in the feasibility study). As with the open condition, evaluation will be for eight flood frequencies (i.e.., 2-, 5-, 10-, 25-, 50-, 100- and 500-year) events. However, actual probability of occurrence will be assigned through a JPA analysis (to be included inthe task order if greater fidelity than *ref. xi* can be reasonably expected to be obtained). Residual flooding will be documented for each of the flood frequencies considering the JPA.

12. The point of contact for this memorandum is Robert Thomas at 409-766-3975 or email Robert.c.thomas@usace.army.mil.

Encl

TIMOTHY R. VAIL
COL, EN
Commanding

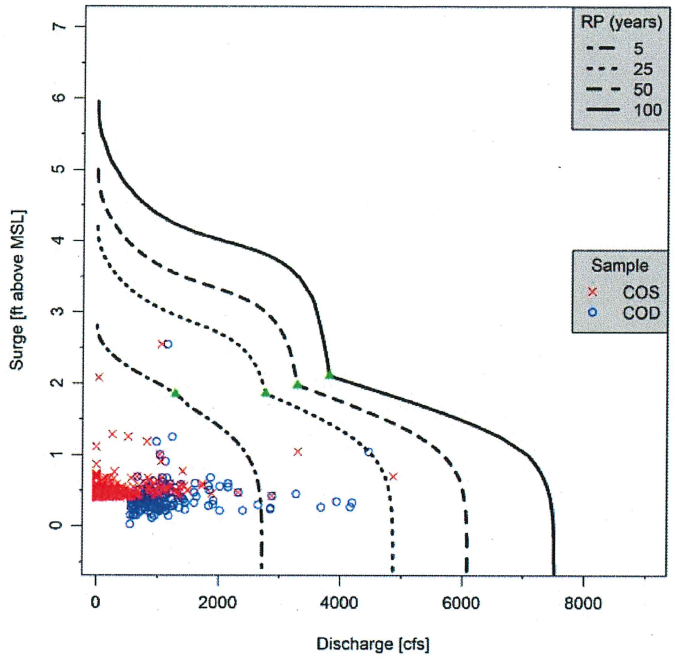


Figure 1: Cow Bayou RP for Discharge Values at the Mauriceville gage and Surge levels at the Sabine River Tidal Gare (from Figure 21 of Ref i)

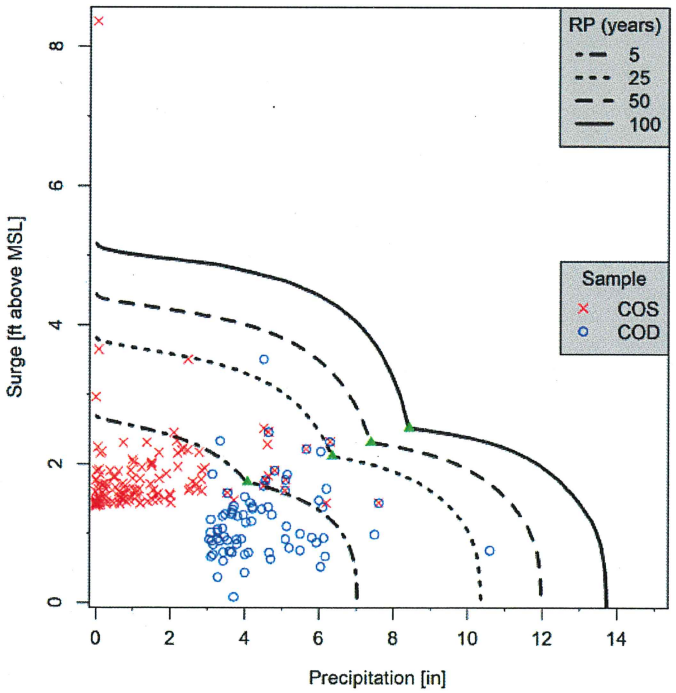


Figure 2: Compound Flood Return period for Adams Bayou with Precipitation Values at the Orange Station and Surge levels atthe Sabine River Tidal Gare (from Figure 32 of Ref i)

Sabine Pass to Galveston Bay, Texas
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Appendix C

Economic Analysis

May 2017

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1 COASTAL STORM RISK MANAGEMENT

1.1 PURPOSE

The purpose of this appendix is to describe the economic methodology, its associated assumptions, and the use of economic and engineering tools used to assess, evaluate, and recommend a plan for the Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration Feasibility Study.

1.2 INITIAL SCREENING OF ALTERNATIVES

Prior to the Alternatives Milestone Meeting, development of an initial array of alternatives from a wide range of measures for three regions covering six counties along the Texas Gulf Coast that would address coastal storm risk management and ecosystem restoration. The initial study was scoped during a planning charrette in August 2012 to comply with SMART Planning guidelines. Following the first Alternatives Milestone Meeting (AMM) in July 2013, a determination was made that a study encompassing the three-region, six-county area could not be done within the constraints of SMART Planning. Options were developed in order to minimize risk as much as possible and while still adhering to the basic tenets of SMART Planning. The Galveston District developed an option for completing a study of low to moderate risk that would cost $4.4 million and would drop the Galveston region concentrating instead on the Brazoria and Sabine regions. The study also dropped any ecosystem restoration measures and would only analyze CSRM alternatives in Brazoria, Jefferson, and Orange Counties.

The initial array of alternatives can be found in Appendix B – Plan Formulation. The final array of alternatives is shown in Table 1-1. This array was agreed to in the Alternatives Milestone Meeting (AMM) that occurred on April 9, 2014. This final array of alternative plans does not include alternatives in Galveston Bay region, nor does it include Ecosystem Restoration (ER) measures. Instead, those potential actions are to be included in future interim feasibility studies, including the ongoing Coastal Texas study. Appendix B further describes the formulation process that produced this final array.

Table 1-1. Sabine Pass to Galveston Bay, TX - Final Array of Alternatives

Alternative Number	Alt Name / Description
No Action	No Action or Future Without Project (FWOP)
S5	Sabine Inland Barrier CSRM Focus (Neches Gate/Sabine Levees/Hurricane Flood Protection)
S11	Sabine Nonstructural Alternative/ Buyouts and Lone Star-type Conservation Plan
B2	Brazoria Coastal Barrier CSRM Focus (revised)

Alternative Number	Alt Name / Description
B5	Brazoria Nonstructural Alternative/ Buyouts and Lone Star-type Conservation Plan

An IPR was conducted on May 30, 2014, to discuss the results in the analysis supporting whether the Neches Gate should be dropped from further consideration. As a result of the decision to drop the Neches Gate and as means of clarifying the nomenclature for the final array, alternatives in the final array were renamed. The Sabine Inland Barrier Alternative has been split into two parts, one addressing the new levee system in Orange and Jefferson Counties, and the other addressing improvements to the existing Port Arthur hurricane flood protection (HFP). The Brazoria Coastal Barrier Coastal Storm Risk Management (CSRM) Focus has been renamed after its primary component – Freeport and Vicinity CSRM. Non-structural plans will be evaluated for both Brazoria and Sabine regions.

- Orange-Jefferson Coastal Storm Risk Management (CSRM)
- Freeport and Vicinity CSRM
- Port Arthur and Vicinity CSRM
- Brazoria and Sabine Non-Structural

1.3 REACH DETERMINATION

The determination of reaches for the initial array of alternatives was based on the original designation of the three regions with measures and the subsequent alternatives being assigned to the appropriate region. Following the approval of the exemption from SMART Planning and the successful concurrence of the final array of alternatives following the April 2014 AMM, reaches were developed for the areas according to the final array of alternatives. This was required since a different methodology would be employed for the optimization of any new proposed levees/floodwalls and for improvements to any of the existing hurricane flood protection systems (HFP). While the initial screening of alternatives used HEC-FIA with 1 % annual chance exceedance (ACE) depth grids in conjunction with HAZUS-MH data to determine without and with-project economic damages, the analysis for evaluating the final array would incorporate a risk-based analysis in compliance with ER-1105-2-101. The following describes the reaches that were established for evaluating the final array.

1.3.1 Orange-Jefferson CSRM

The initial configuration of new levees was based on alignments from the Orange County Flood Protection Planning Study (Orange Report), completed in 2012. Refinement of the alignments was made in some areas to increase potential benefits, reduce costs, and reduce potential

environmental impacts, and to protect critical infrastructure. Without-project storm surge values were used to optimize levee heights and further refinement of the alignment for identification of the National Economic Development (NED) Plan and TSP. As part of the identification of the NED and TSP, analysis was conducted to determine levee sections that are incrementally justified. Alternatives analysis was based on utilizing the without-project surge elevations and frequencies. Without-project storm surge and waves were based on previous work by FEMA and revised to current joint probability method – optimum sampling (JPM-OS) methods to the appropriate ACE values. Figure 1-1 displays the initial configuration to be evaluated for these new levees at Jefferson and Orange Counties following the exclusion of the Neches Gate from further consideration. The system was set up with three major components based on their location. The following lists the major features.

- Orange 1 – 3
- Jefferson Main
- Beaumont A – C

The Orange component runs along the north side of the Neches River and was divided into three sections; Orange 1 on the western end that primarily protects Rose City, Orange 2 which begins just east of Rose City and ends roughly halfway between Rose City and Bridge City, and Orange 3 which encompasses the remainder of the Orange County component. Orange 1 consists of approximately 27,000 linear feet (LF) of levee and 16,500 LF of floodwall (total of 8.2 miles). Orange 2 consists of approximately 34,600 LF of levee (6.6 miles), while Orange 3 consists of a combination of 113,600 LF of levee and 29,800 LF of floodwall (total of 27 miles).

The Jefferson Main component consists of approximately 41,700 LF of levee and 16,200 LF of floodwall (11 miles). Beaumont A is combination of 3,100 LF of levee and 200 LF of floodwall (0.6 mile). Beaumont B is 2,500 LF of levee (0.5 mile) and Beaumont C is 6,800 LF of levee (1.3 mile).

1.3.2 Port Arthur and Vicinity CSRM

The draft findings of the Semi-Quantitative Risk Assessment (SQRA) for the Freeport system (to be discussed next) were applied to the plan formulation for the Port Arthur because one has not yet been done for this system. For the Port Arthur system, the detailed description of the needs is similar to what will be presented in the Freeport HFPS section. However, the Port Arthur system is different because there are no known deferred maintenance issues for the Port Arthur system at this time.

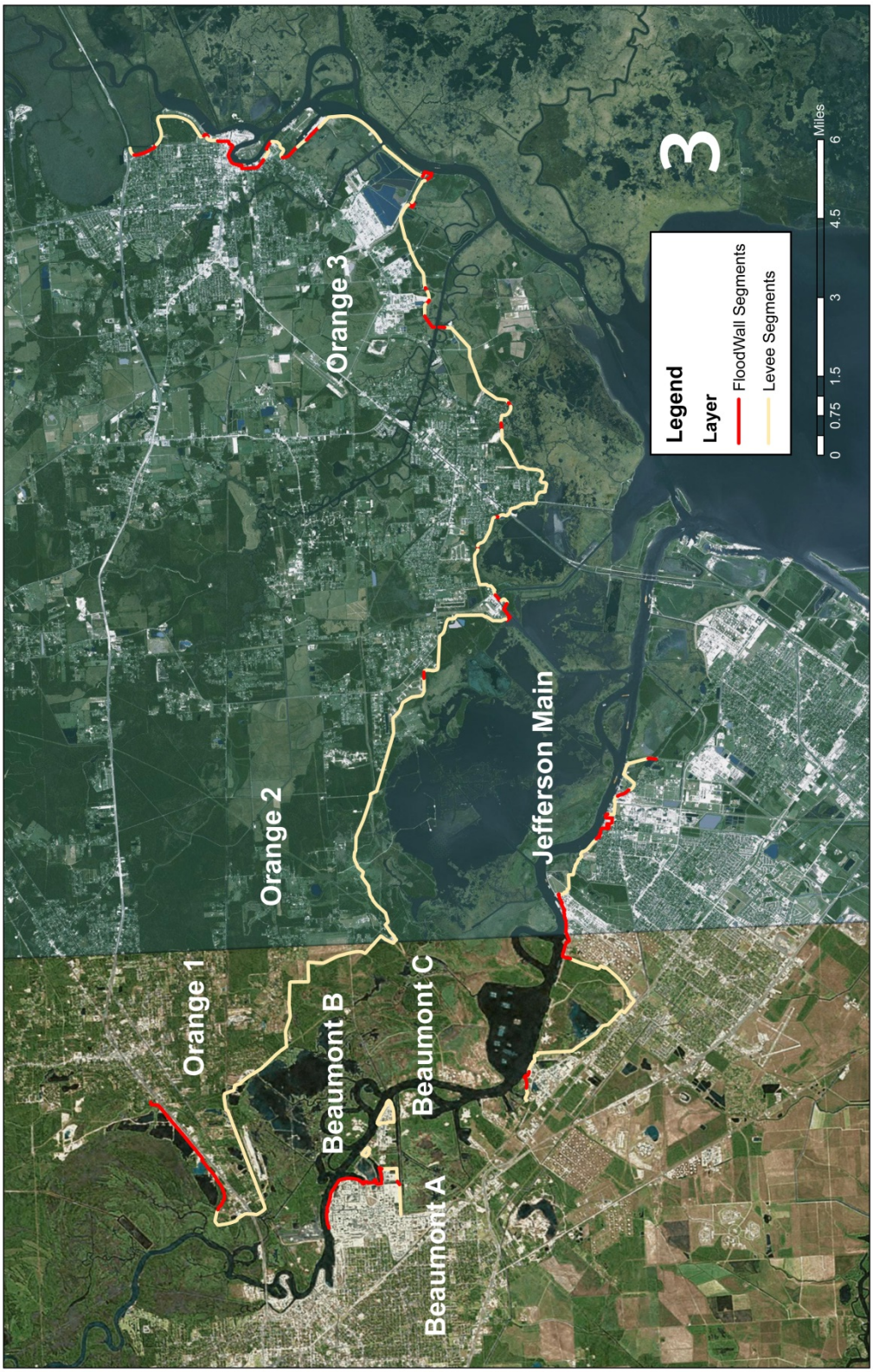

Figure 1-1. Configuration of the Orange-Jefferson CSRM

The formulation of alternatives for the Port Arthur and Vicinity CSRM began with defining reaches for the system. These were based on the failure locations identified by the levee safety program in the absence of a SQRA. Figure 1-2 displays the Port Arthur HFPS failure locations. These locations were included in formulation where improvements would positively impact the system's capacity for protection. The following lists the reaches at Port Arthur.

- Port Arthur 8feet-10feet I-Wall
- Port Arthur Closure Structure
- Port Arthur I-Wall Near Valero
- Port Arthur I-Wall Near Tank Farm

1.3.3 Freeport and Vicinity CSRM

The draft findings of the SQRA for the Freeport system show vulnerabilities primarily associated with floodwall and levee overtopping. Other performance issues identified during the SQRA were the result of deferred local sponsor maintenance, or alterations that local industrial stakeholders have constructed over time. Floodwall performance issues, at locations where the originally constructed floodwall is still in place and has been operated and maintained in an acceptable manner, are being evaluated to include stability and resiliency. Levee reaches that are non-uniform in height or otherwise susceptible to concentrated overtopping erosion during an event are being evaluated for raising or armoring to reduce the likelihood of breach.

The formulation of alternatives for the Freeport and Vicinity CSRM began with defining reaches for the system. These were based on the failure locations identified in the SQRA (Figure 1-3). These locations were then narrowed during formulation to those locations where improvements would positively impact the system's capacity for protection and to reduce any redundancies. For example, improvements to the Dow Barge Canal would negate any failures at the Dow Turning Basin. The following is the resulting list of reaches at the Freeport and Vicinity CSRM.

- Dow Barge Canal
- East Storm Levee
- Freeport Dock
- Old River at Dow Thumb
- Oyster Creek Levee
- South Storm Levee
- Tide Gate I-Wall

Figure 1-2. Port Arthur and Vicinity CSRM

Figure 1-3. Freeport and Vicinity CSRM

2 HEC-FDA ANALYSIS

Note: Sections 2.1 to 2.8 describes the HEC-FDA ANALYSIS used for alternative development, formulation, and evaluation processes that led to the identification of the TSP. The information contained herein was presented in the Sept 11, 2015 DIFR-EIS that was released for public review. Changes to the TSP have occurred since that public review which are briefly described explained in Section 2.9. The changes to the TSP resulted in the Recommended Plan presented in this final section.

2.1 ENGINEERING INPUTS

2.1.1 Stage-Probability Relationships

Water surface profiles representing stage-probability functions were imported into HEC-FDA utilizing data from Advanced Circulation model (ADCIRC) points for without-project storm surge and waves. This sub-set of 62 total storms (based on previous FEMA work and revised by ERDC using subject matter expertise for storms having the most effect on stage-frequency) was used in the revised to current JPM-OS simulation technique for the appropriate ACE values analysis. Mean water level, wave height and wave period responses were defined for each of the modeled return periods. In the absence of a Hydrologic Engineering Centers River Analysis System (HEC-RAS) stationing scheme which would also use a stage-discharge function, those ADCIRC points falling closest to the location of the levee/floodwall footprint were used to develop average ACE values for the seven events modeled by ERDC. For the existing Port Arthur and Freeport HFP systems, ADCIRC points representing average still water levels closest to the failure locations were used to quantify damages. An equivalent record length (15 years) for each study reach was used to generate a stage-probability relationship with uncertainty for the without-project and the with-project alternatives through the use of graphical analysis based on the appropriate gage data. A sensitivity analysis on the 0.1 percent modeled points found a consistent one standard deviation difference of 2.1 feet for the Freeport Region and 2.0 feet difference for the Sabine region. Stage/probability functions entered into HEC-FDA using the fifteen year period of record found the average difference for one standard deviation to be 1.64 for Jefferson, 1.8 feet for Orange, and 2.17 feet for Port Arthur. The average difference for Freeport was 3.18 feet. Increasing the period of record resulted in actual increases in the difference between the stated stage and the subsequent one standard deviation. Based on the fact that the storms ERDC used for modeling all occurred within the historical period of the last fifteen years and considering the results from analyzing the variation between data modeled by ERDC and what was entered into HEC-FDA, the fifteen year period of record is appropriate. The model used the eight stage-probability events together with the equivalent record length to define the full range of the stage-probability or stage-probability functions by interpolating between the data points. Values for the 0.999 and 0.5 percent ACE were

set at 0.25 and 1.0 feet respectively in order to make HEC-FDA operational. Table 2-1 lists these values used for each region. The ADCIRC points for the Orange-Jefferson CSRM are shown in Figure 2-1. Points for the Port Arthur CSRM are shown in Figure 2-2 and the ADCIRC points for the Freeport CSRM are in Figure 2-3.

Still water levels were used to compare the economic efficiency of the alternatives. Once the recommended plan is determined, wave run-up and overtopping will be analyzed at specific system locations in conjunction with any necessary interior drainage analysis. The horizontal and vertical datums used in the engineering inputs are referenced to North American Datum (NAD) of 1983.

Table 2-1. Average Still Water Elevations at HEC-FDA Index Point

Orange-Jefferson

Exceedance Probability/Reach	*0.1 ACE*	*0.05 ACE*	*0.02 ACE*	*0.01 ACE*	*0.005 ACE*	*0.002 ACE*	*0.001 ACE*
Orange 1	3.62	5.05	6.69	7.76	8.66	9.66	10.35
Orange 2	3.6	5.36	7.24	8.52	9.6	10.77	11.57
Orange 3	2.78	4.25	6.11	7.51	8.64	9.81	10.57
Beaumont A	2.92	4.26	6	7.25	8.47	9.73	10.51
Beaumont B	2.71	3.88	5.62	6.86	7.94	9.07	10.34
Beaumont C	3.55	5.1	6.85	8.02	9	10.1	10.85
Jefferson Main	3.08	4.63	6.31	7.49	8.47	9.51	10.22

Port Arthur

Exceedance Probability/Reach	*0.1 ACE*	*0.05 ACE*	*0.02 ACE*	*0.01 ACE*	*0.005 ACE*	*0.002 ACE*	*0.001 ACE*
8ft-10ft I-Wall	2.85	4.31	6.98	9.25	10.94	12.68	13.81
Closure Structure	3.45	5.01	6.9	8.2	9.3	10.46	11.2
I-Wall Near Valero	3.87	5.97	8.47	10.47	12.61	14.77	16.08
I-Wall Near Tank Farm	3.77	5.72	8.1	9.99	12.02	14.08	15.31

Freeport Region

Exceedance Probability/Reach	*0.1 ACE*	*0.05 ACE*	*0.02 ACE*	*0.01 ACE*	*0.005 ACE*	*0.002 ACE*	*0.001 ACE*
South Storm Levee	4.21	6.68	9.59	11.63	13.71	16.31	17.93
Old River levee at Dow Thumb	4.43	7.08	10.15	12.41	14.69	17.43	18.97
Freeport Dock	4.47	7.17	10.3	12.63	14.97	17.79	19.38
Tide Gate	4.46	7.18	10.32	12.65	15.02	17.9	19.52
East Storm Levee	5.08	7.81	11.05	13.38	15.55	17.99	19.5
Dow Barge Canal	4.6	7.46	10.82	13.28	15.76	18.55	20.12
Oyster Creek	4.44	8.49	12.21	14.63	16.62	18.77	20.19

2.1.2 Fragility Curves

Fragility curves (the relationship between water surface stage on the exterior side of the levee versus the probability of levee failure) were developed based on the use of average still water levels for damage estimates. Fragility curves for the Freeport HFP system were initially developed as a result of the Freeport SQRA and were modified slightly due to the use of average still water levels for damage estimates. A similar approach was used for the development of the curves for the Port Arthur system. These curves for the Port Arthur and Freeport systems are listed in Tables 2-2 and 2-3, respectively. These fragility curves assume that all O&M is current and will be accomplished before implementing the Recommended Plan..

Figure 2-1. ADCIRC Points Orange-Jefferson CSRM

Figure 2-2. ADCIRC Points in Port Arthur and Vicinity CSRM

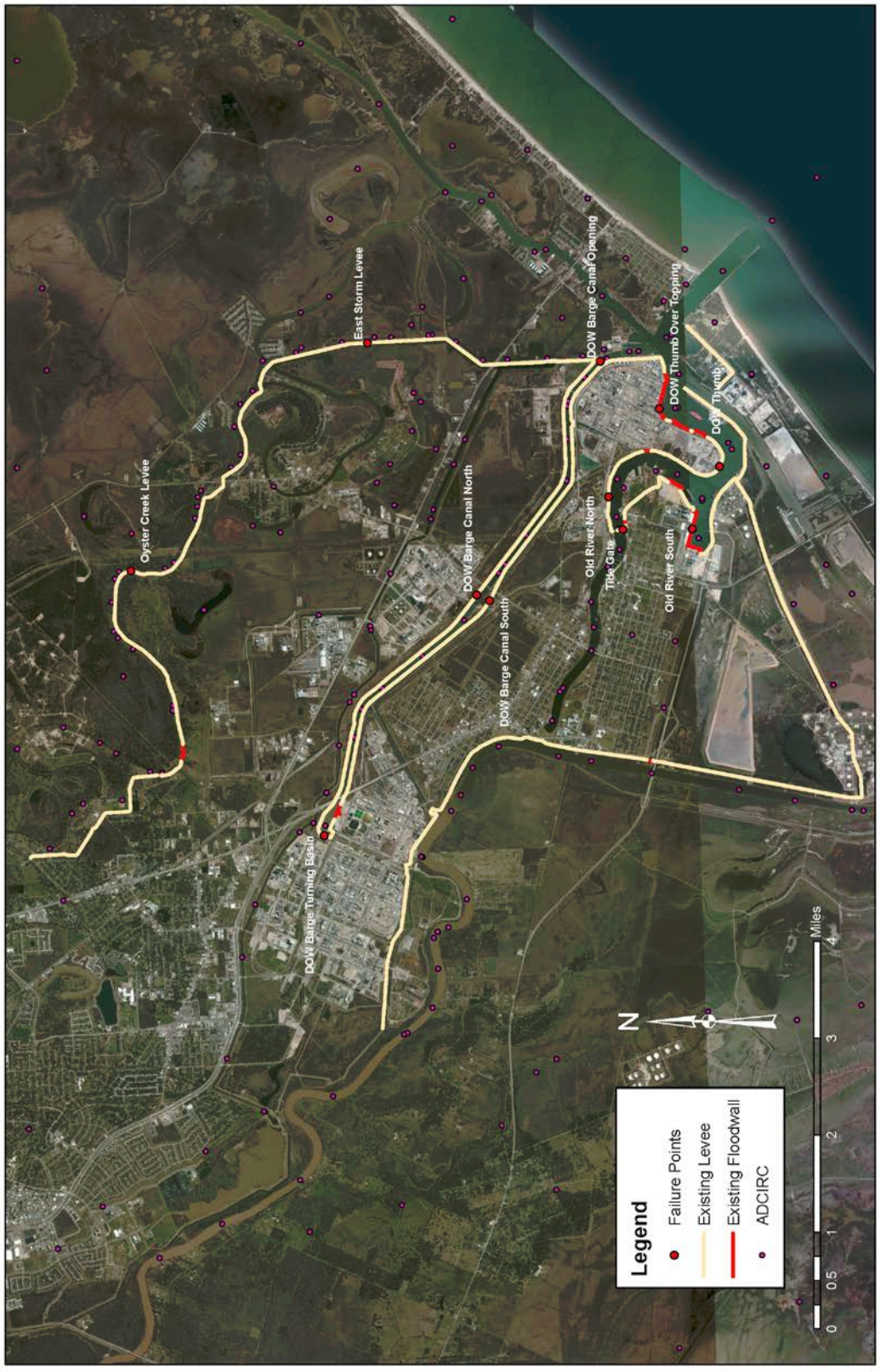

Figure 2-3. ADCIRC Points in Freeport and Vicinity CSRM

Table 2-2. Fragility Curves for Port Arthur and Vicinity CSRM

Stage	Tank Farm	8ft-10ft I-Wall	I-Wall Near Valero	Closure Structure
14	-	0.10	-	-
14.5	-	0.28	0.10	0.20
15	0.20	0.45	0.50	0.40
15.5	0.35	0.63	0.70	0.60
16	0.50	0.80	0.90	0.90
16.5	0.90	0.90	0.92	0.95
17	1.00	1.00	0.93	1.00
17.5	-	-	0.95	-
18	-	-	0.97	-
18.5	-	-	0.98	-
19	-	-	1.00	-

Table 2-3. Fragility Curves for Freeport and Vicinity CSRM

Stage	Dow Barge Canal	East Storm	Oyster Creek Levee	Freeport Dock	Tide Gate I-Wall	Old River at Dow Thumb
10.5	-	-	0.03	-	0.04	0.04
11	-	-	0.06	-	0.08	0.08
11.5	-	-	0.1	-	0.11	0.11
12	-	-	0.13	-	0.15	0.15
12.5	-	-	0.16	0.05	0.19	0.19
13	-	-	0.19	0.75	0.23	0.23
13.5	-	-	0.23	1.00	0.26	0.26
14	-	-	0.26	1.00	0.3	0.3
14.5	-	0.08	0.29	1.00	0.34	0.34
15	-	0.15	0.32	1.00	0.38	0.38
15.5	-	0.23	0.35	-	0.41	0.41
16	-	0.3	0.39	-	0.45	0.45
16.5	-	0.38	0.42	-	0.6	0.68
17	-	0.45	0.45	-	0.75	1.00
17.5	-	0.54	0.68	-	1.00	-
18	-	0.63	1.00	-	-	-
18.5	-	0.72	-	-	-	-
19	-	0.81	-	-	-	-
19.5	-	1.00	-	-	-	-
20	-	-	-	-	-	-
20.5	0.11	-	-	-	-	-
21	0.23	-	-	-	-	-
21.5	0.34	-	-	-	-	-
22	0.45	-	-	-	-	-
22.5	0.53	-	-	-	-	-
23	0.6	-	-	-	-	-

Table 2-3, continued

23.5	0.68	-	-	-	-	-
24	0.75	-	-	-	-	-
24.5	0.83	-	-	-	-	-
25	1.00	-	-	-	-	-

2.2 ECONOMIC INPUTS

2.2.1 Ground Elevations

Centroids were created for each parcel to represent the structures associated with that parcel. Ground elevations were derived from data processed using U.S. Geological Survey Digital Elevation Model (DEM) 0.05m elevation data for the appropriate Gulf Coast Counties. These data were obtained from Texas Natural Resources Information System (TNRIS). Residential structures in inland areas generally received a 0.5-foot floor correction (some areas were raised 1 to 1.5 feet) while many of the coastal areas received much higher raises as appropriate. Industrial, commercial, and public structures received floor corrections from 0 to 5 feet. The point at which damages for many high-value industrial and commercial structures is reflected in the ground elevation making floor correction was necessary. These floor corrections assumptions were verified through spot checks utilizing Google Earth and Google Street View. The horizontal and vertical datums used in the economic inputs are referenced to North American Datum (NAD) of 1983 or North American Vertical Datum (NAVD) of 1988.

2.2.2 Structure Inventory

All three study areas can be described as being relatively fully developed. As discussed under the study area demographics, Brazoria is expected to be the one county among the three that is expected to grow at a rate outpacing the State. Orange and Jefferson Counties are expected to grow at rates well below that of the State of Texas. For the purpose of this analysis, housing stock is assumed to remain relatively constant over the period of analysis. Since commercial and industrial make up a substantial amount of the structure inventory, those developments that are expected to come online with a reasonable amount of certainty and in the relatively near future are include in the inventory. The structure inventory was derived from data obtained from each of the appropriate appraisal districts for the 2015 tax appraisal year (Table 2-4). These data were adjusted to reflect a replacement cost less depreciation value. Due to tax abatements and incentives given to large industrial developers and due to the competitive nature of the petrochemical industry in the region, many high-value industrial and commercial properties are not listed on the tax appraisal rolls. In these instances, square footage values were developed from those properties that were listed on the tax rolls based on square footage values of similar structures from appraisal data. Therefore, a certain amount of uncertainty exists for these values in many cases, which could lead to an over- or underestimation of damages. Values to reflect replacement minus depreciation were

calculated using Marshall and Swift Commercial and Residential Estimator based on information contained within the appraisal district data including structure type, age, square footage, building materials, and condition on a random selection of both residential and non-residential structures on the following the TSP milestone. Samples were taken for each of the residential and non-residential damage categories based on the depth/damage function applied to the specific structures. These adjustments were then averaged and applied to the appropriate damage category. Residential structures were adjusted by 24.4 percent and non-residential structures were adjusted by 14.6 percent. Two separate structure files with a high degree of overlap were created for the system since failures would impact slightly different numbers of structures. One structure file was used for a failure at the Dow Barge Canal and another for the remaining reaches. The following tables and figures depict the structure files used in the damage analyses. Parcels representing the structures at risk for the Orange-Jefferson CSRM are in Figure 2-4, while the parcels representing the structures at risk for the Port Arthur and Freeport CSRM are in Figures 2-5, 2-6, and 2-7 respectively.

Table 2-4. Structure and Content Values of Inventoried Structures by CSRM and Type 2015 Price and Development Levels

Orange-Jefferson CSRM

Commercial	268	$109,778,000	$109,203,000	$218,981,000
Industrial	20	$1,711,063,000	$1,711,061,000	$3,422,124,000
Multi-Family	193	$23,828,000	$23,828,000	$47,656,000
Mobile	699	$10,573,000	$10,573,000	$21,146,000
Public	214	$76,324,000	$83,913,000	$160,237,000
Vehicles	16,045	$200,448,000	$0	$200,448,000
Single-Family	12,734	$1,038,476,000	$1,038,443,000	$2,076,919,000
Grand Total	30,173	$3,170,490,000	$2,977,021,000	$6,147,511,000
Commercial	893	$319,062,000	$431,769,000	$750,831,000
Industrial	22	$662,341,000	$827,820,000	$1,490,161,000
Multi-Family	226	$186,264,000	$186,264,000	$372,528,000
Public	140	$124,284,000	$136,882,000	$261,166,000
Vehicles	15,954	$167,781,000	$0	$167,781,000
Single-Family	12,662	$2,539,056,000	$2,538,915,000	$5,077,971,000
Grand Total	29,897	$3,998,788,000	$4,121,650,000	$8,120,438,000

Port Arthur and Vicinity CSRM

Category Name	Count	Structure Value	Content Value	Total

Commercial	1,152	$5,190,935,000	$8,777,567,000	$13,968,502,000
Industrial	9	$201,486,000	$338,497,000	$539,983,000
Multi-Family	269	$69,382,000	$69,382,000	$138,764,000
Public	452	$217,266,000	$228,574,000	$445,840,000
Vehicles	26,431	$350,231,000	$0	$350,231,000
Single-Family	20,977	$1,911,200,000	$1,911,068,000	$3,822,268,000
Grand Total	43,968	$7,869,963,000	$11,325,088,000	19,265,588,000

Freeport and Vicinity CSRM

Dow Barge Canal				
Category Name	**Count**	**Structure Value**	**Content Value**	**Total**
Commercial	903	$117,426,000	$156,275,000	$273,701,000
Industrial	45	$5,557,849,000	$9,339,639,000	$14,897,488,000
Multi-Family	375	$68,916,000	$69,123,000	$138,039,000
Mobile	6	$135,000	$135,000	$270,000
Public	207	$225,032,000	$248,092,000	$473,124,000
Vehicles	8,832	$185,858,000	$0	$185,858,000
Single-Family	8,826	$377,405,000	$377,572,000	$754,977,000
Grand Total	19,194	$6,532,621,000	$10,190,836,000	$16,723,457,000

Lower Reaches				
Category Name	**Count**	**Structure Value**	**Content Value**	**Total**
Commercial	244	$39,019,000	$30,565,000	$69,584,000
Industrial	5	$13,383,000	$22,406,000	$35,789,000
Multi-Family	117	$13,168,000	$13,168,000	$26,336,000
Public	76	$28,620,000	$29,784,000	$58,404,000
Vehicles	2,323	$38,847,000	$0	$38,847,000
Single-Family	1,844	$74,744,000	$74,744,000	$149,488,000
Grand Total	4,609	$207,781,000	$170,667,000	$378,448,000

2.2.3 Vehicle Inventory

The number of vehicles associated with a residence was estimated based on the average number of vehicles per residence characteristic of the study area, and the probability of their being present at the time of a flood. This value is 1.26 vehicles per residence. Values were based on the national average price of new and used vehicles as reported by the U.S. Bureau of Transportation Statistics (BTS) prices for new vehicles. The most recent price reported by BTS is $13,105. Adjusting this value based on the percent difference in median income for each county compared to the median income for the U.S., the resulting value for Orange County vehicles was set at $15,411 and $13,251 for Jefferson County. Vehicle values for Brazoria were set at $21,044.

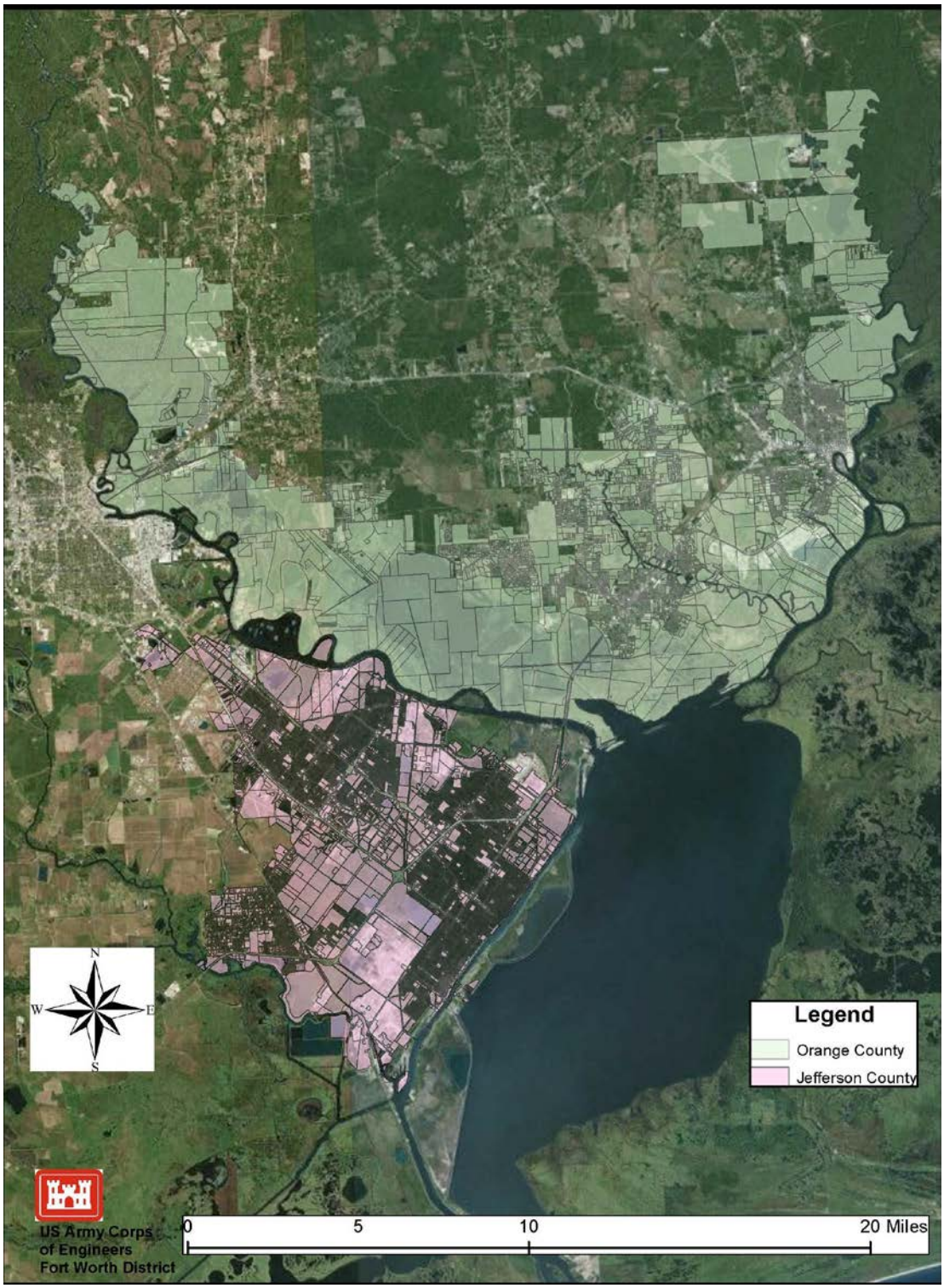

Figure 2-4. Orange-Jefferson CSRM Structures at Risk (Parcels)

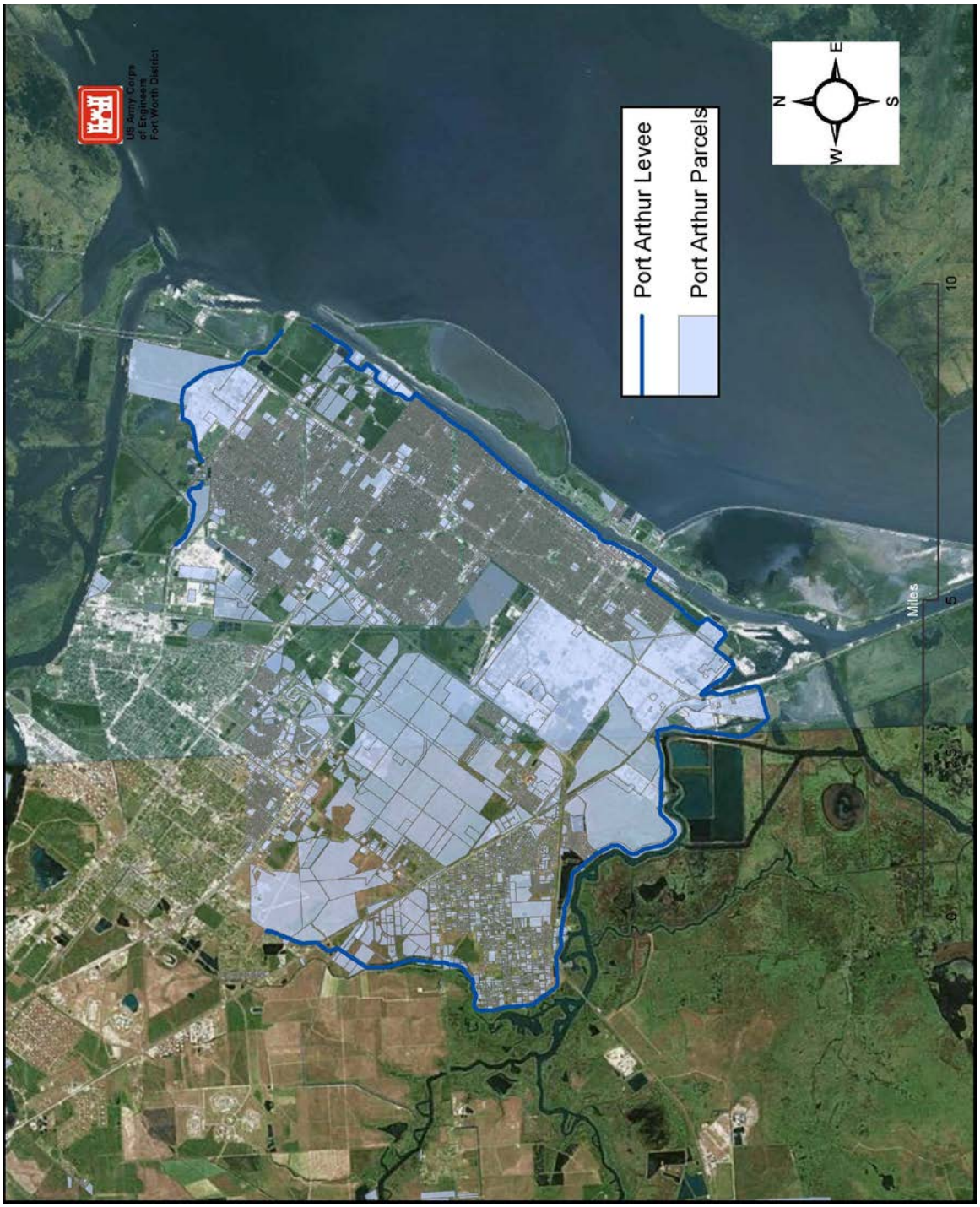

Figure 2-5. Port Arthur and Vicinity CSRM Structures at Risk

Figure 2-6. Freeport and Vicinity CSRM Structures at Risk – Dow Barge Canal Reach

Figure 2-7. Freeport and Vicinity CSRM Structures at Risk – Remaining Reaches

2.2.4 Depth-Damage Functions

Depth-damage functions were obtained from the New Orleans District from the *Lower Atchafalaya and Morganza to the Gulf, Louisiana, Feasibility Study*. These functions reflect saltwater inundation for short durations. The following table lists the functions covering the following structure types and also the content-to-structure value ratio (CSVR) along with the uncertainties associated with the structure content values and the first-floor corrections. Uncertainties assumed a normal distribution (with the exception of vehicles which assumes a triangular distribution) and were based on coefficient of variation calculations for each of the sources of uncertainty and were also based on historic knowledge gleaned from based studies in the region.

These functions were used primarily since they addressed the incidence of inundation from saltwater for short durations and because these damage functions, while not derived from locally oriented data, were more reflective current building guidelines and potential damage estimation. Graphical representations for these for these functions are depicted at the end of this appendix.

Table 2-5. Depth-Damage CSVR, and Uncertainties.

Name	Description	CSVR (%)	Struc. Unc. (%)	Cont. Unc. (%)	FF Unc. (ft.)
1STY-SLAB	One-Story Single -Family Residential Slab Foundation	71	7.5	24	0.70
2STY-PIER	Two-Story single -Family Residential Pier and Beam Foundation	50	7.5	30	0.70
AUTO	Automobiles	0	15.4-21	0	0.55
EAT	Restaurants	428	17.97	36	0.66
GROC	Grocery Stores	128	6.6	98	0.70
MOBHOM	Mobile Homes	148	7.5	69	0.79
MULT	Multi-Family Residential	23	6.6	29.38	0.53
PROF	Professional Businesses	78	8.67	193.4	0.57
PUBL	Public & Semi Public Structures	82	6.5	71.4	0.70
REPA	Repairs & Home Use	251	5.98	62.2	0.71
RETA	Retail & Personal Services	148	13.37	39.7	0.62
WARE	Warehouse & Contractor Services	372	8.72	194.6	0.57
RESEMERG	Residential Emergency Cleanup Costs	-	13	-	0.70
COMEMERG	Commercial Emergency Cleanup Costs	-	20	-	0.65
HWY	Damage to Highways	-	-	-	0.55
RAILROAD	Damage to Railroads	-	-	-	0.80
STREETS	Damage to Streets	-	-	-	0.75

2.3 FUTURE WITHOUT-PROJECT STRUCTURE AND CONTENT DAMAGES

2.3.1 Methodology Overview

The methodology employed for this economic analysis is in accordance with current principles and guidelines and standard economic practices, as outlined in the Planning Guidance Notebook – ER 1105-2-100. Economic analysis is conducted at a given price level using the current Federal discount rate and a period of analysis of 50 years. Per the Planning Guidance Notebook, flood events will be expressed in probabilistic terms rather than the classic "x-Year" event. For example, the 100-Year event will be called a 1 percent ACE (equivalent to the HEC-FDA term Annual Exceedance Probability Event). Other equivalent probabilities can be obtained by dividing 1 by the year occurrence interval; the 500-year event is 1/500 = 0.2 percent ACE, and so forth.

A risk-based analysis (RBA) procedure has been used to evaluate without-project flood damages in the study area. Guidance for conducting RBA is included in Corps Engineering Regulation 1105-2-101, Risk-Based Analysis for Evaluation of Hydrology/Hydraulics, Geotechnical Stability and Economics in Flood Damage Reduction Studies (January 3, 2006).

The guidance specifies that the derivation of expected annual flood damage must take into account the uncertainty in hydrologic, hydraulic, and economic factors. Risk and uncertainty are intrinsic in water resource planning and design. They arise from measurement errors and the inherent variability of complex physical, social and economic situations. Best estimates of key variables, factors, parameters and data components are developed, but are often based on short periods of record, small sample sizes, measurements subject to error, and innate residual variability in estimating methods. RBA explicitly and analytically incorporates these uncertainties by defining key variables in terms of probability distributions, rather than single-point estimates. The focus of RBA is to concentrate on the uncertainties of variables having the largest impact on study conclusions.

The following are the primary sources of uncertainty for coastal storm damage analysis studies along with a discussion of the uncertainties associated with each of these sources.

- Stage/Probability – Uncertainty in the stage/probability curves are addressed by utilizing graphical exceedance probability functions which sets confidence limits for discharges at each discrete exceedance probability based on the equivalent record length. Uncertainties is also addressed by assigning distributions to stage-damage functions. In the case of this

study, the equivalent record length is set at 15 years and the error for the stage-damage functions is set at 0.5 feet.

- Geo-technical Features – Fragility curves were developed for the two existing HFPSs from either completed or draft SQRAs conducted by a risk cadre in accordance to ER 110-2-1156 for various identified breach locations on each of the two systems. These curves were developed as part of the reevaluation of the initial SPRAs at each system. These curves were developed to a much higher definition than is typically done for flood-risk analysis in HEC-FDA. No uncertainties were assigned to the fragility curves themselves since HEC-FDA has no way of entering any uncertainty parameters.
- Structure Elevation – Stated earlier, USGS DEM 0.05m elevation data was obtained from TNRIS and used for ground elevations with the observed foundation elevations added to ground elevation for the first-floor elevations. Uncertainties based on calculated coefficients of variation produced first-floor errors ranging from 0.493 to 0.788 feet depending on structure type.
- Structure and Content Values – Uncertainties for structure and content values are based on calculated standard deviations by structure type. These standard deviations are expressed in terms of percentages and range anywhere from 6.5 to almost eighteen percent for structure values and range from 30 to almost 195 percent for content-to-structure ratios.
- Inundation Depth/Percent Damage – Depth/Damage functions were obtained from the New Orleans District and are based on a triangular probability density functions using minimum, maximum, and most likely estimates for the damage percentage at various stages based on the input from a panel of experts. These estimates were generated for the District's *Lower Atchafalaya and Morganza to the Gulf, Louisiana, Feasibility Study*. These curves are displayed in the back of this appendix.

The Army Corps of Engineers Hydrologic Engineering Center has developed software specifically designed for conducting risk based analysis, referred to as the HEC-FDA Program. Version 1.2.5 was used for this analysis with the exception of the final recommended plan which was run in Version 1.4. This program applies Monte Carlo simulation process, whereby the expected value of damages is determined explicitly through a numerical integration technique accounting for uncertainty in the basic parameters described above. For this analysis, the number of Monte Carlo simulations is set at 100 with the minimum and maximum number of intervals set at 20 and 30 respectively. Data requirements for the program include:

- Structure data, including structure I.D., category (single or multi-family residential, commercial, industrial, and public), stream location, ground and/or first floor elevation, structure value and content value. These data were developed in a Microsoft Excel spreadsheet and imported into the HEC-FDA program

- Hydrologic and hydraulic data, including water surface profiles and stage/probability relationships
- Depth-Damage functions

2.3.2 Future Without-Project Condition Expected Annual Damages

Estimates of Expected Annual Damages (EAD) under future without-project conditions were calculated, using the risk and uncertainty model, through integration of frequency-damage data. The future expected annual damages shown here are projected over the project life of 50 years. Table 2-6 shows a breakdown of where these damages are predicted to occur for each CSRM. Tables 2-7, 2-8, and 2-9 break down the number of structures by event in each reach of the three project areas along with the corresponding still water level for that event.

For the Orange 1, Orange 2, and Orange 3 alternative reaches, significant damages start at approximately the 1 percent ACE; the depth of flooding at the 1 percent ACE is approximately 8 feet. In the Jefferson Main alternative reach, significant damages start between the 2 percent and 1 percent ACE; the depth of flooding between the 2 percent and 1 percent ACE is approximately 6.5 feet and 7.5 feet. For the Beaumont A, Beaumont B and Beaumont C the significant damages start at the 1 percent ACE; the depth of flooding is approximately 7.5 feet.

The estimated start of damages for the Port Arthur and Vicinity alternative reaches is approximately 15 feet, which corresponds to an estimated high probability of failure of the existing HFPS based on the fragility curves. Flooding depths approximate the stage on the exterior side of the existing HFPS, and goes up to approximately 14 feet for the 0.1 percent ACE.

The estimated start of damages for the Freeport and Vicinity alternative reaches is approximately 15 feet, which corresponds to an estimated high probability of failure of the existing HFPS based on the fragility curves. Flooding depths approximate the stage on the exterior side of the existing HFPS, and goes up to approximately 19 feet for the 0.1 percent ACE.

2.4 ALTERNATIVE ANALYSIS

2.4.1 Orange-Jefferson CSRM

As agreed at the Alternative Milestone Meeting (AMM), future without-project (FWOP) damages were run with a rough order of magnitude costs to identify NED benefits. Costs representing a linear foot in both length and height for both levees and floodwalls were developed. The costs per linear foot of levee were estimated at $237.50 and floodwalls were estimated at $475.00. These costs included contingency, engineering and design, and constriction management. Real estate

costs were also included with commercial and residential estimates of $100,000 per acre, industrial at $70,000 per acre, undeveloped land at $9,000 per acre, and marsh at $750. Operation, Maintenance, Repair, Replacement and Rehabilitation

Table 2-6. Equivalent Annual Damages Future Without-Project Condition (2015 price level)
(FY 2015 Price Level/3.375 percent interest rate)

	Damage Categories							
Reach	**Commercial**	**Industrial**	**Multifamily**	**Mobile**	**Public**	**POV**	**SFR**	**Total**
Orange Jefferson CSRM								
Orange 1	$73,000	$0	$0	$7,000	$10,000	$33,000	$190,000	$312,000
Orange 2	$0	$0	$0	$4,000	$0	$10,000	$54,000	$68,000
Orange 3	$21,833,000*	$0	$93,000	$98,000	$409,000	$969,000	$6,585,000	$29,987,000
Beaumont A	$0	$6,937,000	$0	$0	$0	$0	$0	$6,937,000
Beaumont B	$0	$23,000	$0	$0	$0	$0	$0	$23,000
Beaumont C	$0	$262,000	$0	$0	$0	$0	$0	$262,000
Jefferson Main	$4,600,000	$929,000	$4,834,000	$0	$1,824,000	$536,000	$15,509,000	$28,231,000
Port Arthur CSRM								
8ft-10ft I-Wall	$19,302,000	$560,000	$83,000	$0	$368,000	$275,000	$2,824,000	$23,413,000
Closure Structure	$3,128,000	$86,000	$13,000	$0	$59,000	$44,000	$453,000	$3,784,000
I-Wall Near Valero	$50,798,000	$1,587,000	$228,000	$0	$975,000	$726,000	$7,553,000	$61,867,000
I-Wall Near Tank Farm	$31,139,000	$1,012,000	$143,000	$0	$599,000	$446,000	$4,670,000	$38,009,000
Freeport CSRM								
Dow Barge Canal	$3,070,000	$145,903,000	$884,000	$2,000	$4,815,000	$3,088,000	$8,897,000	$166,660,000
East Storm Levee	$346,000	$247,000	$99,000	$0	$233,000	$191,000	$587,000	$1,701,000
Freeport Dock	$768,000	$583,000	$217,000	$0	$549,000	$456,000	$1,387,000	$3,960,000
Old River at Dow Thumb	$489,000	$367,000	$139,000	$0	$349,000	$290,000	$882,000	$2,517,000
South Storm Levee	$52,000	$37,000	$15,000	$0	$35,000	$28,000	$87,000	$254,000
Tide Gate I-Wall	$541,000	$406,000	$154,000	$0	$387,000	$321,000	$977,000	$2,785,000
Oyster Creek	$744,000	$553,000	$211,000	$0	$526,000	$436,000	$1,329,000	$3,800,000

*Most of these commercial values are actually associated with industrial facilities. These were corrected in later analyses

Table 2-7. Structures and Damages by Event for Orange-Jefferson CSRM
(FY 2015 Price Level, $1,000)

Orange 1														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.62		5.05		6.69		7.76		8.66		9.66		10.35	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	0	$0	1	$469	1	$939	1	$1,150	1	$1,229	1	$1,288	7	$1,733
Industrial	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
MultiFamily	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Mobile	2	$24	2	$35	7	$49	7	$69	8	$74	8	$93	19	$326
Public	0	$0	0	$0	2	$49	2	$285	2	$317	2	$410	4	$765
Vehicles	0	$0	11	$139	13	$185	72	$543	81	$1,134	87	$1,251	202	$1,322
Single-Family	2	$262	14	$675	23	$1,473	82	$3,581	92	$4,818	98	$5,899	232	$9,989
Grand Total	4	$286	28	$1,318	46	$2,695	164	$5,629	184	$7,572	196	$8,942	464	$14,136

Orange 2														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.60		5.36		7.24		8.51		9.60		10.77		11.57	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	0	$0	0	$0	1	$0	1	$1	1	$1	1	$1	1	$1
Industrial	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Mobile	0	$0	0	$0	4	$61	4	$63	4	$77	11	$301	11	$317
Public	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Vehicles	0	$0	3	$31	15	$46	16	$244	18	$270	40	$277	42	$607
Single-Family	1	$3	3	$123	15	$676	17	$999	17	$1,264	35	$2,460	36	$2,906
Grand Total	1	$3	6	$154	35	$783	38	$1,307	40	$1,612	87	$3,038	90	$3,831

Orange 3														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	2.78		4.25		6.11		7.51		8.64		9.81		10.57	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.

Commercial	0	$0	3	$2,832	4	$7,667	42	$15,849	48	$22,486	51	$31,342	198	$58,526
Industrial	0	$0	1*	$52,625	1*	$139,876	6*	$505,494	6*	$800,283	6*	$1,169,796	8*	$1,572,382
MultiFamily	0	$0	3	$32	3	$72	99	$2,702	102	$4,354	111	$6,810	180	$10,380
Mobile	0	$0	20	$385	23	$565	167	$2,769	173	$2,960	185	$3,489	385	$7,415
Public	2	$0	5	$36	6	$61	70	$10,642	76	$20,067	79	$26,546	166	$48,532
Vehicles	8	$105	267	$170	319	$4,563	3,157	$5,319	3,345	$49,671	3,506	$52,245	9,180	$54,070
Single-Family	11	$772	287	$15,608	347	$27,250	3,247	$171,623	3,404	$236,983	3,621	$294,110	9,146	$591,898
Grand Total	21	$876	586	$71,686	703	$180,054	6,788	$714,399	7,154	$1,136,804	7,559	$1,584,338	19,263	$2,343,202

* Represents the number of actual parcels containing damageable structures. Parcels may contain anywhere from one to several dozen structures.

Jefferson Main														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.08		4.63		6.31		7.49		8.47		9.51		10.22	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	0	$154	20	$22,233	22	$38,014	153	$87,131	160	$138,157	164	$167,493	240	$194,754
Industrial	0	$0	0	$2	1	$684	3	$40,301	3	$53,133	3	$68,150	4	$73,108
MultiFamily	0	$488	9	$33,171	10	$61,258	31	$90,713	31	$106,705	31	$118,311	55	$126,228
Public	1	$1,945	5	$5,859	5	$7,611	22	$14,466	22	$16,132	22	$18,555	32	$21,796
Vehicles	0	$0	267	$2,273	348	$4,137	1909	$5,034	1974	$25,480	2047	$26,425	2097	$27,102
Single-Family	0	$482	290	$63,639	388	$118,128	1940	$398,790	2010	$509,002	2078	$607,949	3418	$762,789
Grand Total	1	$3,070	591	$127,178	774	$229,832	4,058	$636,436	4,200	$848,609	4,345	$1,006,883	5,846	$1,205,777

Beaumont A														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	2.92		4.26		6.00		7.25		8.47		9.73		10.51	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Industrial	0	$0	0	$0	0	$0	1	$121,360	1	$207,110	1	$273,565	2	$340,322
MultiFamily	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Public	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Grand Total	0	$0	0	$0	0	$0	1	$121,360	1	$207,110	1	$273,565	2	$340,322

Beaumont B&C														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.55		5.09		6.85		8.02		9.00		10.10		10.85	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Industrial	1	$385	1	$1,119	1	$1,584	1	$1,980	1	$3,334	1	$4,956	1	$4,956
Grand Total	1	$385	1	$1,119	1	$1,584	1	$1,980	1	$3,334	1	$4,956	1	$4,956

Table 2-8. Structures and Damages by Event for Port Arthur CSRM
(FY 2015 Price Level, $1,000)

8ft-10ft I-Wall														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	2.85		4.31		6.98		9.25		10.94		12.68		13.81	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	50	$12,673	549	$1,964,562	938	$4,551,332	956	$6,636,919	1,050	$7,946,501	1,057	$9,271,555	1,143	$9,589,158
Industrial	0	$0	4	$829	6	$2,068	7	$4,959	9	$92,393	9	$161,616	9	$194,575
MultiFamily	15	$245	119	$7,270	215	$27,158	217	$44,413	249	$55,287	252	$62,567	261	$67,713
Public	16	$2,802	189	$98,180	399	$202,523	401	$275,467	435	$311,283	437	$329,585	445	$337,484
Vehicles	939	$8,440	9,129	$24,024	12,007	$132,922	16,998	$223,811	19,478	$233,279	19,584	$258,901	20,538	$259,840
Single Family	1,197	$52,822	9,262	$486,400	16,626	$1,162,179	16,947	$1,710,962	19,378	$2,122,765	19,492	$2,395,681	20,443	$2,554,936
Grand Total	2,217	$76,981	19,252	$2,581,265	30,191	$6,078,183	35,526	$8,896,531	40,599	$10,761,508	40,831	$12,479,904	42,839	$13,003,707

I-Wall Near Valero														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.87		5.97		8.47		10.47		12.61		14.77		16.08	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	535	$1,657,699	637	$3,713,146	950	$6,101,335	1,050	$7,593,867	1,056	$9,240,514	1,144	$9,746,974	1,146	$9,866,247
Industrial	4	$586	5	$1,548	7	$4,147	9	$77,050	9	$159,439	9	$236,777	9	$272,478
MultiFamily	117	$5,718	124	$16,147	217	$39,439	247	$52,984	252	$62,231	261	$73,521	262	$81,171
Public	188	$70,949	315	$140,451	400	$256,829	435	$303,194	437	$328,916	445	$346,872	446	$355,637
Vehicles	8,981	$14,225	9,682	$124,636	16,888	$222,467	19,450	$226,172	19,581	$258,840	20,611	$272,392	20,680	$273,417
Single Family	9,126	$405,918	11,610	$750,402	16,838	$1,586,428	19,348	$2,024,867	19,484	$2,388,605	20,500	$2,677,915	20,582	$2,787,254
Grand Total	18,951	$2,155,095	22,373	$4,746,330	35,300	$8,210,645	40,539	$10,278,134	40,819	$12,438,545	42,970	$13,354,449	43,125	$13,636,204

Closure Structure														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.45		5.01		6.90		8.20		9.30		10.46		11.20	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	518	$581,099	562	$2,774,267	938	$4,483,372	948	$5,869,655	956	$6,672,436	1,050	$7,585,987	1,050	$8,139,242
Industrial	3	$193	5	$1,171	6	$2,005	7	$3,841	7	$5,002	9	$76,772	9	$105,511
MultiFamily	114	$2,160	119	$10,779	215	$25,754	216	$37,614	217	$44,713	247	$52,927	250	$56,575
Public	186	$25,192	192	$107,413	399	$195,062	400	$253,214	401	$276,761	435	$303,013	435	$314,034
Vehicles	1,269	$11,581	9,340	$120,815	11,949	$129,070	16,847	$221,849	17,003	$223,898	19,449	$226,151	19,495	$249,305
Single Family	9,002	$180,669	9,493	$582,269	16,611	$1,110,282	16,793	$1,513,337	16,955	$1,718,340	19,348	$2,023,183	19,392	$2,163,792
Grand Total	11,092	$800,894	19,711	$3,596,716	30,118	$5,945,545	35,211	$7,899,510	35,539	$8,941,150	40,538	$10,268,032	40,631	$11,028,459

Tank Farm														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	3.77		5.72		8.10		9.99		12.02		14.08		15.31	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	531	$1,567,287	572	$3,449,143	946	$5,752,432	1,050	$7,210,661	1,052	$8,861,927	1,143	$9,616,172	1,144	$9,850,235
Industrial	3	$526	5	$1,463	7	$3,743	9	$27,351	9	$140,998	9	$206,100	9	$251,925
MultiFamily	116	$5,323	123	$14,395	216	$36,807	246	$48,984	250	$59,898	261	$68,935	261	$77,359
Public	188	$63,836	208	$129,134	400	$251,210	434	$290,941	436	$322,815	445	$339,456	446	$352,879
Vehicles	1,580	$13,552	9,585	$123,602	16,836	$221,595	17,114	$225,227	19,549	$258,373	20,564	$260,222	20,636	$272,876
Single Family	9,102	$382,410	9,749	$707,373	16,781	$1,479,447	19,319	$1,852,854	19,445	$2,324,783	20,464	$2,590,490	20,530	$2,738,829
Grand Total	11,520	$2,032,933	20,242	$4,425,110	35,186	$7,745,233	38,172	$9,656,019	40,741	$11,968,794	42,886	$13,081,375	43,026	$13,544,104

Table 2-9. Structures and Damages by Event for Freeport CSRM
(FY 2015 Price Level, $1,000)

Dow Barge Canal														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.60		7.46		10.82		13.28		15.76		18.55		20.12	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	242	$23,201	284	$46,104	288	$60,385	289	$64,029	289	$65,606	289	$65,967	289	$65,999
Industrial	11	$42,981	13	$768,756	14	$1,859,908	14	$2,567,500	14	$3,217,335	14	$3,381,792	14	$3,382,450
MultiFamily	111	$7,963	115	$14,013	115	$16,356	115	$19,079	115	$23,671	115	$24,386	115	$24,403
Mobile	0	$0	0	$0	2	$64	2	$67	2	$75	2	$75	2	$75
Public	59	$45,413	62	$72,465	65	$85,390	65	$92,968	65	$98,788	65	$99,975	65	$99,987
Vehicles	2,342	$41,345	2,566	$50,260	2,605	$54,308	2,606	$54,830	2,607	$54,851	2,607	$54,851	2,607	$54,851
Single Family	2,348	$103,013	2,571	$142,945	2,605	$166,359	2,607	$173,954	2,607	$177,031	2,607	$177,640	2,607	$177,729
Grand Total	5,113	$263,916	5,611	$1,094,543	5,694	$2,242,770	5,698	$2,972,427	5,699	$3,637,358	5,699	$3,804,687	5,699	$3,805,494

Tide Gate														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.46		7.18		10.32		12.65		15.02		17.90		19.52	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	206	$8,898	238	$23,406	242	$34,982	242	$41,374	243	$46,185	243	$48,705	243	$49,016
Industrial	3	$6,132	3	$12,524	3	$19,426	3	$24,018	3	$25,000	3	$25,107	3	$25,107
MultiFamily	114	$6,788	117	$11,531	117	$13,472	117	$15,579	117	$18,985	117	$20,344	117	$20,380
Public	62	$25,274	68	$38,183	70	$43,033	70	$45,463	70	$46,474	70	$46,860	70	$46,941
Vehicles	1,656	$26,696	1,816	$35,404	1,832	$38,378	1,845	$38,819	1,846	$38,840	1,846	$38,840	1,846	$38,840
Single Family	1,657	$70,032	1,816	$94,166	1,843	$109,968	1,843	$115,628	1,844	$117,760	1,844	$118,518	1,844	$118,682
Grand Total	3,698	$143,821	4,058	$215,214	4,107	$259,258	4,120	$280,881	4,123	$293,244	4,123	$298,373	4,123	$298,966

East Storm Levee														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	5.08		7.81		11.05		13.38		15.55		17.99		19.50	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	209	$11,308	238	$26,277	242	$37,159	243	$42,674	243	$47,499	243	$48,748	243	$49,016
Industrial	3	$8,117	3	$14,301	3	$20,825	3	$24,693	3	$25,107	3	$25,107	3	$25,107
MultiFamily	115	$8,049	117	$12,212	117	$13,887	117	$16,277	117	$19,717	117	$20,348	117	$20,380
Public	65	$27,074	68	$39,777	70	$43,669	70	$45,664	70	$46,713	70	$46,871	70	$46,941
Vehicles	1,661	$34,822	1,820	$36,906	1,845	$38,622	1,845	$38,819	1,846	$38,840	1,846	$38,840	1,846	$38,840
Single Family	1,666	$78,199	1,819	$98,338	1,843	$111,773	1,844	$116,192	1,844	$118,109	1,844	$118,539	1,844	$118,682
Grand Total	3,719	$167,569	4,065	$227,811	4,120	$265,935	4,122	$284,319	4,123	$295,985	4,123	$298,452	4,123	$298,966

Oyster Creek														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.44		8.49		12.21		14.63		16.62		18.77		20.19	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	206	$8,803	239	$29,591	242	$40,613	243	$45,125	243	$48,497	243	$49,014	243	$49,019
Industrial	3	$6,065	3	$16,061	3	$23,456	3	$24,839	3	$25,107	3	$25,107	3	$25,107
MultiFamily	114	$6,746	117	$12,772	117	$15,171	117	$18,098	117	$20,185	117	$20,373	117	$20,383
Public	62	$25,222	68	$41,228	70	$45,271	70	$46,168	70	$46,777	70	$46,939	70	$46,941
Vehicles	1,656	$26,183	1,821	$38,266	1,845	$38,819	1,846	$38,840	1,846	$38,840	1,846	$38,840	1,846	$38,840
Single Family	1,657	$69,814	1,820	$103,564	1,843	$115,232	1,844	$117,425	1,844	$118,263	1,844	$118,663	1,844	$118,708
Grand Total	3,698	$142,833	4,068	$241,481	4,120	$278,561	4,123	$290,496	4,123	$297,669	4,123	$298,936	4,123	$298,998

Old River at Dow														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.43		7.08		10.15		12.41		14.69		17.43		18.97	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	206	$8,755	238	$22,955	242	$34,546	242	$40,986	243	$45,288	243	$48,539	243	$49,015
Industrial	3	$6,031	3	$12,331	3	$19,097	3	$23,760	3	$24,863	3	$25,107	3	$25,107
MultiFamily	114	$6,725	117	$11,406	117	$13,377	117	$15,346	117	$18,235	117	$20,322	117	$20,375
Public	62	$25,195	68	$37,976	70	$42,839	70	$45,396	70	$46,217	70	$46,821	70	$46,941
Vehicles	1,656	$25,927	1,814	$35,376	1,828	$38,361	1,845	$38,819	1,846	$38,840	1,846	$38,840	1,846	$38,840
Single Family	1,657	$69,706	1,816	$93,721	1,843	$109,306	1,843	$115,488	1,844	$117,485	1,844	$118,440	1,844	$118,672
Grand Total	3,698	$142,339	4,056	$213,765	4,103	$257,526	4,120	$279,794	4,123	$290,930	4,123	$298,069	4,123	$298,949

South Storm Levee														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.21		6.68		9.59		11.63		13.71		16.31		17.93	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	205	$7,965	238	$18,251	241	$33,086	242	$39,164	243	$43,275	243	$48,253	243	$48,719
Industrial	3	$5,396	3	$11,560	3	$18,009	3	$22,091	3	$24,693	3	$25,107	3	$25,107
MultiFamily	114	$6,284	117	$10,879	117	$13,106	117	$14,553	117	$16,658	117	$20,122	117	$20,345
Public	62	$23,852	68	$36,779	69	$42,203	70	$44,466	70	$45,756	70	$46,754	70	$46,864
Vehicles	1,654	$21,887	1,686	$35,277	1,824	$38,320	1,845	$38,819	1,846	$38,819	1,846	$38,840	1,846	$38,840
Single Family	1,657	$66,993	1,814	$89,695	1,825	$107,559	1,843	$113,575	1,844	$116,633	1,844	$118,222	1,844	$118,525
Grand Total	3,695	$132,376	3,926	$202,441	4,079	$252,283	4,120	$272,668	4,123	$285,834	4,123	$297,298	4,123	$298,399

Freeport Dock														
Event (ACE)	**0.1**		**0.05**		**0.02**		**0.01**		**0.005**		**0.002**		**0.001**	
Elevation (MSL)	4.47		7.17		10.30		12.63		14.97		17.79		19.38	
Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	206	8,946	238	23,361	242	34,931	242	41,340	243	46,050	243	48,652	243	49,016
Industrial	3	6,166	3	12,504	3	19,388	3	23,996	3	24,979	3	25,107	3	25,107
MultiFamily	114	6,809	117	11,519	117	13,461	117	15,560	117	18,872	117	20,338	117	20,379
Public	62	25,301	68	38,162	70	43,011	70	45,457	70	46,437	70	46,848	70	46,941
Vehicles	1,656	26,952	1,816	35,402	1,831	38,376	1,845	38,819	1,846	38,840	1,846	38,840	1,846	38,840
Single Family	1,657	70,141	1,816	94,122	1,843	109,907	1,843	115,615	1,844	117,725	1,844	118,498	1,844	118,679
Grand Total	3,698	144,315	4,058	215,069	4,106	259,072	4,120	280,787	4,123	292,902	4,123	298,282	4,123	298,962

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Table 2-10. Economic Performance of Orange-Jefferson CSRM
(FY 2015 Price Level/3.375 percent interest rate)

	Orange 1 New Levee					Orange 2 New Levee					Orange 3 New Levee			
	10 - Foot	**11 - Foot**	**12 - Foot**	**13 - Foot**		**10 - Foot**	**11 - Foot**	**12 - Foot**	**13 - Foot**		**10 - Foot**	**11 - Foot**	**12 - Foot**	**13 - Foot**
INVESTMENT														
Estimated First Cost	$32,300,000	$46,617,000	$60,935,000	$75,252,000		$32,870,000	$41,088,000	$49,305,000	$57,523,000		$205,338,000	$246,811,000	$288,284,000	$329,762,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%		3.375%	3.375%	3.375%	3.375%		3.375%	3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50		50	50	50	50		50	50	50	50
Construction Period (months)	36	36	36	36		36	36	36	36		36	36	36	36
Interest During Construction	$1,647,000	$2,377,000	$3,108,000	$3,838,000		$1,676,000	$2,095,000	$2,515,000	$2,934,000		$10,472,000	$12,587,000	$14,702,000	$16,818,000
Investment Cost	$33,947,000	$48,995,000	$64,043,000	$79,090,000		$34,546,000	$43,183,000	$51,820,000	$60,456,000		$215,810,000	$259,398,000	$302,986,000	$346,580,000
Interest	$1,146,000	$1,654,000	$2,161,000	$2,669,000		$1,166,000	$1,457,000	$1,749,000	$2,040,000		$7,284,000	$8,755,000	$10,226,000	$11,697,000
Amortization	$269,000	$388,000	$508,000	$627,000		$274,000	$342,000	$411,000	$479,000		$1,711,000	$2,056,000	$2,402,000	$2,747,000
OMRR&R ($/year)*											$4,084,000	$4,084,000	$4,084,000	$4,084,000
TOTAL ANNUAL COSTS	**$1,415,000**	**$2,042,000**	**$2,669,000**	**$3,296,000**		**$1,440,000**	**$1,800,000**	**$2,160,000**	**$2,520,000**		**$13,078,000**	**$14,895,000**	**$16,711,000**	**$18,528,000**
Without Project EAD	$312,000	$312,000	$312,000	$312,000		$68,000	$68,000	$68,000	$68,000		$29,987,000	$29,987,000	$29,987,000	$29,987,000
Residual EAD	$62,000	$39,000	$23,000	$12,000		$32,000	$26,000	$20,000	$16,000		$8,171,000	$5,242,000	$3,044,000	$1,654,000
Storm Reduction Benefits	$250,000	$273,000	$289,000	$300,000		$36,000	$42,000	$48,000	$52,000		$21,816,000	$24,745,000	$26,943,000	$28,333,000
TOTAL BENEFITS	**$250,000**	**$273,000**	**$289,000**	**$300,000**		**$36,000**	**$42,000**	**$48,000**	**$52,000**		$21,816,000	$24,745,000	$26,943,000	$28,333,000
NET BENEFITS	**($1,165,000)**	**($1,769,000)**	**($2,380,000)**	**($2,996,000)**		**($1,404,000)**	**($1,757,000)**	**($2,112,000)**	**($2,467,000)**		**$8,738,000**	**$9,851,000**	**$10,232,000**	**$9,804,000**
BENEFIT-COST RATIO	**0.2**	**0.1**	**0.1**	**0.1**		**0.0**	**0.0**	**0.0**	**0.0**		**1.7**	**1.7**	**1.6**	**1.5**

***For Mitigation**

Table 2-10. Economic Performance of Orange-Jefferson CSRM (continued)
(FY 2015 Price Level/3.375 percent interest rate)

	Beaumont A New Levee					Beaumont B New Levee					Beaumont C New Levee		
	11 - Foot	**12 - Foot**	**13 - Foot**	**14 - Foot**		**11 - Foot**	**12 - Foot**	**13 - Foot**	**14 - Foot**		**11 - Foot**	**12 - Foot**	**13 - Foot**
INVESTMENT													
Estimated First Cost	$62,661,000	$70,202,000	$77,743,000	$85,284,000		$1,695,000	$2,295,000	$2,895,000	$3,494,000		$15,793,000	$16,078,000	$19,007,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%		3.375%	3.375%	3.375%	3.375%		3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50		50	50	50	50		50	50	50
Construction Period (months)	36	36	36	36		36	36	36	36		36	36	36
Interest During Construction	$3,196,000	$3,580,000	$3,965,000	$4,349,000		$86,000	$117,000	$148,000	$178,000		$805,000	$820,000	$969,000
Investment Cost	$65,857,000	$73,782,000	$81,708,000	$89,634,000		$1,782,000	$2,412,000	$3,042,000	$3,673,000		$16,599,000	$16,898,000	$19,977,000
Interest	$2,223,000	$2,490,000	$2,758,000	$3,025,000		$60,000	$81,000	$103,000	$124,000		$560,000	$570,000	$674,000
Amortization	$522,000	$585,000	$648,000	$711,000		$14,000	$19,000	$24,000	$29,000		$132,000	$134,000	$158,000
TOTAL ANNUAL COSTS	**$2,745,000**	**$3,075,000**	**$3,405,000**	**$3,736,000**		**$74,000**	**$101,000**	**$127,000**	**$153,000**		**$692,000**	**$704,000**	**$833,000**
Without Project EAD	$6,937,000	$6,937,000	$6,937,000	$6,937,000		$23,000	$23,000	$23,000	$23,000		$262,000	$262,000	$262,000
Residual EAD	$1,449,000	$870,000	$494,000	$259,000		$7,000	$4,000	$3,000	$1,000		$12,000	$7,000	$4,000
Storm Reduction Benefits	$5,488,000	$6,067,000	$6,442,000	$6,677,000		$17,000	$19,000	$21,000	$22,000		$249,000	$255,000	$258,000
TOTAL BENEFITS	**$5,488,000**	**$6,067,000**	**$6,442,000**	**$6,677,000**		**$17,000**	**$19,000**	**$21,000**	**$22,000**		**$249,000**	**$255,000**	**$258,000**
NET BENEFITS	**$2,743,000**	**$2,992,000**	**$3,037,000**	**$2,942,000**		**($58,000)**	**($82,000)**	**($106,000)**	**($131,000)**		**($442,000)**	**($449,000)**	**($574,000)**
BENEFIT-COST RATIO	**2.0**	**2.0**	**1.9**	**1.8**		**0.2**	**0.2**	**0.2**	**0.1**		**0.4**	**0.4**	**0.3**

Table 2-10. Economic Performance of Orange-Jefferson CSRM (continued)
(FY 2015 Price Level/3.375 percent interest rate)

	Jefferson Main New Levee			
	10 - Foot	**11 - Foot**	**12 - Foot**	**13 - Foot**
INVESTMENT				
Estimated First Cost	$46,948,000	$65,726,000	$87,674,000	$104,747,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50
Construction Period (months)	36	36	36	36
Interest During Construction	$2,394,000	$3,352,000	$4,471,000	$5,342,000
Investment Cost	$49,342,000	$69,078,000	$92,145,000	$110,089,000
Interest	$1,665,000	$2,331,000	$3,110,000	$3,715,000
Amortization	$391,000	$548,000	$730,000	$873,000
OMRR&R ($/year)*	$371,000	$371,000	$371,000	$371,000
TOTAL ANNUAL COSTS	**$2,428,000**	**$3,250,000**	**$4,212,000**	**$4,960,000**
Without Project EAD	$28,231,000	$28,231,000	$28,231,000	$28,231,000
Residual EAD	$4,207,000	$2,520,000	$1,440,000	$776,000
Flood Reduction Benefits	$24,025,000	$25,711,000	$26,791,000	$27,456,000
TOTAL BENEFITS	**$24,025,000**	**$25,711,000**	**$26,791,000**	**$27,456,000**
NET BENEFITS	**$21,597,000**	**$22,461,000**	**$22,580,000**	**$22,496,000**
BENEFIT-COST RATIO	**9.9**	**7.9**	**6.4**	**5.5**

* For Mitigation

(OMRR&R) (with the exception of mitigation) was not taken into account, since these are expected to be proportional among alternatives and would not impact the ranking of alternatives. Mitigation was estimated using the Wetlands Value Assessment Model (WVA), and preliminary wetland mitigation costs were developed for use in plan comparison. These costs were based on compensation for a loss of 85.2 Average Annual Habitat Units (AAHUs) from forested wetlands and 181.7 AAHUs from coastal wetlands and applied to only the Orange 3 and Jefferson Main sections, since Beaumont B and C were already not economically viable, and to Beaumont A because they were small. The same costs were applied to all analyzed levee heights and did not vary. Since the alignment may change as a result of public, technical, and policy review, conceptual mitigation plans and preliminary cost estimates were developed to support TSP plan comparison and selection. The primary determinant in differentiating benefits is the scale of the levee being proposed along with the associated cost for that levee/floodwall height.

It should be noted that the initial evaluations of economic performance, as depicted in Tables up through 2-20, did not incorporate relative sea level change (RSLC). Subsequent analyses will

incorporate a number of changed conditions as the analysis progressed through the study including changes in interest rates, increases and other changes in costs and price levels of structure inventories, addressing the potential for repetitive damages, and the inclusion of additional damage categories. The changes in conditions of the analysis are documented in the appropriate sections of this economics appendix.

Table 2-10 displays the economic evaluation for a range of levee/floodwall heights modifications based on the beginning at 10 feet mean sea level (MSL) up to 13 feet MSL NAVD88. They show the economic performance of the Orange 1, 2, and 3 with new levees and the economic performance of Jefferson Main with new levee as well as Beaumont A, B, and C with new levees. All are calculated at a FY 2015 price level and interest rate.

Based on the information provided in the preceding tables the alternative with the highest net benefits for the Orange-Jefferson CSRM is a levee/floodwall at a height of 12 feet at Orange 3 with Orange 1 and 2 being removed from further consideration. For Beaumont, B and C are removed from consideration and the alternative with the highest net benefits for this area is a 13-foot levee/floodwall at Beaumont A. At Jefferson Main, the alternative with the highest net benefits is a 12-foot levee/floodwall. Residual economic damages in the reaches where an alternative is considered range from $1.7 to $8.1 million in Orange 3. At Beaumont A, annual residual economic damages run from $0.3 to $1.5 million. For the Jefferson Main reach, residual economic damages run from $0.8 to $4.2 million annually.

While both of the 12-foot raises at Orange 3 and Jefferson Main produce higher net benefits than the 11-foot raises, ER-1105-2-100 states “Where two cost-effective plans produce no significantly different levels of net benefits, the less costly plan is to be the NED plan, even though the level of outputs may be less” (Appendix G, pp. G-7 to G-8). The same scenario exists for the 13-foot Raise at Beaumont A versus the 12-foot raise. Based on this guidance, the 11-foot raise at Orange 3 and Jefferson Main and the 12-foot raise at Beaumont A are included as part of the TSP.

2.4.2 Port Arthur and Vicinity CSRM

Just as with the alternative selection with the Freeport CSRM and the Orange-Jefferson CSRM, FWOP damages will have rough order of magnitude costs to identify the NED. Parametric costs were estimated for the first-added resiliency features. The same costs per linear foot both length and height for both levees and floodwalls used for Orange-Jefferson were used for the next added 1- and 2-foot raises to the system. No environmental impacts were identified, and no mitigation costs were included in the comparison. The primary determinant in differentiating benefits lies in the without project damages which is based on the fragility curve at each potential failure location. Additional determinants include the raise of the levee being proposed along with the associated

costs associated with those required features, allowing for the removal of the fragility curve in the analysis and the costs for the increases in the levee/floodwall height.

Just as with the Freeport system, costs for any modifications above these resiliency and raise options begin to escalate significantly since reconstruction would be required for providing additional protection from these features. These additional costs include highway raises, gravity structures, closure structure replacement, replacement of I-wall, and additional pump stations, which are not incrementally justified.

The following tables display the economic evaluation for a range of alternatives beginning with "No Fail" resiliency measures (meaning that the levee/floodwall will not fail prior to overtopping) followed by raises to each reach. All are calculated at a FY 2015 price level and interest rate.

Based on the information provided in Table 2-11, the NED components for the Port Arthur and Vicinity CSRM are generally a "No Fail, One-Foot Raise" for the system. Net benefits for each reach range from $2.9 million to $50.7 million. Residual economic damages for the Port Arthur CSRM range from $3.3 to $10.0 million for 8-foot to10-foot I-Wall, $0.2 to $1.0 million at the Closure Structure, $7.1 to $16.3 million at the I-Wall near Valero, and $10.9 to $25.1 million at the Tank Farm.

2.4.3 Freeport and Vicinity CSRM

Just as with the alternative selection for the Orange-Jefferson CSRM, FWOP damages will have rough order of magnitude costs to identify NED benefits. The same costs per linear foot both length and height for both levees and floodwalls used for Orange-Jefferson were used for the next added 1- and 2-foot raises to the system. No environmental impacts were identified, and no mitigation costs were included in the comparison.

Costs for any modifications above these resiliency and raise options begin to escalate significantly since reconstruction would be required for providing additional protection from these features. These additional costs include features such as high performance turf reinforcement mats, replacement of the Tide gate, gravity structures, intake structures, and rebuilding the dock and floodwalls, which are not incrementally justified.

Table 2-11 displays the economic evaluation for a range of alternatives beginning with "No Fail" resiliency measures followed by raises to each reach. All are evaluated at a FY 2015 price level and interest rate. Just as with the Port Arthur CSRM, the primary determinant in differentiating benefits lies in the without-project damages, which is based on the fragility curve at each potential

failure location. Additional determinants include the raise of the levee being proposed along with the associated costs associated with those required features, allowing for the removal of the fragility curve in the analysis and the costs for the increases in the levee/floodwall height.

Table 2-11. Economic Performance of Port Arthur and Vicinity CSRM
(FY 2015 Price Level/3.375 percent interest rate)

	8ft-10ft I-Wall Raise			Closure Structure Raise			I-Wall Raise Near Valero			I-Wall Raise Near Tank Farm		
	No Fail	1-Foot Raise	2 -Foot Raise	No Fail	1- Foot Raise	2-Foot Raise	No Fail	1-Foot Raise	2-Foot Raise	No Fail	1-Foot Raise	2-Foot Raise
INVESTMENT												
Estimated First Cost	$3,330,000	$8,915,000	$66,744,000	$3,804,000	$10,654,000	$22,822,000	$7,655,000	$8,948,000	$312,523,000	$2,756,000	$4,627,000	$188,878,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50	50	50	50	50	50	50	50	50
Construction Period (months)	36	36	36	36	36	36	36	36	36	36	36	36
Interest During Construction	$170,000	$455,000	$3,404,000	$194,000	$543,000	$1,164,000	$390,000	$456,000	$15,938,000	$141,000	$236,000	$9,633,000
Investment Cost	$3,500,000	$9,370,000	$70,148,000	$3,998,000	$11,197,000	$23,986,000	$8,045,000	$9,404,000	$328,461,000	$2,897,000	$4,863,000	$198,511,000
Interest	$118,000	$316,000	$2,367,000	$135,000	$378,000	$810,000	$272,000	$317,000	$11,086,000	$98,000	$164,000	$6,700,000
Amortization	$28,000	$74,000	$556,000	$32,000	$89,000	$190,000	$64,000	$75,000	$2,604,000	$23,000	$39,000	$1,574,000
TOTAL ANNUAL COSTS	**$146,000**	**$391,000**	**$2,924,000**	**$167,000**	**$467,000**	**$1,000,000**	**$335,000**	**$392,000**	**$13,689,000**	**$121,000**	**$203,000**	**$8,273,000**
Without Project EAD	$23,413,000	$23,413,000	$23,413,000	$3,784,000	$3,784,000	$3,784,000	$61,867,000	$61,867,000	$61,867,000	$38,009,000	$38,009,000	$38,009,000
Residual EAD	$9,962,000	$5,730,000	$3,274,000	$995,000	$408,000	$156,000	$16,379,000	$10,813,000	$7,101,000	$25,130,000	$16,874,000	$10,893,000
Flood Reduction Benefits	$13,451,000	$17,683,000	$20,138,000	$2,788,000	$3,375,000	$3,628,000	$45,488,000	$51,054,000	$54,766,000	$12,879,000	$21,135,000	$27,116,000
TOTAL BENEFITS	**$13,451,000**	**$17,683,000**	**$20,138,000**	**$2,788,000**	**$3,375,000**	**$3,628,000**	**$45,488,000**	**$51,054,000**	**$54,766,000**	**$12,879,000**	**$21,135,000**	**$27,116,000**
NET BENEFITS	**$13,305,000**	**$17,292,000**	**$17,215,000**	**$2,622,000**	**$2,908,000**	**$2,628,000**	**$45,153,000**	**$50,662,000**	**$41,076,000**	**$12,758,000**	**$20,932,000**	**$18,843,000**
BENEFIT-COST RATIO	**92.1**	**45.2**	**6.9**	**16.7**	**7.2**	**3.6**	**135.8**	**130.2**	**4.0**	**106.4**	**104.1**	**3.3**

Table 2-12. Economic Performance of Freeport and Vicinity CSRM
(FY 2015 Price Level/3.375 percent interest rate)

	Dow Barge Canal Protection		Oyster Creek Levee Raise				East Storm Levee Raise				Freeport Dock Floodwall Raise		
	No Fail - Closure Structure		No Fail	1-Foot Raise	2 Foot Raise		No Fail	1-Foot Raise	2- Foot Raise		Partial Fail	No Fail	1-Foot Raise
INVESTMENT													
Estimated First Cost	$130,000,000		$1,663,000	$4,869,000	$54,244,000		$3,415,000	$6,530,000	$26,402,000		$1,500,000	$2,850,000	$150,000,000
Annual Interest Rate	3.375%		3.375%	3.375%	3.375%		3.375%	3.375%	3.375%		3.375%	3.375%	3.375%
Project Life (years)	50		50	50	50		50	50	50		50	50	50
Construction Period (months)	36		36	36	36		36	36	36		36	36	36
Interest During Construction	$6,630,000		$85,000	$248,000	$2,766,000		$174,000	$333,000	$1,346,000		$76,000	$145,000	$7,650,000
Investment Cost	$136,630,000		$1,748,000	$5,117,000	$57,010,000		$3,590,000	$6,863,000	$27,748,000		$1,576,000	$2,995,000	$157,650,000
Interest	$4,611,000		$59,000	$173,000	$1,924,000		$121,000	$232,000	$937,000		$53,000	$101,000	$5,321,000
Amortization	$1,083,000		$14,000	$41,000	$452,000		$28,000	$54,000	$220,000		$12,000	$24,000	$1,250,000
TOTAL ANNUAL COSTS	**$5,694,000**		**$73,000**	**$213,000**	**$2,376,000**		**$150,000**	**$286,000**	**$1,156,000**		**$66,000**	**$125,000**	**$6,570,000**
Without Project EAD	$166,660,000		$3,800,000	$3,800,000	$3,800,000		$1,701,000	$1,701,000	$1,701,000		$3,960,000	$3,960,000	$3,960,000
Residual EAD	$47,052,000		$1,717,000	$1,272,000	$933,000		$782,000	$581,000	$425,000		$3,771,000	$1,742,000	$1,333,000
Storm Reduction Benefits	$119,608,000		$2,083,000	$2,527,000	$2,866,000		$919,000	$1,121,000	$1,276,000		$189,000	$2,218,000	$2,627,000
TOTAL BENEFITS	**$119,608,000**		**$2,083,000**	**$2,527,000**	**$2,866,000**		**$919,000**	**$1,121,000**	**$1,276,000**		**$189,000**	**$2,218,000**	**$2,627,000**
NET BENEFITS	**$113,914,000**		**$2,010,000**	**$2,314,000**	**$490,000**		**$769,000**	**$835,000**	**$120,000**		**$123,000**	**$2,093,000**	**($3,944,000)**
BENEFIT-COST RATIO	**21.0**		**28.5**	**11.9**	**1.2**		**6.1**	**3.9**	**1.1**		**2.9**	**17.7**	**0.4**

Table 2-12. Economic Performance of Freeport and Vicinity CSRM (continued)
(FY 2015 Price Level/3.375 percent interest rate)

	Old River Levee Raise at Dow Thumb				South Storm Levee Raise			Tide Gate I-Wall Raise		
	No Fail	1-Foot Raise	2- Foot Raise		1-Foot Raise	2- Foot Raise		No Fail	1-Foot Raise	2- Foot Raise
INVESTMENT										
Estimated First Cost	$7,581,000	$8,294,000	$92,088,000		$3,325,000	$6,650,000		$1,720,000	$3,800,000	$35,644,000
Annual Interest Rate	3.375%	3.375%	3.375%		3.375%	3.375%		3.375%	3.375%	3.375%
Project Life (years)	50	50	50		50	50		50	50	50
Construction Period (months)	36	36	36		36	36		36	36	36
Interest During Construction	$387,000	$423,000	$4,696,000		$170,000	$339,000		$88,000	$194,000	$1,818,000
Investment Cost	$7,968,000	$8,717,000	$96,784,000		$3,495,000	$6,989,000		$1,808,000	$3,994,000	$37,462,000
Interest	$269,000	$294,000	$3,266,000		$118,000	$236,000		$61,000	$135,000	$1,264,000
Amortization	$63,000	$69,000	$767,000		$28,000	$55,000		$14,000	$32,000	$297,000
TOTAL ANNUAL COSTS	**$332,000**	**$363,000**	**$4,034,000**		**$146,000**	**$291,000**		**$75,000**	**$166,000**	**$1,561,000**
Without Project EAD	$2,517,000	$2,517,000	$2,517,000		$254,000	$254,000		$2,785,000	$2,785,000	$2,785,000
Residual EAD	$1,215,000	$913,000	$679,000		$182,000	$127,000		$1,184,000	$897,000	$675,000
Storm Reduction Benefits	$1,302,000	$1,604,000	$1,838,000		$72,000	$127,000		$1,601,000	$1,888,000	$2,110,000
TOTAL BENEFITS	**$1,302,000**	**$1,604,000**	**$1,838,000**		**$72,000**	**$127,000**		**$1,601,000**	**$1,888,000**	**$2,110,000**
NET BENEFITS	**$969,000**	**$1,241,000**	**($2,196,000)**		**($74,000)**	**($164,000)**		**$1,526,000**	**$1,721,000**	**$549,000**
BENEFIT-COST RATIO	**3.9**	**4.4**	**0.5**		**0.5**	**0.4**		**21.4**	**11.4**	**1.4**

Based on the information provided in the preceding table, the NED components for the Freeport and Vicinity CSRM are generally a "No Fail, One-Foot Raise" for the system. The exception is a "No Fail" closure structure at the Dow Barge Canal and a "No Fail" floodwall at Freeport Dock. No further consideration is given to the South Storm Levee, since neither of the two potential raises analyzed is economically justified. A "no fail" alternative was not analyzed, since this levee was not expected to fail prior to overtopping and it also has the highest crest elevation of 21 feet MSL. Residual economic damages are $47.1 million at the Dow Barge Canal, range from $0.9 to 1.7 million at the Oyster Creek Levee, range from $0.4 to $0.8 million at the East Storm Levee, $1.3 to $3.8 at Freeport Dock, $0.7 to $1.2 million at Old River Levee at the Dow thumb, and $0.7 to $1.2 million at the Tide Gate I-Wall.

2.4.4 Brazoria and Sabine Non-Structural

2.4.4.1 Non-Structural Measures

The following describes the non-structural measures considered to reduce the risk of flooding in the study area.

2.4.4.1.1 Floodplain Management

Floodplain management is most effective in controlling future development of the floodplain, thereby assuring that the existing flood problems do not become worse. However, floodplain management cannot, by itself, significantly alleviate existing flooding conditions within a highly urbanized floodplain. The technique of controlled land use is particularly helpful in planning for future development, but is of limited use in highly developed areas.

Effective regulation of the floodplain is dependent on developing enforceable ordinances to ensure that floodplain uses are compatible with the flood hazard. Several means of regulation are available, including zoning ordinances, subdivision regulations, and building codes. Zoning regulations require prudent use and development of the floodplain to prevent excessive property damage, expenditure of public funds, inconvenience, and most importantly, loss of life due to flooding. Subdivision regulations guide the division of large land parcels into smaller lots and requires proof of compliance with other regulations and ordinances. A subdivision ordinance with special reference to flood hazards would require installation of adequate drainage facilities, prohibit encroachment in floodway areas, require the placement of critical streets and utilities above a selected flood elevation, and require that building lots be filled or structures be elevated above a selected flood elevation.

Floodplain management is the most effective means to control future development of the floodplain, and ensure that existing flood problems do not worsen. This alternative did not require

further consideration because the municipalities participate in the National Flood Insurance Program.

2.4.4.1.2 Flood Forecast and Warning Systems

Flood forecasting and warning systems involves the determination of imminent flooding, implementation of a plan to warn the public, and organization of assistance in the evacuation of persons and some personal property. Notification of impending flooding can be accomplished by radio, siren, individual notification, or by elaborate remote sensor devices. Some type of flood warning and emergency evacuation effort should be a part of any FRM plan. These measures normally serve to reduce the hazards to life and damage to portable personal property.

Broad warnings as storm systems develop are coordinated through various agencies, such as the National Weather Service, which provides reports to the essential print and electronic media outlets. The National Weather Service generally releases tropical storm watches 48 hours in advance of any anticipated onset of tropical storm force winds. Since outside preparedness activities become difficult once winds reach tropical storm force, warnings are issued 36 hours in advance of any anticipated onset of tropical storm force winds. The Texas Department of Public Safety's Division of Emergency Management coordinates the state emergency management program, as well as implementing the Texas Emergency Tracking Network (ETN), part of a comprehensive data-management system that provides real-time information before, during, and after a disaster. Orange and Jefferson Counties are members of the Southeast Texas Alerting Network, which can alert users of emergencies, plant operations, traffic, and weather information or other outreach from emergency management. Both counties as well as Brazoria, also have emergency management departments that engage their respective cities, including specific evacuation plans and processes.

2.4.4.1.3 Flood Proofing

Damage to existing structures can be reduced or eliminated through various flood proofing measures. These methods protect damageable property by preventing flood waters from entering the building and/or reaching the contents inside. Flood proofing is most easily applied to new construction, and is most applicable where flooding is of short duration, low velocity, and infrequent occurrence of shallow depths. Flood proofing is usually employed in locations where structural flood protection is not feasible or where collective action is not possible. Typically, flood proofing techniques include water-tight door and window seals, raising of structures, installation of check valves on gravity-flow water and sewer lines, incorporation of seepage controls, and sandbagging of door openings during emergency situations. Due to the relatively large number of structures and the depth of flooding, this measure was not given further consideration.

2.4.4.1.4 Raising Structures in Place

One method of flood proofing involves raising the structures at their existing site. This plan is most applicable where a limited number of structures are receiving a large portion of the total flood damages along a given reach. Structure raising in Port Arthur and Freeport CSRM project areas would be ancillary to the improvement to existing levees/floodwalls system. Since a large portion of the total flood damages were already being addressed by the levee system the structure raising in Port Arthur and Freeport CSRM were removed from consideration. In the other areas the opportunities for structure raising was limited. Most structure would have to be raised several feet off the ground, which then would result in additional problems, such as access concerns, and increased wind damage during storm events. Based on these findings, a raise-in-place plan was determined to be not consistent with the goals and objectives of the project

2.4.4.1.5 Structure Relocation

Plans for structure relocation would involve moving the existing structures to a more non-flood-prone site. The practicality of this measure depends on the frequency of flooding, the value of the property, its importance to the community, and the need for land use areas that are more compatible with floodplain constraints. Relocation of the structures subject to catastrophic flood events within the existing systems to provide additional protection in the event of levee overtopping would be an impractical and potentially cost prohibitive solution. In areas without existing risk reduction systems it was determined that structure relocations were also not consistent with the goals and objectives of the project. Relocation of residential structures would be detrimental to community cohesion in the area. Many of the local industries employ local residents in the area. Due to the large flat floodplain, implementing structure relocations would place residents over an hour's drive away from their work place. Also many of the local communities rely on direct access to waterways to support the good and service in the area. Removing structures would have significant impacts on the local communities ability to provide services if structures would be relocated. Based on these findings, relocation was not considered any further.

2.4.4.1.6 Permanent Evacuation

Evacuation involves the acquisition and removal or demolition of frequently flooded structures from the floodplain. One advantage of floodplain evacuation is it generally provides high marginal benefits, because targeted structures are those being damaged at the most frequent events. Floodplain evacuation can also expand open space and enhance natural and beneficial uses and facilitate the secondary use of newly vacated land. Similar to the relocation measure, evacuation to provide additional protection can be impractical and potentially cost prohibitive. One area was analyzed for the potential for additional risk reduction due to it not receiving and flood risk benefits

from the proposed levee alignments at the Orange-Jefferson CSRM. An examination of the existing damages determined that there were limited opportunities for large scale reductions in damages with permanent structure evacuations due to the fact that there are limited damages to the residential structures associated with the Orange 3 project area. Only 15 percent of the total without equivalent annual damages are to residential structures. 65 percent of the damages in Orange 3 are to the industrial damage category, which are not conducive permanent structure evacuations. As stated above many of these local industries are dependent on the local waterways and transportation corridors.

In addition there would be OSE concerns with leaving local communities exposed while trying to only address industrial damages. Developing risk reduction systems (i.e. levees and floodwalls) for only the industrial areas could potentially induce stages in the local communities. Even with if structure relocations were included (i.e. flood proofing and raising), the area would still face detrimental flooding depths, limiting their ability to recover post storm events in the industrial areas. Based on these findings, permanent structure evacuations was not considered any further.

2.4.4.1.7 Ancillary Permanent Evacuation

Surveys of aerial imagery for the three counties were done to look for the potential for buyouts. Buyouts would be ancillary to the implementation of new levees/floodwalls in Orange and Jefferson Counties and to the enhancement of features in the Freeport and Port Arthur systems. Buyout opportunities in Brazoria are virtually non-existent and very limited in both Orange and Jefferson Counties. Several structures in Jefferson have the potential for being bought out. All of these structures, however, are commercial and buying out these structures is very unlikely to be the economically viable. Figure 2-8 shows the potential for buyouts in Orange County. There are approximately 20 residential structures that could be potentially economically viable and are currently being evaluated. While some of the parcels appeared to have no structures located on them, inspection of county appraisal records in many cases showed improvements on many of these parcels. Visual inspections of aerial photos and further inspection of the appraisal records showed that many of these were agricultural improvements and would therefore not be subject to any permanent evacuation analysis. A quantitative analysis was conducted to determine the viability of any proposed evacuation. Water surface profiles and stage/probability functions were developed from the ADCIRC points that intersected those parcels of interest and imported into HEC-FDA along with depth-damage functions and structure files representing these structures of interest and evaluated. The original list of 20 structures was whittled down to six. Four of these structures were in the 2 percent ACE, with the other two being in the 0.05 percent ACE. Without-project EADs were estimated for these structures which totaled $8,700. Costs for buying out these structures were low-balled to include merely the appraised value of the structure plus $10,000 to demolish the structure. Annual costs for evacuating all six were $21,700, creating net benefits of

-$13,000. Buying only the four in the 2 percent ACE produced net benefits of -$8,600. Based on this analysis, any potential buyouts to be included in the TSP are eliminated. The results of the analysis are captured in Table 2-13.

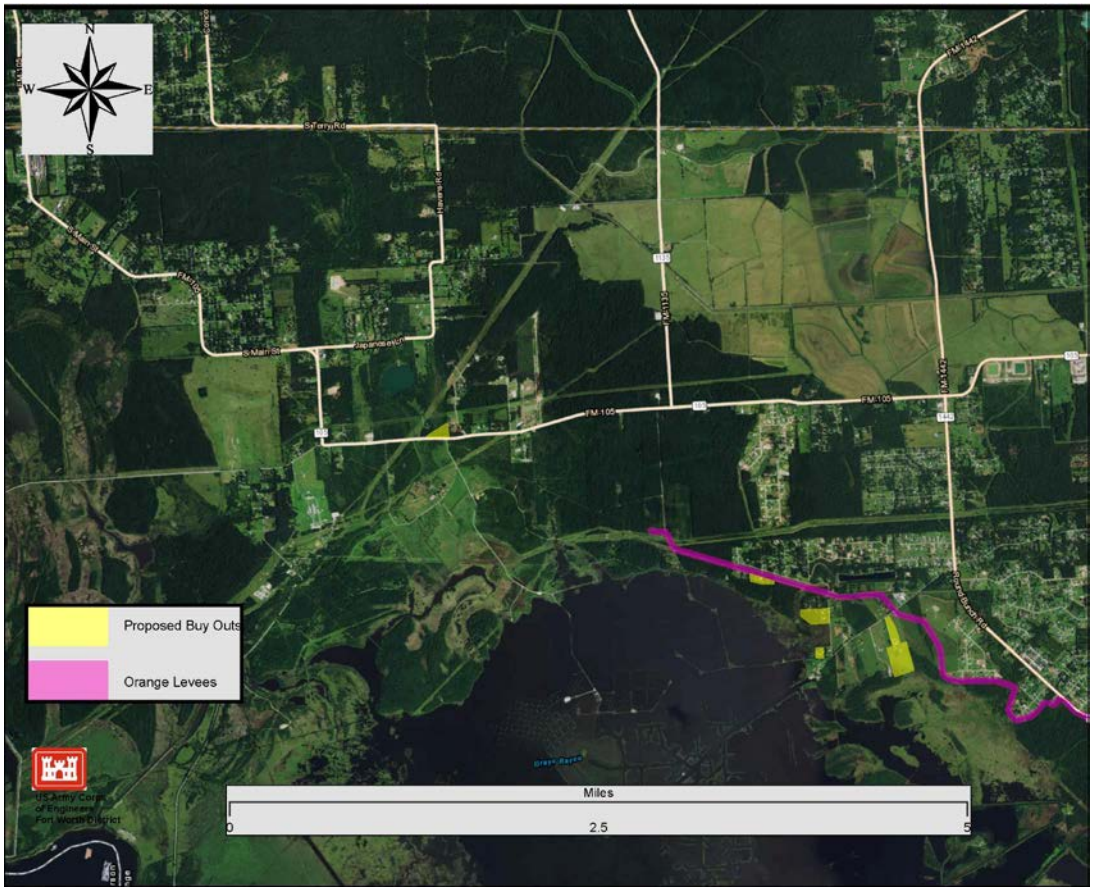


Figure 2-8. Potential Orange County Buyouts

Table 2-13. Non-structural Analysis

	0.02 to 0.01 % ACE Buyout	Total Buyout
INVESTMENT		
Estimated First Cost	$396,400	$511,900
Annual Interest Rate	3.375%	3.375%
Project Life (years)	50	50
Construction Period (months)	12	12
Interest During Construction	$7,200	$9,300
Investment Cost	$403,600	$521,200
Interest	$13,600	$17,600
Amortization	$3,200	$4,100
TOTAL ANNUAL COSTS	**$16,800**	**$21,700**
Without Project EAD	$8,700	$8,700

	0.02 to 0.01 % ACE Buyout	Total Buyout
Residual EAD	$500	$0
Flood Reduction Benefits	$8,200	$8,700
TOTAL BENEFITS	**$8,200**	**$8,700**
NET BENEFITS	**($8,600)**	**($13,000)**
BENEFIT-COST RATIO	**0.5**	**0.4**

2.5 ADJACENT IMPACTS/INDUCED FLOODING

The ERDC surge model ran a full “maximum” footprint for the Freeport, Port Arthur, Jefferson, and Orange levees and showed induced impacts could reach levels of nearly 1 to 1.5 feet in some areas along the Neches River and the Orange County levee. The levees on the Neches River that could induce damages in this area have been removed from the recommended plan eliminating these impacts. The existing systems of Port Arthur and Freeport showed negligible impacts during a 100-year event. Some induced flooding was at Orange 3 but these sections of levee were removed from the final selected plan and impacts in this area were negligible. This drastically reduces adjacent impacts caused by the proposed levee.

Adjacent impacts to the south and southeast of the levee were also analyzed and determined that most areas impacted are vacant areas of grasslands and wetlands. Surge modeling data for a 1 percent ACE were calculated and mapped for differences between the with-project and without-project water surface elevations which showed adjacent impacts to be minimal. The map showing adjacent impacts for a 1 percent ACE can be found in Engineering Map D-11 near the end of the Engineering Appendix. Most values are negligible with the exception of the areas previously mentioned with impacts measuring from 0.02 to 0.05 feet.

2.6 RISK PERFORMANCE OF PROPOSED ACTIONS

Engineer Regulation 1105-2-101 states that risk and uncertainty are intrinsic in water resources planning and design with inaccuracy in all measured or estimated values in project planning and design to some varying degrees. Invariably, the true values are different from any single, point values presently used in project formulation, evaluation, and design. The best estimates of key variables, factors, parameters, and data components in the planning and design of flood damage reduction projects are considered the "most likely" values. These values, however, are frequently based on small periods of record, sample sizes, and measurements that are subject to error.

The ER also states that risk analyses “captures and quantifies the extent of the risk and uncertainty in the various planning and design components of an investment project. The total effect of uncertainty on the project's design and economic viability can be examined and conscious decisions made reflecting an explicit tradeoff between risks and costs. Risk analysis can be used to compare plans in terms of the variability of their physical performance, economic success, and residual risks.”

Engineer Manual 1110-2-1619 identifies a number of potential sources of uncertainty. These include (1) uncertainty about future hydrologic events such as steam flow and rainfall; (2) uncertainty arising from the use of simplified models to describe complex hydraulic phenomena;

(3) economic and social uncertainty, particularly the relationship between depth and inundation damage, inaccuracies in estimates of structure values and locations, and the predictability of how the public will respond to a flood; and (4) uncertainty about structural and geotechnical performance of water-control measures when subjected to rare storm events.

Uncertainty in the hydrology and hydraulics is addressed primarily by utilizing graphical exceedance probability functions which sets confidence limits for discharges at each discrete exceedance probability based on the equivalent record length. Uncertainty for hydrology and hydraulics is also addressed by assigning distributions to stage-damage functions. In the case of this study, the equivalent record length is set at 15 years and the error for the stage-damage functions is set at 0.5 feet. No fragility curves are assigned to the proposed levee, since flooding durations are short and it would be overtopped regardless for those rare events. Economic uncertainties are similarly managed with normal distributions with standard errors assigned to the depth-damage functions and by defining uncertainty parameters for first floor corrections, structure and content values. Uncertainties are further handled by changing, if necessary, the number of Monte Carlo simulations and by varying the range of ordinates in the aggregated stage-damage functions.

HEC-FDA produces project performance reports to display the hydrologic and hydraulic performance of a particular plan. Table 2-14 shows the project performance for the proposed levee raise. For the future without-project condition, the expected annual exceedance probability (AEP) for the Orange Jefferson CSRM ranges from 2.8 percent for Beaumont A to 11.4 percent for Jefferson Main. For the Port Arthur CSRM, the expected AEP ranges from 0.0 percent for the Closure Structure to 0.2 percent for the I-Wall near Valero. For the Freeport CSRM, the expected AEP ranges from 0.1 percent for the South Storm Levee to 6.0 percent for the Dow Barge Canal. Implementing the TSP reduces these expected AEP substantially.

The lack of any long-term performance of the existing conditions at the Orange-Jefferson CSRM shows that the area where levees/floodwalls are being proposed has anywhere from a 76 percent to 99.8 chance of being inundated in 50 years and a virtually zero chance of not being exceeded by the 0.2 percent event. The long-term risk for the existing Port Arthur system is somewhat less, but the long-term risk for the existing Freeport system has a wide variation from the different potential failure locations ranging from 3.7 percent for the South Storm Levee to 95.5 percent for the Dow Barge Canal. Long-term risk is reduced considerably for all three CSRMs with implementation of the TSP. The non-exceedance probability for the 0.2 percent ACE also increases substantially with the implementation of the TSP. These results are also all listed in Table 2-14.

2.6.1 Performance of the Tentatively Selected Plan under Relative Sea Level Change

An analysis was conducted in order to assess how the TSP might perform under various relative sea level change (RSLC) scenarios. As part of this analysis, H&H determined what engineering guidance would need to be for levee/floodwall heights based on EC 1110-2-6067 and CFR 2000 Title 44 and additional guidance for the three CSRMs to address the projected 50-year RSLC under low, intermediate, and high scenarios. These required heights were averaged so that they could be compared to the recommended heights specified in the TSP. Table 2-15 shows these required engineering heights in the left side of the table, while the right side specifies the recommend heights based on the criteria to determine the TSP and the difference between the two sets of criteria. Under the three RSLC scenarios, the TSP addresses relative sea level change well for the Port Arthur and Freeport CSRMs. The Orange-Jefferson CSRM shows deficiencies ranging from 2.24 to 4.77 feet. These results are also in Table 2-15.

Table 2-14. Project Performance for the Tentatively Selected Plan

Without Project

		Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange -Jefferson CSRM										
Orange 3	7.7%	55.0%	86.4%	98.2%	85.4%	11.4%	2.1%	0.5%	0.2%	0.0%
Beaumont A	2.8%	24.8%	50.9%	75.9%	100.0%	77.7%	35.3%	13.0%	3.8%	1.8%
Jefferson Main	11.4%	70.2%	95.1%	99.8%	55.7%	5.3%	1.3%	0.4%	0.2%	0.0%
Port Arthur CSRM										
8ft-10ft I-Wall	0.1%	0.5%	1.2%	2.4%	100.0%	100.0%	100.0%	99.8%	94.2%	82.7%
Closure Structure	0.0%	0.0%	0.1%	0.1%	100.0%	100.0%	100.0%	100.0%	99.5%	98.0%
I-Wall Near Valero	0.2%	2.3%	6.8%	11.0%	100.0%	100.0%	99.9%	97.1%	75.4%	55.9%
I-Wall Near Tank Farm	0.1%	1.1%	2.7%	5.2%	100.0%	100.0%	100.0%	99.3%	87.2%	70.7%
Freeport CSRM										
Dow Barge Canal	6.0%	46.3%	78.9%	95.5%	83.6%	59.4%	43.1%	27.2%	12.3%	6.9%
East Storm Levee	0.5%	4.7%	11.3%	21.3%	100.0%	99.9%	97.1%	84.8%	59.2%	42.4%
Freeport Dock	1.2%	10.9%	25.1%	43.8%	100.0%	99.1%	84.2%	52.7%	21.6%	11.3%
Old River at Dow Thumb	0.7%	7.1%	16.8%	30.8%	100.0%	98.9%	91.8%	75.9%	46.4%	29.3%
South Storm Levee	0.1%	0.7%	2.2%	3.7%	100.0%	100.0%	100.0%	100.0%	97.7%	89.4%
Tide Gate I-Wall	0.8%	7.4%	17.5%	32.0%	100.0%	98.7%	91.0%	74.5%	44.9%	27.8%
Oyster Creek	0.6%	6.2%	14.9%	27.5%	100.0%	99.8%	94.2%	76.1%	49.7%	34.8%

Table 2-14. Project Performance for the Tentatively Selected Plan (continued)

With Project

		Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange -Jefferson CSRM										
Orange 3 New Levee (11-Foot)	0.2%	1.7%	1.7%	4.1%	100.0%	100.0%	100.0%	98.8%	87.0%	72.5%
Beaumont A New Levee (12-Foot)	0.1%	0.8%	2.1%	4.1%	100.0%	100.0%	100.0%	99.9%	95.9%	86.9%
Jefferson Main New Levee (11-Foot)	0.1%	0.8%	1.9%	3.8%	100.0%	100.0%	100.0%	99.7%	96.1%	89.3%
Port Arthur CSRM										
8- to 10-foot I-Wall Raise (1-foot)	0.4%	0.4%	1.2%	2.0%	100.0%	100.0%	100.0%	100.0%	99.8%	98.3%
Closure Structure Raise (1-foot)	0.0%	0.4%	1.1%	2.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
I-Wall Raise Near Valero (1-foot)	0.1%	0.5%	1.6%	2.7%	100.0%	100.0%	100.0%	100.0%	99.0%	94.3%
I-Wall Raise Near Tank Farm (1-foot)	0.1%	0.7%	2.1%	3.6%	100.0%	100.0%	100.0%	100.0%	97.4%	89.5%
Freeport CSRM										
Dow Barge Canal Gate Structure	0.6%	5.8%	16.4%	25.9%	100.0%	100.0%	97.7%	80.9%	45.2%	27.1%
East Storm Levee Raise (1-foot)	0.2%	1.6%	4.8%	7.9%	100.0%	100.0%	100.0%	98.7%	87.3%	72.7%
Freeport Dock (No Fail)	0.5%	4.8%	11.5%	21.7%	100.0%	100.0%	98.9%	87.0%	53.5%	32.9%
Old River Levee Raise at Dow Thumb (1-foot)	0.3%	2.5%	7.4%	12.1%	100.0%	100.0%	99.9%	97.3%	77.1%	55.6%
South Storm Levee	-	-	-	-	-	-	-	-	-	-
Tide Gate I-Wall - 1-foot	0.3%	2.5%	6.1%	11.9%	100.0%	100.0%	100.0%	97.5%	77.6%	55.8%
Tide Gate I-Wall Raise (1-foot)	0.3%	3.3%	8.0%	15.4%	100.0%	100.0%	99.5%	92.3%	69.8%	52.3%

Table 2-15. Tentatively Selected Plan Relative Sea Level Change Project Performance

	Engineering Criteria - FT NAVD				TSP Project Performance				
	Without RSLC	*Low RSLC*	*Intermediate RSLC*	*High RSLC*	*Recommended Height - TSP*	*Surplus/ Deficit (Without)*	*Surplus/ Deficit (Low)*	*Surplus/Deficit (Intermediate)*	*Surplus/ Deficit (High)*
Orange-Jefferson Floodwall	12.50	13.43	13.98	15.77	11.00	-1.50	-2.43	-2.98	-4.77
Orange-Jefferson Levee	12.33	13.24	13.83	15.59	11.00	-1.33	-2.24	-2.83	-4.59
Port Arthur Floodwall	13.25	16.10	16.72	18.25	19.00	5.75	2.90	2.28	0.75
Port Arthur Levee	12.94	13.86	14.43	16.20	18.00	5.06	4.14	3.58	1.80
Dow Barge Canal	15.85	16.58	17.15	18.93	26.00	10.15	9.43	8.85	7.08
Freeport Levee	16.42	17.13	17.66	19.45	20.75	4.33	3.63	3.09	1.30
Oyster Creek	16.41	16.41	16.41	16.41	19.00	2.59	2.59	2.59	2.59

2.6.2 Life Safety Considerations

The population at risk (PAR) is displayed by project area is included in Table 2-16. The PAR was developed based on the 2010 census blocks that intersect the damageable properties in the project areas. This population reflects the residential population that may be exposed to flood risk. This does not include transportation routes for evacuation or those at work in commercial or industrial areas. The PAR the same is due to the fact that virtually the same structures being protected by the levee at Jefferson Main are also being protected by the existing hurricane flood protection system at Port Arthur. In the case of Jefferson Main, the levee is protecting against surge coming up the Neches River. For Port Arthur, damages are being quantified from the failure locations along the HFPS. In the case of Beaumont A – C, all three reaches fall within the same census block.

Table 2-16. Population at Risk by CSRM

CSRM	Population at Risk
Orange-Jefferson	
Orange 1	17,014
Orange 2	13,952
Orange 3	60,044
Beaumont A	2,078
Beaumont B	2,078
Beaumont C	2,078
Jefferson Main	116,762
Port Arthur	116,762
Freeport	16,559

Discussed previously, broad warnings as storm systems develop are coordinated through various agencies, such as the National Weather Service, which provides reports to the essential print and electronic media outlets. The National Weather Service generally releases tropical storm watches 48 hours in advance of any anticipated onset of tropical storm force winds. Since outside preparedness activities become difficult once winds reach tropical storm force, warnings are issued 36 hours in advance of any anticipated onset of tropical storm force winds. The Texas Department of Public Safety's Division of Emergency Management coordinates the state emergency management program, as well as implementing the Texas Emergency Tracking Network (ETN), part of a comprehensive data-management system that provides real-time information before, during, and after a disaster. Orange and Jefferson Counties are members of the Southeast Texas Alerting Network, which can alert users of emergencies, plant operations, traffic, and weather information or other outreach from emergency management. Both counties as well as Brazoria,

also have emergency management departments that engage their respective cities, including specific evacuation plans and processes.

2.7 IDENTIFICATION OF THE TSP

The primary planning objective to select the TSP is to reduce economic damage for the 50-year period of analysis. The TSP also meets the Federal objective of maximizing net benefits. Alternatives were evaluated to show reductions in expected annual damages towards a plan that maximizes net benefits. To that end, the following summarizes each of the CSRMs with their respective alternatives with the highest net benefits to be included in the TSP.

2.7.1 Orange-Jefferson CSRM

- Orange 3 New Levee – 11-Foot Levee/Floodwall
- Jefferson Main New Levee –11-Foot Levee/Floodwall
- Beaumont A New Levee –12-Foot Levee/Floodwall

2.7.2 Port Arthur and Vicinity CSRM

- 8-10 ft I-Wall Raise (1-Foot)
- Closure Structure Raise (1-Foot)
- I-Wall Raise Near Valero (1-Foot)
- I-Wall Raise Near Tank Farm (1-Foot)

2.7.3 Freeport and Vicinity CSRM

- Dow Barge Canal Gate Structure
- Oyster Creek Levee Raise (1-Foot)
- East Storm Levee Raise (1-Foot)
- Freeport Dock No Fail
- Old River Levee Raise at Dow Thumb (1-Foot)
- Tide Gate I-Wall Raise (1-Foot)

The following tables display each of the maximized NED alternatives which comprise the TSP beginning with the Orange-Jefferson CSRM, then the Port Arthur and Vicinity CSRM, and finally the Freeport and Vicinity CSRM (Tables 2-16 through 2-18). It should be noted that no OMRR&R was calculated for Beaumont A since initial estimates were not found to be particularly sensitive across alternative ranking. This was also true for the existing CSRMs.

Table 2-17. TSP for Orange-Jefferson CSRM

(FY 2015 Price Level/3.375 percent interest rate)

	Orange 3	Jefferson Main	Beaumont A
	11 - Foot	11 - Foot	12 - Foot
INVESTMENT			
Estimated First Cost	$246,811,000	$65,726,000	$70,202,000
Annual Interest Rate	3.375%	3.375%	3.375%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,587,000	$3,352,000	$3,580,000
Investment Cost	$259,398,000	$69,078,000	$73,782,000
Interest	$8,755,000	$2,331,000	$2,490,000
Amortization	$2,056,000	$548,000	$585,000
OMRR&R ($/year)	$4,084,000	$371,000	
TOTAL ANNUAL COSTS	**$14,895,000**	**$3,250,000**	**$3,075,000**
Without Project EAD	$29,987,000	$28,231,000	$6,937,000
Residual EAD	$5,242,000	$2,520,000	$870,000
Storm Reduction Benefits	$24,745,000	$25,711,000	$6,067,000
TOTAL BENEFITS	$24,745,000	**$25,711,000**	**$6,067,000**
NET BENEFITS	**$9,851,000**	**$22,461,000**	**$2,992,000**
BENEFIT-COST RATIO	**1.7**	**7.9**	**2.0**

Table 2-18. TSP for Port Arthur and Vicinity CSRM
(FY 2015 Price Level/3.375 percent interest rate)

	8ft-10ft I-Wall	Closure Structure	I-Wall Near Valero	I-Wall Near Tank Farm
	1-Foot Raise	1-Foot Raise	1-Foot Raise	1-Foot Raise
INVESTMENT				
Estimated First Cost	$8,915,000	$10,654,000	$8,948,000	$4,627,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50
Construction Period (months)	36	36	36	36
Interest During Construction	$455,000	$543,000	$456,000	$236,000
Investment Cost	$9,370,000	$11,197,000	$9,404,000	$4,863,000
Interest	$316,000	$378,000	$317,000	$164,000
Amortization	$74,000	$89,000	$75,000	$39,000
TOTAL ANNUAL COSTS	**$391,000**	**$467,000**	**$392,000**	**$203,000**
Without Project EAD	$23,413,000	$3,784,000	$61,867,000	$38,009,000
Residual EAD	$5,730,000	$408,000	$10,813,000	$16,874,000

	8ft-10ft I-Wall	Closure Structure	I-Wall Near Valero	I-Wall Near Tank Farm
	1-Foot Raise	1-Foot Raise	1-Foot Raise	1-Foot Raise
Flood Reduction Benefits	$17,683,000	$3,375,000	$51,054,000	$21,135,000
TOTAL BENEFITS	**$17,683,000**	**$3,375,000**	**$51,054,000**	**$21,135,000**
NET BENEFITS	**$17,292,000**	**$2,908,000**	**$50,662,000**	**$20,932,000**
BENEFIT-COST RATIO	**45.2**	**7.2**	**130.2**	**104.1**

As stated earlier, the TSP for the Orange-Jefferson CSRM includes a 113,600 LF of levee and 29,800 LF of floodwall (total of 27 miles) combination at a levee crest of 11 feet MSL at Orange 3. This has an estimated first cost of $246.8 million annualized to $14.9 million. Total annual benefits are $24.7 million which produces $9.85 million in annual net benefits and benefit-to-cost ratio of 1.7. Also included are a 41,700 LF of levee and 16,200 LF of floodwall (11 miles) combination at Jefferson Main with 11-foot crest elevation and an estimated first cost of $65.7 million with annual costs of $3.3 million. Total annual benefits come to $25.7 million, leaving an estimate of $22.5 million in net benefits and 7.9 benefit-to-cost ratio. Finally, it also includes a combination of 3,100 LF of levee and 200 LF of floodwall (0.6 mile) with a 12-foot crest elevation with first cost of $70.2 million, annual costs of $3.1 million, annual benefits of $6.1 million, and annual net benefits of $3.0 million, and a 2.0 benefit-to-cost ratio.

Table 2-19. TSP for Freeport and Vicinity CSRM
(FY 2015 Price Level/3.375 percent interest rate)

	Dow Barge Canal	Oyster Creek Levee	East Storm Levee	Freeport Dock	Old River Levee at Dow Thumb	Tide Gate I-Wall
	No Fail - Closure Structure	1-Foot Raise	1-Foot Raise	No Fail	1-Foot Raise	1-Foot Raise
INVESTMENT						
Estimated First Cost	$130,000,000	$4,869,000	$6,530,000	$2,850,000	$8,294,000	$3,800,000
Annual Interest Rate	3.375%	3.375%	3.375%	3.375%	3.375%	3.375%
Project Life (years)	50	50	50	50	50	50
Construction Period (months)	36	36	36	36	36	36
Interest During Construction	$6,630,000	$248,000	$333,000	$145,000	$423,000	$194,000
Investment Cost	$136,630,000	$5,117,000	$6,863,000	$2,995,000	$8,717,000	$3,994,000
Interest	$4,611,000	$173,000	$232,000	$101,000	$294,000	$135,000
Amortization	$1,083,000	$41,000	$54,000	$24,000	$69,000	$32,000
TOTALANNUAL COSTS	**$5,694,000**	**$213,000**	**$286,000**	**$125,000**	**$363,000**	**$166,000**
Without Project EAD	$166,660,000	$3,800,000	$1,701,000	$3,960,000	$2,517,000	$2,785,000
Residual EAD	$47,052,000	$1,272,000	$581,000	$1,742,000	$913,000	$897,000
Storm Reduction Benefits	$119,608,000	$2,527,000	$1,121,000	$2,218,000	$1,604,000	$1,888,000
TOTAL BENEFITS	**$119,608,000**	**$2,527,000**	**$1,121,000**	**$2,218,000**	**$1,604,000**	**$1,888,000**
NET BENEFITS	**$113,914,000**	**$2,314,000**	**$835,000**	**$2,093,000**	**$1,241,000**	**$1,721,000**
BENEFIT-COST RATIO	**21.0**	**11.9**	**3.9**	**17.7**	**4.4**	**11.4**

The TSP for the Port Arthur and Vicinity CSRM includes a one-foot raise above the existing elevation of 8-foot to 10-foot I-Wall, 7,500 LF of 15-foot wide scour pad, and 2,000 LF of levee raised one foot. First costs are $8.9 million, annual costs are $0.4 million, and annual benefits are $17.7 million. Net benefits are $17.3 million with a benefit-to-cost ratio of 45.2. Next is a one-foot raise above the existing elevation at the Port Arthur Closure Structure. The structure would be replaced and 300 LF of 100-foot wide scour pad along with 12,000 LF of levee raised one foot. First costs are $10.7 million, annual costs are $0.5 million, annual benefits of $3.4 million with net benefits of $2.9 million, and a benefit-to-cost ration of 7.2. Next is another one-foot raise above the existing elevation at the I-Wall near Valero with 5,000 LF of 15-foot scour pad and 3,000 LF of levee raised one foot. First costs are $8.9 million annualized to $0.4 million, with annual benefits of $51.1 million. Net benefits are $50.7 million and the benefit-to-cost ratio us 130.2. Finally, the TSP would include a one-foot raise above the existing elevation near the Port Arthur Tank Farm and have 1,800 LF of 15-foot-wide scour pad and 7,000 feet of levee raised one foot. First costs are $4.6 million, annual costs are $0.2 million with annual benefits of $21.1 million. Net benefits are $20.9 million with a 104.1 benefit-to-cost ratio.

The TSP for the Freeport and Vicinity CSRM includes a No-Fail closure structure at the Dow Barge Canal with two sector gates approximately 500 feet long and 80 feet in width for vessel traffic with an estimated first cost of $130 million, annual costs of $5.7 million, annual benefits of $119.6 million and $113.9 in annual net benefits. The benefit-to-cost ratio is 21. Also included are a one-foot raise above the existing elevation at the Oyster Creek Levee 10,000 LF in length. First costs are $4.9 million, annual costs are $0.2 million, annual benefits of $2.5 million and net benefits of $2.3 million, with a benefit-to-cost ration of 11.9. Next, it would include a one-foot raise above the existing elevation at the East Storm Levee and 13,115 LF of High Performance Turf Reinforcement Mat (HPTRM). First costs are $6.5 million, annual costs are $0.3 million, annual benefits are $1.1, and net benefits of $0.8 million with a 3.9 benefit-to cost ratio. Next is a 3,000 LF of No-Fail floodwall at Freeport Dock with first costs of $2.9 million, annual costs of $0.1 million and annual benefits of $2.2 million. Net benefits are $2.1 million and the benefit to-cost ratio is 17.7. Next would be a one-foot raise above the existing elevation at the Old River Levee at the Dow Thumb with a distance of 3,000 LF. First costs are $8.3 million, annual costs $0.4 million, annual benefits are $1.6 million, and net benefits are $1.2 million with a benefit-to-cost ratio of 4.4. Finally, it would also include a reconstructed I-Wall raised one foot above the existing elevation, 700 LF in length. It would also have 2,000 LF of levee raised one foot. First costs are $3.8 million, annual costs are $0.2 million, annual benefits are $1.9 million with $1.7 million in net benefits, and an 11.4 benefit-to-cost ratio.

2.8 RE-OPTIMIZATION TO ACCOUNT FOR RELATIVE SEA LEVEL CHANGE (RSLC)

ER 1100-2-8162 provides "guidance for incorporating the direct and indirect physical effects of projected future sea level change across the project life cycle in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects and systems of projects" and "Alternatives should be evaluated using "low," "intermediate," and "high" rates of future SLC for both "with" and "without" project conditions." ETL 1100-2-1 states that "Using a longer adaptation horizon enables us to improve robustness and resilience compared to planning for shorter time frames" and an "initial assessment that evaluates the exposure and vulnerability of the project area over the 100-year adaptation horizon will assist planners and engineers in determining the long-term approach that best balances risks for the project." The ETL goes on to "strongly recommend that some predictions of how the project or system might perform, as well as its ability to adapt beyond the typical 50-year economic analysis period, be considered in the decision-making."

One approach for addressing RSLC is to consider that the optimization has already taken place with the analysis that identified the TSP and using the identified levee/floodwall crest elevations from the average SWLs as the "base." Any increases to the crest elevation due to wave action and RSLC based on engineering criteria can be added followed by a fresh run HEC-FDA analysis to capture the additional benefits from the increased protection. Another approach is to perform a more rigorous re-optimization based on the 50-year, intermediate RSLC scenario. The following depicts the results for addressing RSLC both for the initial 50-year period of analysis. Based on the 2080 RSLC projections for the USACE intermediate curve at the Freeport NOAA gauge for the Freeport and Vicinity CSRM and the Sabine Pass North NOAA gauge for the Port Arthur and Vicinity CSRM and the Orange-Jefferson CSRM, water surface elevations were adjusted 1.94 and 2.32 feet respectively as provided by SWG's H&H Section. The following graphs depict the water surface elevations as they would be adjusted to reflect various RSLC scenarios for the 20-, 50, and 100-year epochs for each of the three CSRM systems along with the USACE low, intermediate, and high scenarios.

As discussed in the introduction of Section 2.0, after the TSP was verified, the team developed feasibility-level designs for the Recommended Plan. Investigations included detailed cost estimates, benefits, impacts, and implementation requirements. After the ADM, the Beaumont A New Levee (12-foot) and Jefferson Main New Levee (11-foot) were removed from consideration under the Recommended Plan. Beaumont A New Levee (12-foot) was removed due to the local industrial recent actions to reduce the area's risk from storm surges. In the last few years the local industries have developed a levee and floodwall system at the same location as the TSP. The

structural integrity of the existing system is not fully known; however, an assessment of the systems height appears to place it above the heights considered in the Recommended Plan. Additional detailed economic evaluation of Beaumont A was not performed following the ADM; however, it was estimated that the current residual economic damages and life-safety risk are now limited. Risk from storm surge flooding is mainly concentrated to the industrial areas which is now being mitigated for with the newly constructed system. Based on the considerations above the Beaumont A New Levee (12-foot) was removed from the final Recommended Plan.

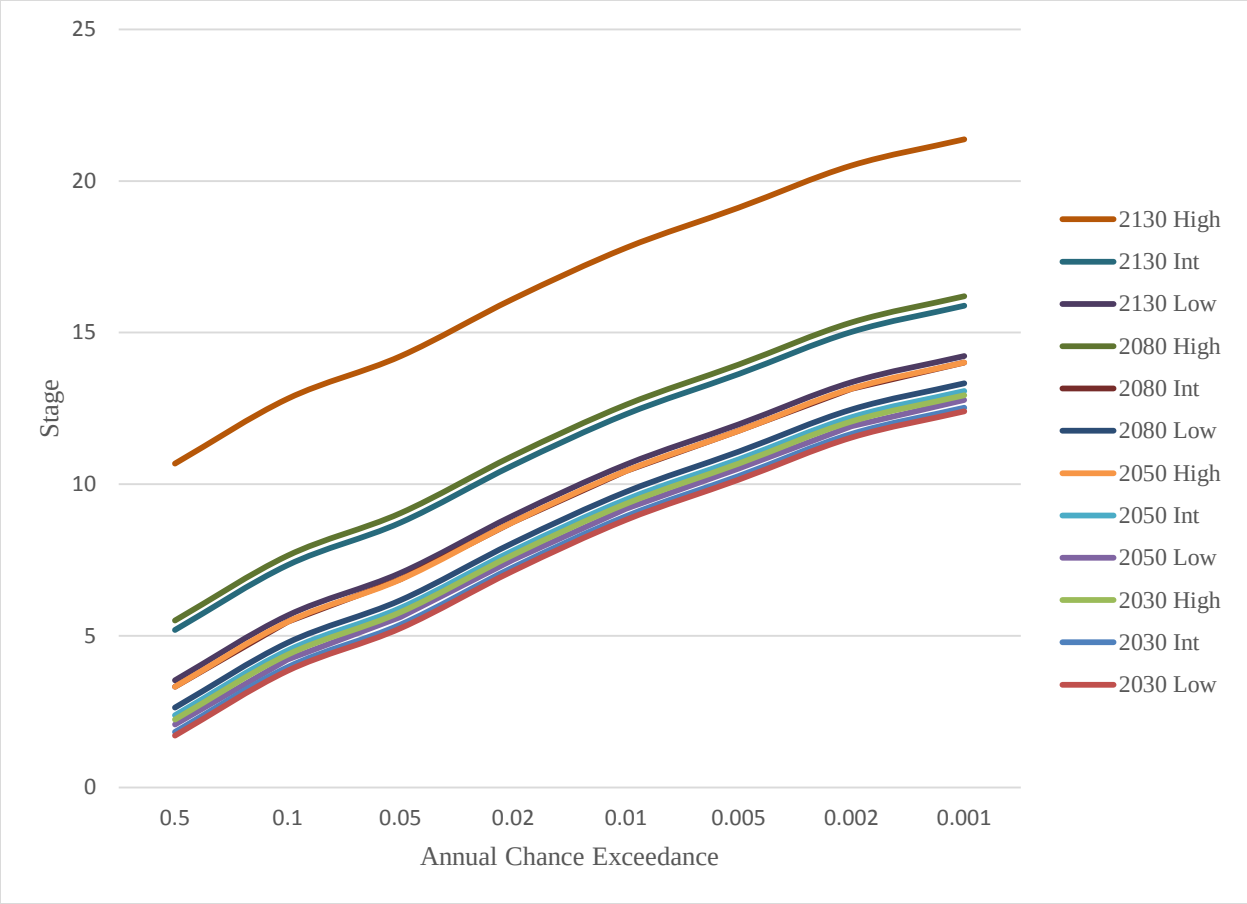


Figure 2-9. Orange-Jefferson CSRM RSLC Scenarios

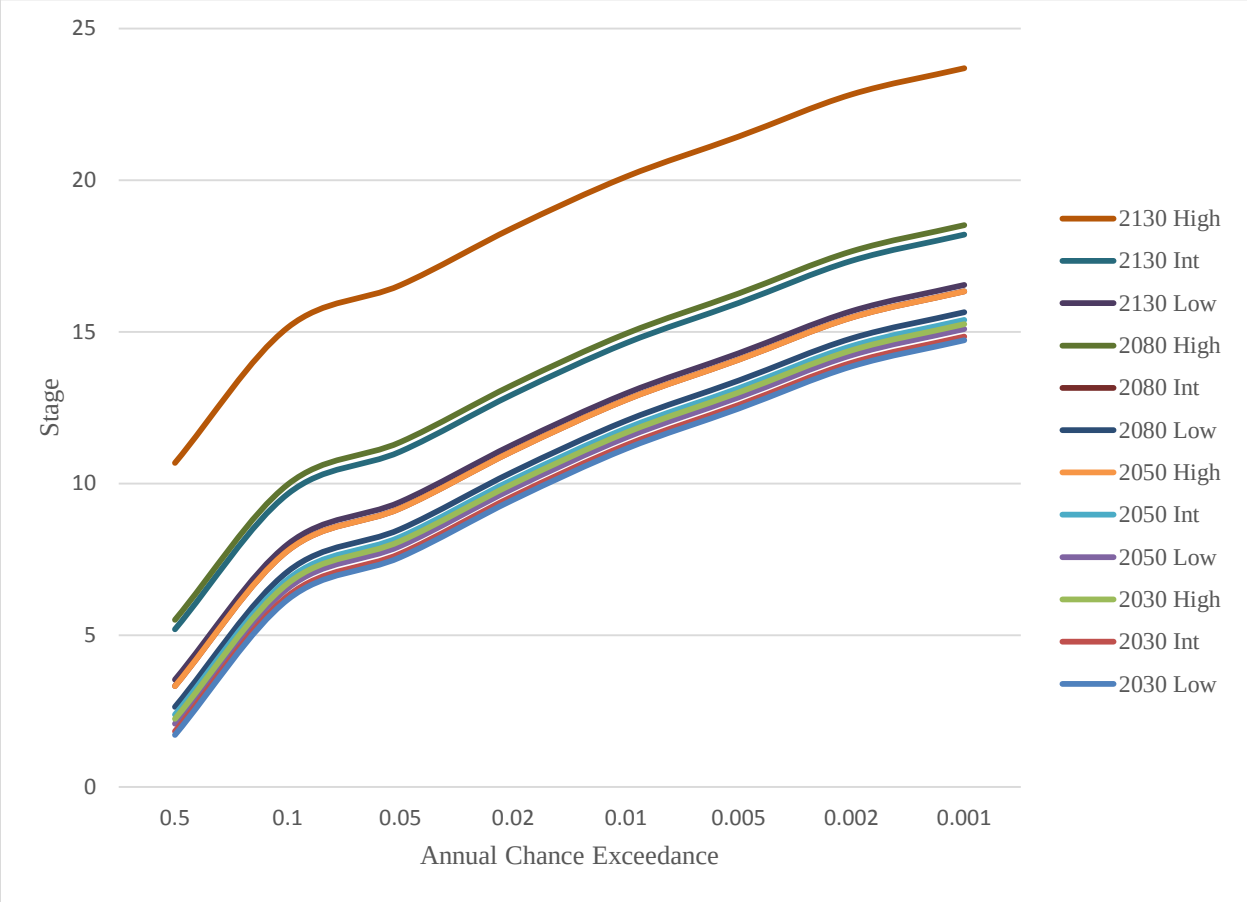


Figure 2-10. Port Arthur CSRM RSLC Scenarios

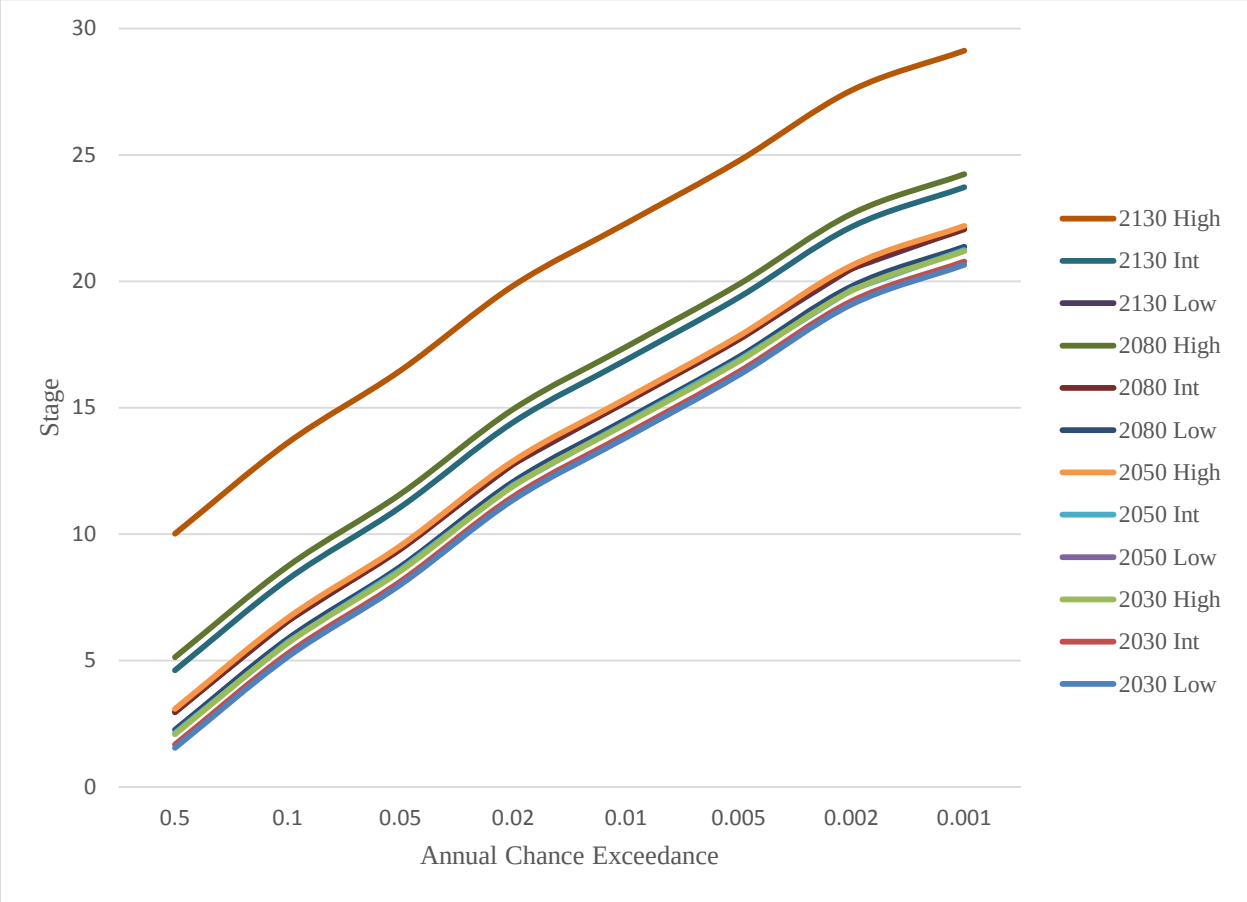


Figure 2-11. Freeport CSRM RSLC Scenarios

Systems Approach for Existing and New CSRMs

The previous analysis related to the identification of the TSP modeled damages at the existing Freeport and Port Arthur CSRMs as independent events at various locations as identified by GeoTech based on either completed or draft SQRAs. As part of the RSLC analysis in response to ATR comments from the Risk Management Center (RMC), without-project damages are estimated at one location identified to be the most likely of having a failure occur. For the Freeport CSRM that location is at the Dow Barge Canal. For the Port Arthur CSRM, that location is at the I-Wall near the Valero Refinery. This approach reduces the potential to overestimate benefits that may accrue at each of these systems. For the Orange-Jefferson CSRM, an "indicator geo-node" was identified for the basis of economic optimization. Once an "optimized" levee crest elevation was identified, the return interval associated with this height would then be applied to the remainder of the system.

Repetitive Damages and Net Benefits of Orange 3 Levee

An additional revision to the RSLC analysis was to address the potential for repetitive damages. No adjustments were done for the Freeport and Port Arthur systems since existing levees are already in place. The following without and with-project damage estimates to compensate for the potential for repetitive damages are based on results done under the 50-year intermediate RSLC scenario and under a reasonably aggressive repetitive damage scenario. All first-floor elevations that fell below the 2050 10-year ACE water surface elevation (4.52 feet) were raised to the 2050 100-year ACE water surface elevation (9.49 feet). This adjustment is similar to the approach used for other Gulf studies but more aggressive than the New Orleans District's *Morganza to the Gulf of Mexico* study and may therefore understate both the without and with-project damages. Damage estimates are based on equivalent annual damages using the water surface elevations and stage-probability functions with 2030 as the base year and 2080 as the most likely future year.

Updated Structure and Content Values

The following tables describe updated structure counts and values to reflect changes made to the structure inventory to match updated costs and to take into account changes due to repetitive damages and by changes in what structures are impacted by annual chance exceedances when RSLC is considered. The first table shows the update structure inventory while the second shows the structure counts by RSLC ACE.

Table 2-20. Updated Structure and Content Values of Inventoried Structures by CSRM and Type - 2016 Price and 2015 Development Levels

Orange 3

Category Name	Count	Structure Value	Content Value	Total
Commercial	265	174,588,000	174,588,000	349,176,000
Industrial	8*	1,908,899,000	1,908,899,000	3,817,798,000
Multi-Family	192	29,482,000	29,482,000	58,964,000
Mobile	600	10,796,000	10,796,000	21,592,000
Public	207	76,621,000	87,546,000	164,167,000
Vehicles	15,033	187,102,000	0	187,102,000
Single-Family	11,931	1,228,101,000	1,228,101,000	2,456,202,000
Grand Total	28,236	3,615,589,000	3,439,412,000	7,055,001,000

* Represents the number of actual parcels containing damageable structures. Parcels may contain anywhere from one to several dozen structures.

Freeport

Category Name	Count	Structure Value	Content Value	Total
Commercial	903	134,576,000	186,747,000	321,323,000

Industrial	49	6,369,294,000	11,160,863,000	17,530,157,000
Multi-Family	375	85,731,000	82,602,000	168,333,000
Mobile	6	168,000	161,000	329,000
Public	207	257,887,000	296,474,000	554,361,000
Vehicles	11,128	212,956,000	0	212,956,000
Single-Family	8,832	469,498,000	451,198,000	920,696,000
Grand Total	21,500	7,530,110,000	12,178,045,000	19,708,155,000

Port Arthur

Category Name	Count	Structure Value	Content Value	Total
Commercial	1,152	5,948,811,000	10,489,192,000	16,438,003,000
Industrial	9	230,903,000	404,504,000	635,407,000
Multi-Family	269	86,311,000	82,911,000	169,222,000
Public	452	248,987,000	273,145,000	522,132,000
Vehicles	26,431	0	0	0
Single-Family	20,977	2,377,533,000	2,283,727,000	4,661,260,000
Grand Total	49,290	8,892,545,000	13,533,479,000	22,426,024,000

Table 2-21. Updated Structure Counts and Damages by CSRM and RSLC ACE (FY 2016 Price Level, $1,000)

Orange 3

Damage Category	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.	No.	Dam.
Commercial	4	$6,532	40	$13,988	49	$26,876	198	$65,768	201	$94,814	257	$139,523	257	$171,585
Industrial	1*	$118,920	6*	$397,175	6*	$964,017	8*	$1,765,198	8*	$2,158,850	8*	$2,606,137	8*	$2,768,134
Multifamily	0	$0	96	$1,624	100	$5,648	180	$12,417	180	$16,580	190	$20,422	190	$23,600
Mobile	2	$53	141	$1,777	154	$3,242	384	$9,092	386	$9,516	537	$10,851	539	$14,425
Public	5	$47	66	$3,565	77	$22,915	166	$49,975	166	$62,312	188	$74,512	188	$93,195
Vehicles	300	$4,296	3,591	$4,935	3,931	$49,927	11,513	$53,731	11,637	$141,890	14,065	$143,549	14,103	$145,123
Single-Family	25	$1,000	2,850	$87,206	3,120	$262,449	9,137	$689,907	9,236	$942,397	11,163	$1,118,302	11,193	$1,337,077
Grand Total	337	$130,848	6,790	$510,270	7,437	$1,335,074	21,586	$2,646,088	21,814	$3,426,358	26,408	$4,113,297	26,478	$4,553,138

* Represents the number of actual parcels containing damageable structures. Parcels may contain anywhere from one to several dozen structures.

Freeport

Commercial	250	$39,042	287	$57,367	288	$63,783	289	$65,386	289	$65,813	289	66,000	289	$66,005
Industrial	12	$90,361	14	$1,453,293	14	$2,434,612	14	$3,086,560	14	$3,336,371	14	3,382,495	14	$3,382,539
Multifamily	114	$12,536	115	$15,535	115	$18,506	115	$23,168	115	$24,342	115	24,403	115	$24,403
Mobile	0	$0	1	$30	2	$66	2	$74	2	$75	2	75	2	$75
Public	60	$64,140	64	$81,057	65	$92,041	65	$97,818	65	$99,591	65	99,988	65	$100,014
Vehicles	3,018	$49,819	3,250	$54,136	3,284	$54,830	3,285	$54,851	3,285	$54,851	3,285	54,851	3,285	$54,851
Single-Family	2,395	$131,204	2,579	$160,383	2,606	$173,502	2,607	$176,690	2,607	$177,473	2,607	177,746	2,607	$177,795
Grand Total	5,849	$387,103	6,310	$1,821,803	6,374	$2,837,340	6,377	$3,504,548	6,377	$3,758,517	6,377	$3,805,559	6,377	$3,805,684

Port Arthur

Elevation (MSL Ft.)	7.79	9.19	11.08	12.76	14.09	15.47	16.34

Commercial	946	$5,395,927	956	$6,596,122	1,050	$8,050,284	1,057	$9,307,032	1,143	$9,617,172	1,144	$9,858,136	1,147	$9,867,585
Industrial	7	$3,431	7	$4,900	9	$99,457	9	$164,103	9	$206,545	9	$256,028	9	$280,020
Multifamily	216	$34,261	217	$44,040	250	$55,979	252	$62,940	261	$68,980	261	$78,053	262	$82,408
Public	400	$244,265	401	$273,957	435	$312,765	437	$330,352	445	$339,534	446	$353,751	446	$356,272
Vehicles	21,087	$187,352	21,341	$223,699	24,429	$241,933	24,564	$258,971	25,785	$260,236	25,879	$273,027	25,981	$273,594
Single-Family	16,736	$1,406,104	16,937	$1,702,403	19,388	$2,144,891	19,495	$2,403,789	20,464	$2,591,879	20,539	$2,752,980	20,620	$2,799,024
Grand Total	39,392	$7,271,339	39,859	$8,845,121	45,561	$10,905,309	45,814	$12,527,188	48,107	$13,084,346	48,278	$13,571,975	48,465	$13,658,903

HEC-FDA Analysis

Re-optimized Orange-Jefferson CSRM

The re-optimized Orange-Jefferson CSRM (under a 50-year intermediate RSLC scenario) has an estimated first cost of $1,087.799 million annualized to $49.412 million. Total annual benefits are $77.070 million which produces $27.657 million in annual net benefits and benefit-to-cost ratio of 1.6.

Table 2-22. Economic Performance of Orange-Jefferson CSRM (50-Year Intermediate RSLC Scenario) (FY 2016 Price Level/3.125 percent interest rate)

	Orange 3 New Levee		
	11 - Foot	**12 - Foot**	**13 - Foot**
INVESTMENT			
Estimated First Cost	**$1,087,799,000**	**$1,228,785,000**	**$1,439,239,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$51,304,000	$57,954,000	$67,879,000
Investment Cost	$1,139,103,000	$1,286,738,000	$1,507,118,000
Interest	$35,597,000	$40,211,000	$47,097,000
Amortization	$9,731,000	$10,993,000	$12,875,000
OMRR&R ($/year)*	$4,084,000	$4,084,000	$4,084,000
TOTAL ANNUAL COSTS	**$49,412,000**	**$55,287,000**	**$64,057,000**
Without Project EAD	$102,293,000	$102,293,000	$102,293,000
Residual EAD	$25,223,000	$17,047,000	$10,881,000
Storm Reduction Benefits	$77,070,000	$85,246,000	$91,412,000
TOTAL BENEFITS	**$77,070,000**	**$85,246,000**	**$91,412,000**
NET BENEFITS	**$27,657,000**	**$29,959,000**	**$27,355,000**
BENEFIT-COST RATIO	**1.6**	**1.5**	**1.4**

*****For Mitigation

Re-optimized Port Arthur CSRM

The re-optimized Port Arthur CSRM (under a 50-year intermediate RSLC scenario) has an estimated first cost of $262.011 million annualized to $10.918 million. Total annual benefits are $65.86 million which produces $54.942 million in annual net benefits and benefit-to-cost ratio of 6.0.

Table 2-23. Economic Performance of Port Arthur and Vicinity CSRM
(50-Year Intermediate RSLC Scenario)
(FY 2016 Price Level/3.125 percent interest rate)

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$255,275,000**	**$262,011,000**	**$327,011,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,040,000	$12,357,000	$15,423,000
Investment Cost	$267,315,000	$274,369,000	$342,434,000
Interest	$8,354,000	$8,574,000	$10,701,000
Amortization	$2,284,000	$2,344,000	$2,925,000
TOTAL ANNUAL COSTS	**$10,637,000**	**$10,918,000**	**$13,626,000**
Without Project EAD	$70,351,000	$70,351,000	$70,351,000
Residual EAD	$8,641,000	$4,491,000	$2,236,000
Storm Reduction Benefits	$61,711,000	$65,860,000	$68,115,000
TOTAL BENEFITS	**$61,711,000**	**$65,860,000**	**$68,115,000**
NET BENEFITS	**$51,073,000**	**$54,942,000**	**$54,489,000**
BENEFIT-COST RATIO	**5.8**	**6.0**	**5.0**

Re-optimized Freeport and Vicinity CSRM

The re-optimized Freeport and Vicinity CSRM (under a 50-year intermediate RSLC scenario) has an estimated first cost of $304.501 million annualized to $12.688 million. Total annual benefits are $184.077 million which produces $171.389 million in annual net benefits and benefit-to-cost ratio of 14.5.

Table 2-24. Economic Performance of Freeport and Vicinity CSRM (50-Year Intermediate RSLC Scenario) (FY 2016 Price Level/3.125 percent interest rate)

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$261,391,000**	**$304,501,000**	**$548,819,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,328,000	$14,361,000	$25,884,000
Investment Cost	$273,719,000	$318,862,000	$574,703,000
Interest	$8,554,000	$9,964,000	$17,959,000
Amortization	$2,338,000	$2,724,000	$4,910,000
TOTAL ANNUAL COSTS	**$10,892,000**	**$12,688,000**	**$22,869,000**
Without Project EAD	$233,118,000	$233,118,000	$233,118,000
Residual EAD	$63,212,000	$49,041,000	$37,797,000
Storm Reduction Benefits	$169,906,000	$184,077,000	$195,320,000
TOTAL BENEFITS	**$169,906,000**	**$184,077,000**	**$195,320,000**
NET BENEFITS	**$159,014,000**	**$171,389,000**	**$172,451,000**
BENEFIT-COST RATIO	**15.6**	**14.5**	**8.5**

The following tables depict the economic performance for the one- and two-foot increments above the "No-Fail" alternatives analyzed at the Orange-Jefferson, Port Arthur, and Freeport CSRMs. The purpose of this analysis is primarily to show that the costs associated with each increment above the least expensive analyzed alternative is economically justified (i.e. benefit-to-cost ratio > 1.0). This was done by using the estimated first cost for the "No-Fail" alternatives at the Port Arthur and Freeport CSRMs and the 11-Foot at the Orange-Jefferson CSRM as the "base" and annualizing the differences in first costs for the other two analyzed alternatives. The same procedure is used for the benefits in order to derive net benefits for each of the "No-Fail + 1 Foot" and "No-Fail + 2 Foot" alternatives at the existing systems and the 12- and 13-Foot alternatives at Orange-Jefferson. As the tables show, the 12-Foot levee/floodwall combination at Orange-

Jefferson generates -$1.783 million in incremental net benefits with a 0.8 benefit-to-cost ratio while the 13-Foot combination generates -$4.386 million incremental net benefits also with a 0.8 benefit-to-cost ratio. At the existing CSRMs, the "No-Fail + 1 Foot" alternative at Port Arthur provides $3.869 million in incremental net benefits while the "No-Fail + 2 Foot" alternative provides -$0.483 million in incremental net benefits with 14.8 and 0.8 benefit-to-cost ratios respectively. At Freeport, the "No-Fail + 1 Foot" alternative generates $12.374 million in incremental net benefits while the "No-Fail + 2 Foot" alternative generates $1.063 million in incremental net benefits with 7.9 and 1.1 respective benefit-to-cost ratios.

Table 2-25. Incremental Benefits for the Orange Jefferson, Port Arthur, and Freeport CSRM Alternatives
(50-Year Intermediate RSLC Scenario - FY 2016 Price Level/3.125 percent interest rate)
Orange-Jefferson CSRM

	11 - Foot	12 - Foot	13 - Foot
INVESTMENT			
Estimated First Cost	**$1,087,799,000**	**$140,986,000**	**$351,440,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$51,304,000	$6,649,000	$16,575,000
Investment Cost	$1,139,103,000	$147,635,000	$368,015,000
Interest	$35,597,000	$4,614,000	$11,500,000
Amortization	$9,731,000	$1,261,000	$3,144,000
OMRR&R ($/year)*	$4,084,000	$4,084,000	$4,084,000
TOTAL ANNUAL COSTS	**$49,412,000**	**$9,959,000**	**$18,728,000**
Without Project EAD	$102,293,000	$8,176,000	$14,342,000
Residual EAD	$25,223,000	$0	$0
Storm Reduction Benefits	$77,070,000	$8,176,000	$14,342,000
TOTAL BENEFITS	**$77,070,000**	**$8,176,000**	**$14,342,000**
NET BENEFITS	**$27,657,000**	**($1,783,000)**	**($4,386,000)**
BENEFIT-COST RATIO	**1.6**	**0.8**	**0.8**

Port Arthur CSRM

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$255,275,000**	**$6,736,000**	**$65,000,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36

Interest During Construction	$12,040,000	$318,000	$3,066,000
Investment Cost	$267,315,000	$7,054,000	$68,066,000
Interest	$8,354,000	$220,000	$2,127,000
Amortization	$2,284,000	$60,000	$581,000
TOTAL ANNUAL COSTS	**$10,637,000**	**$281,000**	**$2,709,000**
Without Project EAD	$70,351,000	$4,149,000	$2,255,000
Residual EAD	$8,641,000	$0	$0
Storm Reduction Benefits	$61,711,000	$4,149,000	$2,255,000
TOTAL BENEFITS	**$61,711,000**	**$4,149,000**	**$2,255,000**
NET BENEFITS	**$51,073,000**	**$3,869,000**	**($453,000)**
BENEFIT-COST RATIO	**5.8**	**14.8**	**0.8**

Freeport and Vicinity CSRM

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$261,391,000**	**$43,110,000**	**$244,319,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,328,000	$2,033,000	$11,523,000
Investment Cost	$273,719,000	$45,143,000	$255,841,000
Interest	$8,554,000	$1,411,000	$7,995,000
Amortization	$2,338,000	$386,000	$2,186,000
TOTAL ANNUAL COSTS	**$10,892,000**	**$1,796,000**	**$10,181,000**
Without Project EAD	$233,118,000	$14,171,000	$11,243,000
Residual EAD	$63,212,000	$0	$0
Storm Reduction Benefits	$169,906,000	$14,171,000	$11,243,000
TOTAL BENEFITS	**$169,906,000**	**$14,171,000**	**$11,243,000**
NET BENEFITS	**$159,014,000**	**$12,374,000**	**$1,063,000**
BENEFIT-COST RATIO	**15.6**	**7.9**	**1.1**

The following table depicts the benefits generated by the re-optimized plan for each of the aforementioned RSLC epochs and scenarios. As stated previously, the initially identified TSP was re-optimized under the 50-year intermediate USACE RSLC scenario. The numbers depicted below represent the "gross" benefits generated by taking the re-optimized alternatives evaluated for the TSP and subtracting the annual residual damages of each alternative from the without-project

benefits for each CSRM. Annual costs for each alternative are not taken into account since reformulation was done under 50-year epoch and intermediate RSLC scenario. For each CSRM, using the 50-year epoch as the "base," average annual benefits for the 20- and 100-year epochs are then compared in percentage terms. These changes are displayed in Table 2-26.

As would be expected, benefits for the re-optimized TSP are somewhat reduced under the 20-year epoch as compared to the 50-year epoch. Depending on the scenario, benefits may be reduced from 12 to 19 percent under the low RSLC scenario and increase from 50 to 52 percent under the high scenario for the Orange CSRM. For the existing CSRMs, changes in benefits stay relatively constant across the varying scales of alternatives. Under the 20-year epoch, benefits decrease around five percent at the Freeport CSRM and around ten percent at Freeport. Under the 100-year epoch, benefits increase around 22 to 23 percent for the Port Arthur CSRM under the low RSLC scenario and increase by over 600 percent under the high scenario. At Freeport, benefits decrease five percent under the 20-year low RSLC scenario and all alternatives increase by an average of 189 percent under the 100-year high scenario relative to the 50-year epoch. The bottom line from this analysis is that under these various epochs and RSLC scenarios, there is little variation in benefits in the array of alternative scales. In this regard, there is no compelling case to deviate from the NED in identifying the recommended plan.

Table 2-26. Benefit Sensitivities by CSRM System

	20-Year	50-Year	100-Year	% ch. 20-yr./50-yr.	% ch. 100-yr./50-yr.
Orange					
Low					
11 - Foot	$48,048,000	$54,648,000	$70,511,000	-12.1%	29.0%
12 - Foot	$49,507,000	$60,824,000	$78,093,000	-18.6%	28.4%
13 - Foot	$55,139,000	$66,816,000	$83,988,000	-17.5%	25.7%
Intermediate					
11 - Foot	$53,427,000	$77,070,000	$131,904,000	-30.7%	71.1%
12 - Foot	$59,479,000	$85,246,000	$143,294,000	-30.2%	68.1%
13 - Foot	$64,049,000	$91,412,000	$152,124,000	-29.9%	66.4%
High					
11 - Foot	$75,806,000	$157,082,000	$327,486,000	-51.7%	108.5%
12 - Foot	$83,663,000	$170,341,000	$563,628,000	-50.9%	230.9%
13 - Foot	$89,828,000	$180,418,000	$737,733,000	-50.2%	308.9%
Port Arthur					
Low					
No Fail	$46,324,000	$51,578,000	$63,153,000	-10.2%	22.4%
No Fail + 1	$49,370,000	$54,980,000	$67,538,000	-10.2%	22.8%
No Fail + 2	$50,997,000	$56,808,000	$69,877,000	-10.2%	23.0%
Intermediate					

No Fail	$50,582,000	$61,711,000	$102,307,000	-18.0%	65.8%
No Fail + 1	$53,910,000	$65,860,000	$109,926,000	-18.1%	66.9%
No Fail + 2	$55,699,000	$68,115,000	$114,285,000	-18.2%	67.8%
High					
No Fail	$67,447,000	$123,578,000	$875,555,000	-45.4%	608.5%
No Fail + 1	$71,982,000	$132,928,000	$942,822,000	-45.8%	609.3%
No Fail + 2	$74,454,000	$138,195,000	$986,739,000	-46.1%	614.0%
Freeport					
Low					
No Fail	$143,770,000	$151,311,000	$167,036,000	-5.0%	10.4%
No Fail + 1	$156,279,000	$164,314,000	$181,031,000	-4.9%	10.2%
No Fail + 2	$166,042,000	$174,603,000	$192,171,000	-4.9%	10.1%
Intermediate					
No Fail	$152,242,000	$169,906,000	$231,022,000	-10.4%	36.0%
No Fail + 1	$165,430,000	$184,077,000	$248,595,000	-10.1%	35.0%
No Fail + 2	$175,661,000	$195,320,000	$262,286,000	-10.1%	34.3%
High					
No Fail	$185,139,000	$270,916,000	$793,343,000	-31.7%	192.8%
No Fail + 1	$200,493,000	$290,612,000	$840,024,000	-31.0%	189.1%
No Fail + 2	$212,695,000	$306,323,000	$876,665,000	-30.6%	186.2%

Table 2-27. Economic Performance of Orange-Jefferson CSRM Under 50-Year Low RSLC Scenario
(FY 2016 Price Level/3.125 percent interest rate)

	Orange 3 New Levee		
	11 - Foot	**12 - Foot**	**13 - Foot**
INVESTMENT			
Estimated First Cost	**$1,087,799,000**	**$1,228,785,000**	**$1,439,239,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$51,304,000	$57,954,000	$67,879,000
Investment Cost	$1,139,103,000	$1,286,738,000	$1,507,118,000
Interest	$35,597,000	$40,211,000	$47,097,000
Amortization	$9,731,000	$10,993,000	$12,875,000
OMRR&R ($/year)	$4,084,000	$4,084,000	$4,084,000
TOTAL ANNUAL COSTS	**$49,412,000**	**$55,287,000**	**$64,057,000**
Without Project EAD	$73,565,000	$73,565,000	$73,565,000
Residual EAD	$18,917,000	$12,742,000	$6,749,000
Storm Reduction Benefits	$54,648,000	$60,824,000	$66,816,000
TOTAL BENEFITS	**$54,648,000**	**$60,824,000**	**$66,816,000**
NET BENEFITS	**$5,236,000**	**$5,537,000**	**$2,760,000**
BENEFIT-COST RATIO	**1.1**	**1.1**	**1.0**

Table 2-28. Economic Performance of Port Arthur and Vicinity CSRM Under 50-Year Low RSLC Scenario
(FY 2016 Price Level/3.125 percent interest rate)

	No Fail	**NF + 1 Foot**	**NF + 2 Foot**
INVESTMENT			
Estimated First Cost	**$255,275,000**	**$262,011,000**	**$327,011,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,040,000	$12,357,000	$15,423,000
Investment Cost	$267,315,000	$274,369,000	$342,434,000
Interest	$8,354,000	$8,574,000	$10,701,000
Amortization	$2,284,000	$2,344,000	$2,925,000
TOTAL ANNUAL COSTS	**$10,637,000**	**$10,918,000**	**$13,626,000**
Without Project EAD	$58,618,000	$58,618,000	$58,618,000
Residual EAD	$7,040,000	$3,638,000	$1,810,000

Storm Reduction Benefits		$51,578,000	$54,980,000	$56,808,000
TOTAL BENEFITS		**$51,578,000**	**$54,980,000**	**$56,808,000**
NET BENEFITS		**$40,941,000**	**$44,062,000**	**$43,182,000**
BENEFIT-COST RATIO		**4.8**	**5.0**	**4.2**

Table 2-29. Economic Performance of Freeport and Vicinity CSRM Under 50-Year Low RSLC Scenario
(FY 2016 Price Level/3.125 percent interest rate)

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$261,391,000**	**$304,501,000**	**$548,819,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,328,000	$14,361,000	$25,884,000
Investment Cost	$273,719,000	$318,862,000	$574,703,000
Interest	$8,554,000	$9,964,000	$17,959,000
Amortization	$2,338,000	$2,724,000	$4,910,000
TOTAL ANNUAL COSTS	**$10,892,000**	**$12,688,000**	**$22,869,000**
Without Project EAD	$209,064,000	$209,064,000	$209,064,000
Residual EAD	$57,753,000	$44,750,000	$34,461,000
Storm Reduction Benefits	$151,311,000	$164,314,000	$174,603,000
TOTAL BENEFITS	**$151,311,000**	**$164,314,000**	**$174,603,000**
NET BENEFITS	**$140,419,000**	**$151,625,000**	**$151,734,000**
BENEFIT-COST RATIO	**13.9**	**13.0**	**7.6**

Table 2-30. Economic Performance of Orange CSRM Under 50-Year High RSLC Scenario (FY 2016 Price Level/3.125 percent interest rate)

	Orange 3 New Levee		
	11 - Foot	**12 - Foot**	**13 - Foot**
INVESTMENT			
Estimated First Cost	**$1,087,799,000**	**$1,228,785,000**	**$1,439,239,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$51,304,000	$57,954,000	$67,879,000
Investment Cost	$1,139,103,000	$1,286,738,000	$1,507,118,000
Interest	$35,597,000	$40,211,000	$47,097,000
Amortization	$9,731,000	$10,993,000	$12,875,000
OMRR&R ($/year)*	$4,084,000	$4,084,000	$4,084,000
TOTAL ANNUAL COSTS	**$49,412,000**	**$55,287,000**	**$64,057,000**
Without Project EAD	$201,203,000	$201,203,000	$201,203,000
Residual EAD	$44,120,000	$30,862,000	$20,785,000
Storm Reduction Benefits	$157,082,000	$170,341,000	$180,418,000
TOTAL BENEFITS	**$157,082,000**	**$170,341,000**	**$180,418,000**
NET BENEFITS	**$107,670,000**	**$115,054,000**	**$116,361,000**
BENEFIT-COST RATIO	**3.18**	**3.08**	**2.82**

*For Mitigation

Table 2-31. Economic Performance of Port Arthur and Vicinity CSRM Under 50-Year High RSLC Scenario (FY 2016 Price Level/3.125 percent interest rate)

	No Fail	**NF + 1 Foot**	**NF + 2 Foot**
INVESTMENT			
Estimated First Cost	**$255,275,000**	**$262,011,000**	**$327,011,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,040,000	$12,357,000	$15,423,000
Investment Cost	$267,315,000	$274,369,000	$342,434,000
Interest	$8,354,000	$8,574,000	$10,701,000
Amortization	$2,284,000	$2,344,000	$2,925,000
TOTAL ANNUAL COSTS	**$10,637,000**	**$10,918,000**	**$13,626,000**
Without Project EAD	$137,926,000	$137,926,000	$137,926,000
Residual EAD	$19,391,000	$10,363,000	$5,331,000
Storm Reduction Benefits	$118,534,000	$127,563,000	$132,595,000
TOTAL BENEFITS	**$118,534,000**	**$127,563,000**	**$132,595,000**
NET BENEFITS	**$107,897,000**	**$116,645,000**	**$118,968,000**
BENEFIT-COST RATIO	**11.1**	**11.7**	**9.7**

Table 2-32. Economic Performance of Freeport and Vicinity CSRM Under 50-Year High RSLC Scenario
(FY 2016 Price Level/3.125 percent interest rate)

	No Fail	NF + 1 Foot	NF + 2 Foot
INVESTMENT			
Estimated First Cost	**$261,391,000**	**$304,501,000**	**$548,819,000**
Annual Interest Rate	3.125%	3.125%	3.125%
Project Life (years)	50	50	50
Construction Period (months)	36	36	36
Interest During Construction	$12,328,000	$14,361,000	$25,884,000
Investment Cost	$273,719,000	$318,862,000	$574,703,000
Interest	$8,554,000	$9,964,000	$17,959,000
Amortization	$2,338,000	$2,724,000	$4,910,000
TOTAL ANNUAL COSTS	**$10,892,000**	**$12,688,000**	**$22,869,000**
Without Project EAD	$358,388,000	$358,388,000	$358,388,000
Residual EAD	$87,473,000	$67,776,000	$52,065,000
Storm Reduction Benefits	$270,916,000	$290,612,000	$306,323,000
TOTAL BENEFITS	**$270,916,000**	**$290,612,000**	**$306,323,000**
NET BENEFITS	**$260,023,000**	**$277,924,000**	**$283,454,000**
BENEFIT-COST RATIO	**24.9**	**22.9**	**13.4**

The following figures recreate the information contained in Table 2-26 to display the annual benefits generated by the revised TSP for the 20-, 50-, and 100-year epochs and under each of the three RSCL scenarios.

Figure 2-12. Orange CSRM Benefits from RSLC Scenarios

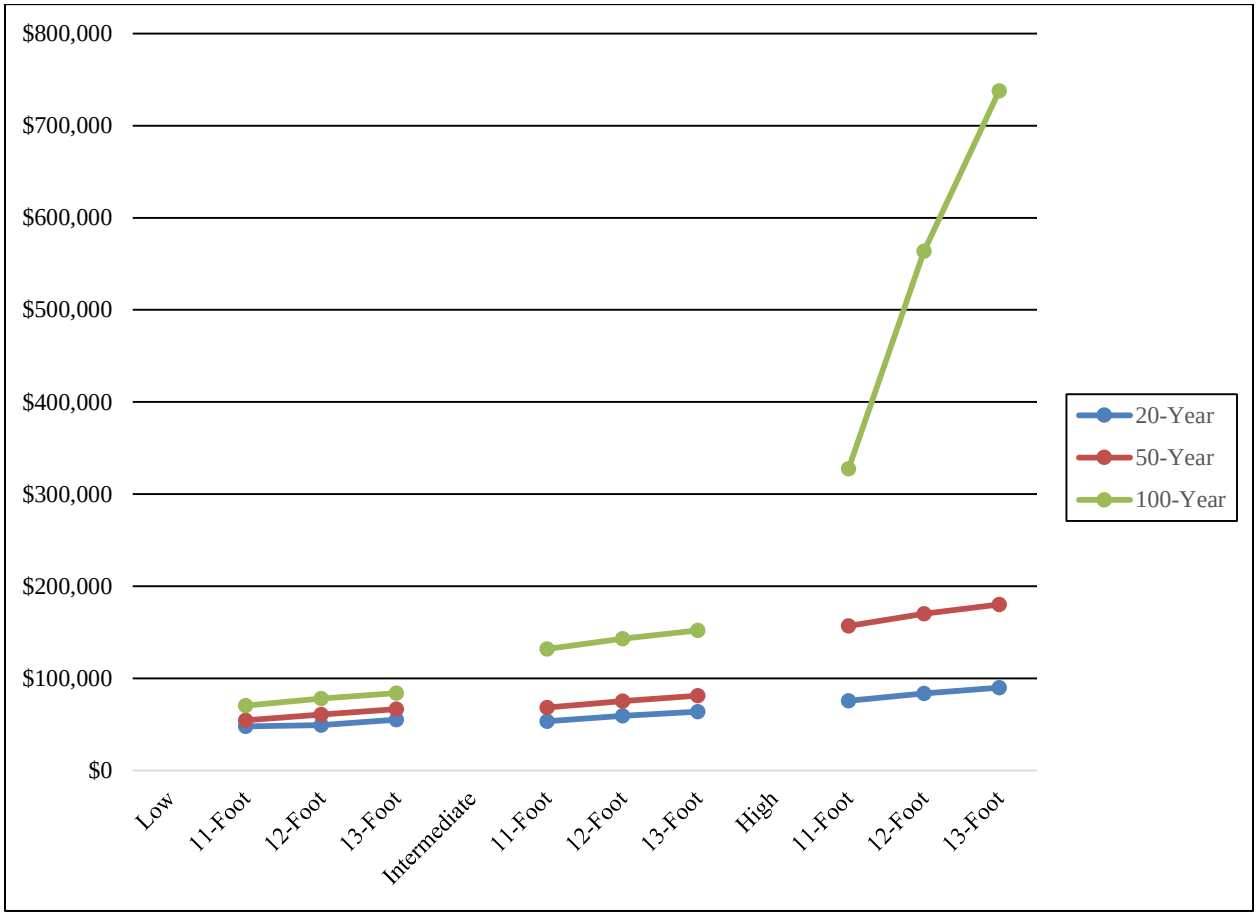


Figure 2-13. Port Arthur CSRM Benefits from RSLC Scenarios

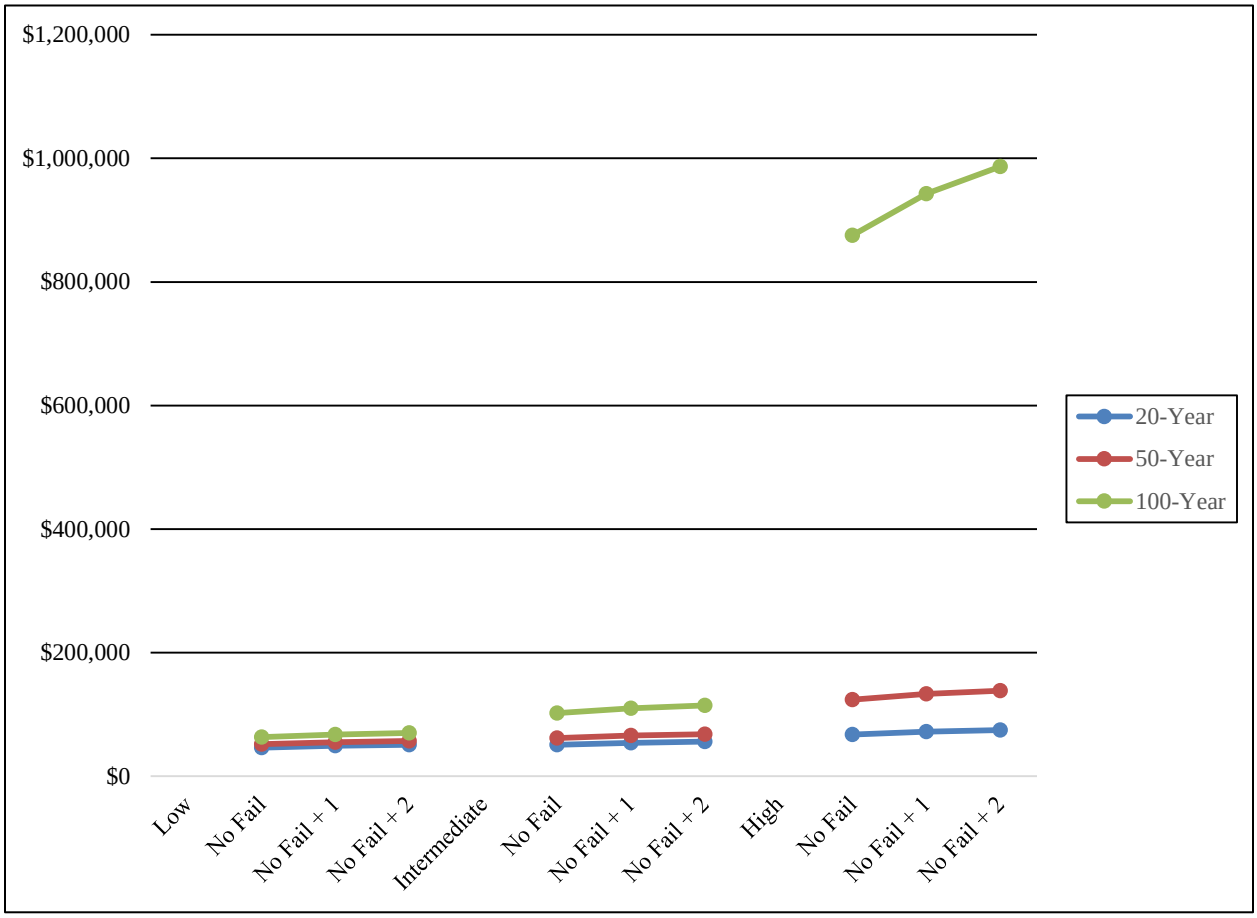
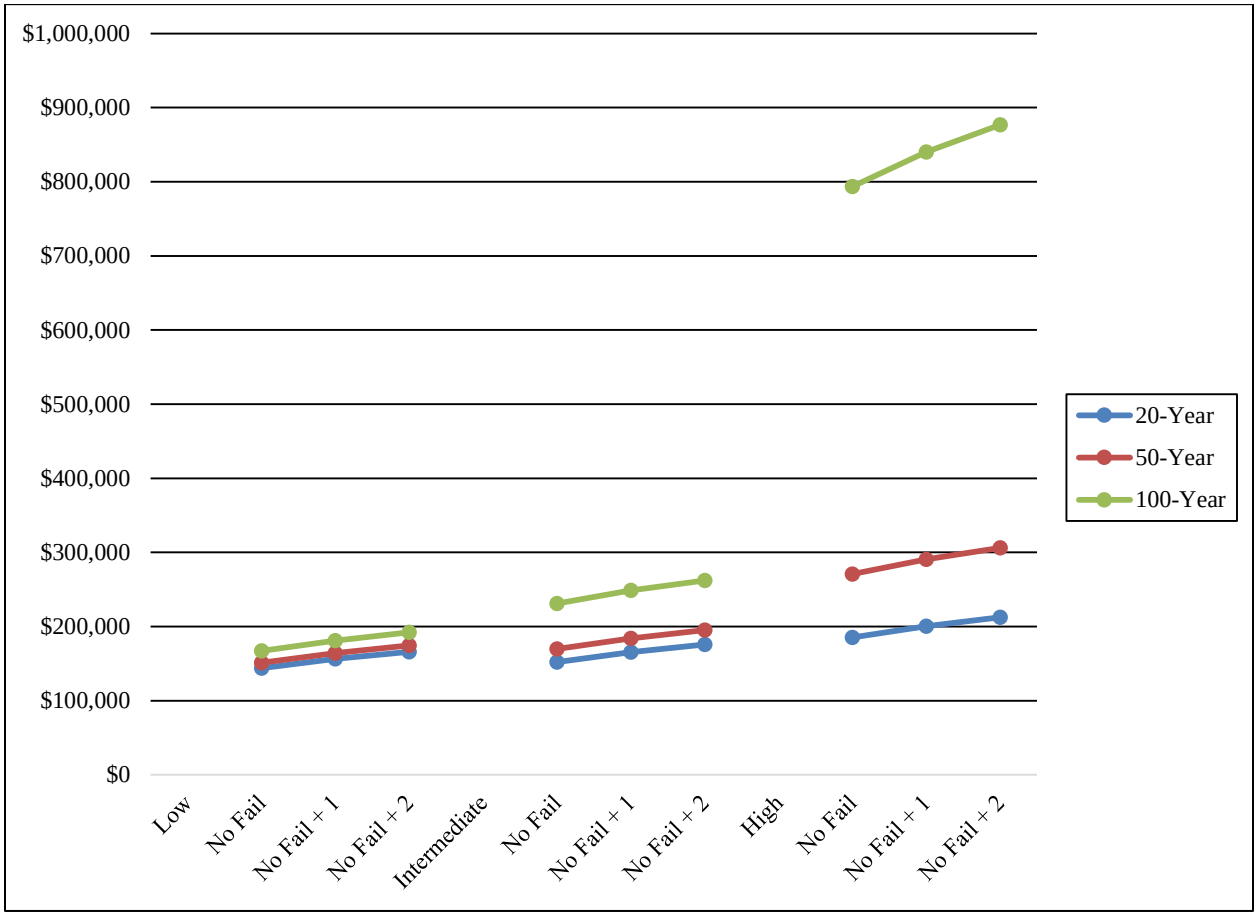


Figure 2-14. Freeport CSRM Benefits from RSLC Scenarios



2.9 RISK PERFORMANCE OF RSLC REVISED PROPOSED ACTIONS

The following table show the risk performance of the revised TSP under the 20-, 50-, and 100-year epochs and under the three RSLC scenarios.

Table 2-33. Project Performance for the Revised Tentatively Selected Plan – 20-Year Epoch

Low

			Long-Term Risk (years)	Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange 3 CSRM									
	Without	0.1049	0.6700	0.6083	0.0655	0.0117	0.0023	0.0000	0.0000
	11-Foot	0.0048	0.0473	0.9997	0.9997	0.9953	0.8648	0.5264	0.3327
	12-Foot	0.0053	0.0516	0.9997	0.9997	0.9959	0.8553	0.4686	0.2590
Port Arthur CSRM									
	Without	0.0021	0.0208	1.0000	1.0000	0.9959	0.9460	0.7874	0.6460
	No Fail	0.0006	0.0062	0.9997	0.9997	0.9997	0.9996	0.9908	0.9653
	No Fail + 1	0.0006	0.0057	0.9997	0.9997	0.9997	0.9997	0.9970	0.9859
	No Fail + 2	0.0005	0.0052	0.9997	0.9997	0.9997	0.9997	0.9992	0.9949
Freeport CSRM									
	Without	0.0808	0.5693	0.7823	0.5401	0.3758	0.2203	0.0901	0.0480
	No Fail	0.0073	0.0709	0.9997	0.9995	0.9564	0.7328	0.3616	0.2021
	No Fail + 1	0.0056	0.0550	0.9997	0.9997	0.9826	0.8291	0.4698	0.2789
	No Fail + 2	0.0044	0.0428	0.9998	0.9998	0.9938	0.8994	0.5772	0.3674

Intermediate

			Long-Term Risk (years)	Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange 3 CSRM									

	Without	0.1140	0.7019	0.5490	0.0500	0.0082	0.0017	0.0000	0.0000
	11-Foot	0.0055	0.0539	0.9997	0.9997	0.9923	0.8278	0.4633	0.2766
	12-Foot	0.0034	0.0335	0.9997	0.9997	0.9992	0.9422	0.6701	0.4590
Port Arthur CSRM									
	Without	0.0023	0.0233	1.0000	0.9997	0.9942	0.9320	0.7554	0.6065
	No Fail	0.0006	0.0061	0.9997	0.9997	0.9997	0.9995	0.9887	0.9586
	No Fail + 1	0.0006	0.0056	0.9997	0.9997	0.9997	0.9997	0.9963	0.9830
	No Fail + 2	0.0005	0.0052	0.9997	0.9997	0.9997	0.9997	0.9990	0.9939
Freeport CSRM									
	Without	0.0897	0.6094	0.7626	0.5202	0.3559	0.2022	0.0790	0.0408
	No Fail	0.0079	0.0763	0.9997	0.9993	0.9461	0.7013	0.3289	0.1782
	No Fail + 1	0.0061	0.0591	0.9997	0.9997	0.9780	0.8061	0.4351	0.2509
	No Fail + 2	0.0047	0.0457	0.9997	0.9997	0.9921	0.8840	0.5459	0.3372

High

			Long-Term Risk (years)	**Assurance by Event**					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange 3 CSRM									
	Without	0.1552	0.8148	0.3298	0.0163	0.0022	0.0000	0.0000	0.0000
	11-Foot	0.0084	0.0811	0.9996	0.9996	0.9678	0.6453	0.2489	0.1188
	12-Foot	0.0053	0.0515	0.9997	0.9997	0.9960	0.8571	0.4686	0.2590
Port Arthur CSRM									
	Without	0.0040	0.0396	1.0000	0.9992	0.9834	0.8710	0.6332	0.4686
	No Fail	0.0006	0.0063	0.9997	0.9997	0.9997	0.9988	0.9771	0.9268
	No Fail + 1	0.0005	0.0055	0.9997	0.9997	0.9997	0.9997	0.9926	0.9693
	No Fail + 2	0.0005	0.0050	0.9997	0.9997	0.9997	0.9997	0.9979	0.9887
Freeport CSRM									

	Without	0.1281	0.7460	0.7003	0.4590	0.2923	0.1479	0.0493	0.0232
	No Fail	0.0100	0.0954	0.9997	0.9975	0.8998	0.5868	0.2289	0.1123
	No Fail + 1	0.0077	0.0744	0.9997	0.9995	0.9551	0.7155	0.3259	0.1686
	No Fail + 2	0.0059	0.0574	0.9997	0.9997	0.9828	0.8212	0.4376	0.2437

Table 2-34. Project Performance for the Revised Tentatively Selected Plan – 50-Year Epoch

Low

			Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange CSRM											
	Without	0.1208	0.7242	0.9790	0.9984	0.5088	0.0411	0.0064	0.0000	0.0000	0.0000
	11-Foot	0.0062	0.0605	0.1707	0.2679	0.9997	0.9997	0.9885	0.7861	0.4047	0.2281
	12-Foot	0.0038	0.0376	0.1087	0.1745	0.9997	0.9997	0.9988	0.9257	0.6227	0.4071
Port Arthur CSRM											
	Without	0.0029	0.0282	0.0821	0.1331	1.0000	0.9997	0.9922	0.9207	0.7254	0.5709
	No Fail	0.0006	0.0061	0.0182	0.0302	0.9997	0.9997	0.9997	0.9994	0.9862	0.9514
	No Fail + 1	0.0006	0.0056	0.0168	0.0278	0.9997	0.9997	0.9997	0.9997	0.9955	0.9799
	No Fail + 2	0.0005	0.0052	0.0047	0.0140	0.0232	0.9997	0.9997	0.9997	0.9997	0.9977
Freeport CSRM											
	Without	0.0939	0.6270	0.9481	0.9928	0.7542	0.5125	0.3473	0.1945	0.0745	0.0380
	No Fail	0.0081	0.0784	0.2173	0.3353	0.9997	0.9992	0.9413	0.6876	0.3155	0.0169
	No Fail + 1	0.0063	0.0609	0.1719	0.2698	0.9997	0.9997	0.9757	0.7954	0.4205	0.2398
	No Fail + 2	0.0048	0.0471	0.1348	0.2145	0.9997	0.9997	0.9913	0.8769	0.5322	0.3251

Intermediate

			Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange CSRM											
	Without	0.1544	0.8131	0.9935	0.9998	0.3333	0.0165	0.0022	0.0000	0.0000	0.0000
	11-Foot	0.0084	0.0814	0.2248	0.3459	0.9996	0.9996	0.9670	0.6426	0.2489	0.1188
	12-Foot	0.0053	0.0516	0.1470	0.2327	0.9997	0.9997	0.9997	0.9625	0.7020	0.4675
Port Arthur CSRM											
	Without	0.0040	0.0397	0.1144	0.1833	1.0000	0.9992	0.9833	0.8709	0.6320	0.4687
	No Fail	0.0006	0.0063	0.0188	0.0312	0.9997	0.9997	0.9997	0.9987	0.9768	0.9267
	No Fail + 1	0.0005	0.0055	0.0164	0.0273	0.9997	0.9997	0.9997	0.9997	0.9925	0.9692
	No Fail + 2	0.0005	0.0050	0.0150	0.0249	0.9997	0.9997	0.9997	0.9997	0.9979	0.9887
Freeport CSRM											
	Without	0.1211	0.7248	0.9792	0.9984	0.7096	0.4681	0.3010	0.1556	0.0530	0.0253
	No Fail	0.0096	0.0923	0.2522	0.3840	0.9997	0.9980	0.9075	0.6051	0.2425	0.1209
	No Fail + 1	0.0074	0.0719	0.2006	0.3114	0.9997	0.9996	0.9591	0.7305	0.3411	0.1800
	No Fail + 2	0.0057	0.0555	0.1575	0.2485	0.9997	0.9997	0.9845	0.8321	0.4543	0.2575

High

			Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange CSRM											
	Without	0.4229	0.9959	1.0000	1.0000	0.0082	0.0000	0.0000	0.0000	0.0000	0.0000
	11-Foot	0.0217	0.1967	0.4816	0.6654	0.9996	0.9468	0.5235	0.0872	0.0077	0.0019
	12-Foot	0.0139	0.1306	0.3430	0.5034	0.9996	0.9957	0.8478	0.2977	0.0436	0.0112
Port Arthur CSRM											
	Without	0.0110	0.1050	0.2831	0.4258	0.9996	0.9786	0.8605	0.5597	0.2683	0.1523
	No Fail	0.0016	0.0161	0.0477	0.0782	0.9998	0.9998	0.9997	0.9865	0.8820	0.7372
	No Fail + 1	0.0009	0.0089	0.0266	0.0439	0.9997	0.9997	0.9997	0.9971	0.9537	0.8663

	No Fail + 2	0.0006	0.0058	0.0172	0.0285	0.9997	0.9997	0.9997	0.9994	0.9854	0.9430
	Without	0.2474	0.9415	0.9998	1.0000	0.5665	0.3227	0.1556	0.0531	0.0109	0.0042
	No Fail	0.0167	0.1547	0.3960	0.5684	0.9997	0.9746	0.6854	0.2885	0.0632	0.0209
	No Fail + 1	0.0129	0.1214	0.3219	0.4766	0.9997	0.9935	0.8271	0.4350	0.1158	0.0425
	No Fail + 2	0.0098	0.0942	0.2567	0.3901	0.9997	0.9997	0.9693	0.7353	0.2972	0.1320

Table 2-35. Project Performance for the Revised Tentatively Selected Plan – 100-Year Epoch

Low

Damage Reach	**Plan Name**	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
	Without	0.1696	0.8442	0.9962	0.9999	0.2729	0.0116	0.0000	0.0000	0.0000	0.0000
	11-Foot	0.0093	0.0887	0.2432	0.3715	0.9996	0.9995	0.9548	0.5905	0.2063	0.0917
	12-Foot	0.0058	0.0566	0.1605	0.2529	0.9996	0.9996	0.9940	0.8256	0.4167	0.2179
	Without	0.0045	0.0439	0.1261	0.2012	1.0000	0.9988	0.9791	0.8515	0.6006	0.4357
	No Fail	0.0008	0.0076	0.0226	0.0374	0.9997	0.9997	0.9997	0.9984	0.9729	0.9169
	No Fail + 1	0.0005	0.0054	0.0163	0.0269	0.9997	0.9997	0.9997	0.9997	0.9912	0.9646
	No Fail + 2	0.0005	0.0050	0.0148	0.0246	0.9997	0.9997	0.9997	0.9997	0.9974	0.9868
	Without	0.1220	0.7278	0.9798	0.9985	0.7083	0.4668	0.2997	0.1545	0.0524	0.0250
	No Fail	0.0097	0.0928	0.2533	0.3854	0.9997	0.9979	0.9063	0.6026	0.2404	0.1197
	No Fail + 1	0.0075	0.0722	0.2015	0.3127	0.9997	0.9996	0.9585	0.7284	0.3388	0.1784
	No Fail + 2	0.0057	0.0558	0.1582	0.2496	0.9997	0.9997	0.9843	0.8306	0.4519	0.2556

Intermediate

			Long-Term Risk (years)	**Assurance by Event**

Damage Reach	Plan Name	Expected AEP	10	30	50	10%	4%	2%	1%	0.4%	0.2%
Orange CSRM											
	Without	0.3673	0.9897	1.0000	1.0000	0.0186	0.0000	0.0000	0.0000	0.0000	0.0000
	11-Foot	0.0189	0.1736	0.4356	0.6146	0.9996	0.9734	0.6352	0.1415	0.0164	0.0038
	12-Foot	0.0122	0.1156	0.3083	0.4589	0.9996	0.9982	0.9009	0.3953	0.0763	0.0211
Port Arthur CSRM											
	Without	0.0096	0.0924	0.0252	0.3840	1.0000	0.9859	0.8928	0.6186	0.3195	0.1904
	No Fail	0.0014	0.0139	0.0411	0.0675	0.9997	0.9997	0.9997	0.9903	0.9054	0.7789
	No Fail + 1	0.0008	0.0078	0.0232	0.0384	0.9997	0.9997	0.9997	0.9979	0.9643	0.8911
	No Fail + 2	0.0005	0.0051	0.0153	0.0253	0.9997	0.9997	0.9997	0.9996	0.9892	0.9550
Freeport CSRM											
	Without	0.2174	0.9138	0.9994	1.0000	0.6005	0.3580	0.1896	0.0729	0.0172	0.0067
	No Fail	0.0146	0.1369	0.3571	0.5211	0.9997	0.9854	0.7596	0.3657	0.0954	0.0356
	No Fail + 1	0.0112	0.1069	0.2876	0.4318	0.9997	0.9966	0.8742	0.5167	0.1606	0.0658
	No Fail + 2	0.0086	0.0830	0.2290	0.3518	0.9997	0.9993	0.9449	0.6633	0.2512	0.1119

High

			Long-Term Risk (years)			Assurance by Event					
Damage Reach	**Plan Name**	**Expected AEP**	**10**	**30**	**50**	**10%**	**4%**	**2%**	**1%**	**0.4%**	**0.2%**
Orange CSRM											
	Without	0.9019	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	11-Foot	0.4296	0.9964	1.0000	1.0000	0.0065	0.0000	0.0000	0.0000	0.0000	0.0000
	12-Foot	0.2343	0.9307	0.9997	1.0000	0.1270	0.0004	0.0000	0.0000	0.0000	0.0000
Port Arthur CSRM											
	Without	0.1135	0.7004	0.9731	0.9976	0.5145	0.1420	0.0417	0.0085	0.0022	0.0015
	No Fail	0.0196	0.1795	0.4476	0.6282	0.9985	0.9216	0.6472	0.2279	0.0396	0.0091
	No Fail + 1	0.0124	0.1176	0.3129	0.4650	0.9997	0.9838	0.8588	0.4665	0.1300	0.0420
	No Fail + 2	0.0078	0.0749	0.2084	0.3226	0.9997	0.9978	0.9627	0.7188	0.3087	0.1316
Freeport CSRM											
	Without	0.5167	0.9993	1.0000	1.0000	0.2454	0.0258	0.0028	0.0010	0.0000	0.0000
	No Fail	0.0594	0.4581	0.8408	0.9533	0.9709	0.1933	0.0149	0.0009	0.0000	0.0000
	No Fail + 1	0.0457	0.3735	0.7541	0.9035	0.9964	0.4097	0.0547	0.0036	0.0001	0.0000

	No Fail + 2	0.0355	0.3030	0.6613	0.8355	0.9997	0.6584	0.1486	0.0144	0.0005	0.0000

HEC-FDA Analysis

2.10 RECOMMENDED PLAN

The Jefferson Main New Levee (11-foot) was removed from the final Recommended Plan based on a lack of local sponsorship and due to the limited perceived benefits. During the concurrent review period, local entities suggested that the economic performance of Jefferson Main should be reevaluated because there was not a perceived need for this component of the TSP. There was limited life-safety risk due to the industrial makeup of the area. Based on results of these evaluation, the sponsor decided to not to pursue this component of the final Recommended Plan.

Following the refinement and update of costs to account for interior drainage and the requisite pumps, costs, particularly for the Orange component (Orange 3) increased significantly. Twelve new pump stations were initially proposed for the Orange 3 levee reach however, due to the high cost of construction and maintenance for these structures, the benefit-to-cost ratio fell to well below unity (<1.0) therefore, a reduction in the pump discharge and number of pump stations was analyzed. A more detailed analysis and changes to the analysis included Joint Probability Analysis (JPA) to estimate discharge rates along with the potential to combine pumps. Additionally, the initial assumption of designing pumps for a 0.04 ACE with an additional ten percent capacity for RSLC was scrubbed in favor of basing pump design on the 0.04 ACE alone. The number of pumps as also reduced to seven from the initial twelve.

On the benefits side, additional benefits for debris removal and potential damages to roads, highways, and railroads were calculated. Information obtained from the New Orleans District included access to the report, *Development of Depth-Emergency Cost and Infrastructure Damage Relationships for Selected South Louisiana Parishes* which developed values as well as depth/damage functions for a number potential damage categories including debris removal and cleanup as well as evacuation activities and damages to transportation and critical infrastructure. Economic assumptions for debris removal and cleanup assumed debris would consist of vegetative (trees, shrubs, etc.), white goods (refrigerators, washers, stoves, etc.), electronic goods (TVs, computers, microwaves), hazardous waste, vehicles, vessels, and tires. Appropriate destination facilities were also identified depending on the type of debris. Assumptions also included consideration for flood-related labor diversion and capital use along with travel cost and the necessity for temporary/rental structures. Roads were divided into two categories; 1) major and secondary highways (assumed to be of the four-laned variety) and 2) streets (those assumed to consist of two lanes). These, along with railroads, were assumed to have been built to completion and are in some stage of depreciation. Unit values for these two damage debris removal and cleanup and roads, highways, and railroads were estimated based on the type of structure (for debris removal and cleanup) and by mile (for roads, highways, and railroads). These values were then adjusted for inflation, based on ENR's Cost Construction Index, and locality, based on the

CPI between Houma, Louisiana and Houston, Texas, the two most appropriate respective areas of analysis. Values for debris removal and cleanup were assigned to structures based on type. To minimize the potential for overestimation of benefits, structures with values below $10,000 were not assigned values for debris removal and cleanup. Roads, highways, and railroads were identified using GIS and values for were assigned per mile for those transportation networks within the protected areas of the recommended plan in each of the three CSRMs. Values for these to benefit categories are shown in the tables below.

Table 2-36. Values for Debris Removal and Cleanup and Roads, Highways, and Railroads

Debris Removal and Cleanup	**$ per structure, $000s**
Mobile Home	$6.09
Single-Family Residence	$5.90
Multi-Family Residence	$10.68
Eating or Recreation Facility	$35.81
Professional Office	$37.04
Public or Semi-Public Facility	$37.04
Warehouse or Construction Facility	$65.69
Streets, Highways, and Railroads	**$ per mile, $000s**
Streets	$255.73
Major and Secondary Highways	$695.72
Railroad	$329.23

As a validity check for estimates to roads and highways, a comparison was done utilizing roads and highway constriction estimates from a report prepared for the Orange County Economic Development Corporation and the Texas Water Development Board titled *Flood Protection Planning Study, Hurricane Flood Protection System, Orange County, Texas* dated December 2012. Estimates were derived using the principle components of road construction, asphalt for minor roads, concrete for major roads such as interstate and state highways, converted into a common unit and then costs calculated per mile. These values are listed in the table below.

Table 2-37. Values for Major and Minor Roads and Highways Based Orange County EDC Report

Minor Roads		
Item Description	**$ per SF**	**$ per Mile (000s)**
Excavation	$0.03	$1.96
Embankment (minus Levee)	$0.06	$3.91

Lime Treatment (6" EXST Material)	$0.44	$28.16
Lime (6% volume)	$1.90	$120.30
8" Asphalt Base	$0.95	$60.15
3" Asphalt Surface	$1.27	$80.20
Swale*	$2.50	$13.20
Signing/Paving Marking*	$15.00	$79.20
Seeding/Sodding	$0.02	$1.02
Total		**$388.10**

Major Roads		
Excavation	$0.03	$2.93
Embankment (minus Levee)	$0.06	$5.87
Lime Treatment for Subgrade	$0.44	$42.24
Lime (6% volume)	$1.90	$180.46
10" Concrete Pavement	$7.22	$686.40
6" Concrete Curb*	$10.00	$52.80
Swale*	$2.50	$13.20
Signing/Paving Marking*	$15.00	$79.20
Seeding/Sodding	$0.02	$1.53
Total		**$1,064.62**

* priced per LF

While these values do not take into consideration depreciation, they are significantly higher than the estimates based on the Louisiana report. In this regard, the values used for the benefit estimation appear valid. Uncertainties for residential and commercial cleanup costs were estimated based on the same method utilizing coefficients of variation for the values themselves assuming a normal distribution while uncertainties for elevations were derived from those used for residential and averages of commercial structures. Uncertainties for highways, streets, and railroads were estimated only for elevation assuming a normal distribution and utilizing coefficients of variation. No uncertainties were estimated for the values themselves.

The following table displays the without and with- project EADs for the recommended plan.

Table 2-38. Without and With-Project Equivalent Annual Damages for the Recommended Plan (FY 2017 Price Level/2.875 percent interest rate, $1,000)

Without Project

	Damage Categories									
Reach	**Commercial**	**Industrial**	**Multifamily**	**Mobile**	**Public**	**POV**	**SFR**	**Debris**	**Roads**	**Total**
Orange CSRM	5,108	105,374	457	306	1,758	3,367	24,479	1,665	20,229	162,742
Port Arthur CSRM	146,428	4,739	609	0	2,650	1,871	19,904	1,100	637	177,937
Freeport CSRM	5,142	268,742	1,436	3	8,143	4,843	14,238	2,318	2,806	307,670

With Project

	Damage Categories									
Reach	**Commercial**	**Industrial**	**Multifamily**	**Mobile**	**Public**	**POV**	**SFR**	**Debris**	**Roads**	**Total**
Orange CSRM	2,320	36,781	267	152	1,008	1,646	14,660	761	1,633	59,228
Port Arthur CSRM	33,923	1,325	0	161	622	438	4,816	258	149	41,692
Freeport CSRM	991	97,676	318	1	1,687	710	2,352	359	581	104,674

Without Project

	Damage Categories									
Reach	**Commercial**	**Industrial**	**Multifamily**	**Mobile**	**Public**	**POV**	**SFR**	**Debris**	**Roads**	**Total**
Orange CSRM	3%	65%	0%	0%	1%	2%	15%	1%	12%	100%
Port Arthur CSRM	82%	3%	0%	0%	1%	1%	11%	1%	0%	100%
Freeport CSRM	2%	87%	0%	0%	3%	2%	5%	1%	1%	100%

With Project

	Damage Categories									
Reach	**Commercial**	**Industrial**	**Multifamily**	**Mobile**	**Public**	**POV**	**SFR**	**Debris**	**Roads**	**Total**
Orange CSRM	4%	62%	0%	0%	2%	3%	25%	1%	3%	100%
Port Arthur CSRM	81%	3%	0%	0%	1%	1%	12%	1%	0%	100%
Freeport CSRM	1%	93%	0%	0%	2%	1%	2%	0%	1%	100%

Table 2-39. Economic Performance of Recommended Plan
(50-Year Intermediate RSLC Scenario)
(FY 2017 Price Level/2.875 percent interest rate)

	Orange 11 - Foot	Freeport NF + 1 Foot	Port Arthur NF + 1 Foot	Combined
INVESTMENT				
Estimated First Cost	**$1,926,224,000**	**$593,313,000**	**$729,069,000**	**$3,248,606,000**
Annual Interest Rate	2.875%	2.875%	2.875%	2.875%
Project Life (years)	50	50	50	50
Construction Period (months)	120	72	72	120
Interest During Construction	$269,306,000	$44,315,000	$54,454,000	$368,075,000
Investment Cost	$2,195,530,000	$637,628,000	$783,523,000	$3,616,681,000
Interest	$63,121,000	$18,332,000	$22,526,000	$103,980,000
Amortization	$20,195,000	$5,865,000	$7,207,000	$33,267,000
OMRR&R ($/year)	$4,565,000	$708,000	$195,000	$5,467,000
TOTAL ANNUAL COSTS	**$87,881,000**	**$24,904,000**	**$29,928,000**	**$142,713,000**
Without Project EAD	$162,742,000	$307,670,000	$177,937,000	$648,349,000
Residual EAD	$59,228,000	$104,674,000	$41,692,000	$205,594,000
Storm Reduction Benefits	$103,515,000	$202,995,000	$136,246,000	$442,756,000
TOTAL BENEFITS	**$103,515,000**	**$202,995,000**	**$136,246,000**	**$442,756,000**
NET BENEFITS	**$15,634,000**	**$178,091,000**	**$106,318,000**	**$300,043,000**
BENEFIT-COST RATIO	**1.2**	**8.2**	**4.6**	**3.1**

The Orange CSRM recommended plan is a combination of levees and floodwalls designed to reduce the flood-damage potential from storm surge to much of the southern half of Orange County along the Sabine River and Bessie Heights Marsh. The plan consists of 82,169 LF of earthen levee and 56,755 LF of floodwall. The plan also calls for the inclusion of seven pump stations, 56 drainage structures, and 32 closure gates. First costs for this plan at the Orange CSRM reach are $1,926.224 million which annualizes to $87.881 million and produces $103.515 million in benefits with $15.634 million in net benefits for a 1.2 benefit-to-cost ratio.

The recommended plan for the Freeport and Vicinity CSRM consists of the construction of floodwalls, raising of levees, replacement of vehicular closure structures, and constructing a navigable gate structure in an active barge canal. Several sections of floodwall and levee require raising due in order to increase system capacity to prevent system failure. The plan consists of 69,375 LF of earthen levee and 29,205 LF of floodwall. The plan also includes four drainage structures, and ten closure gates. First costs for this plan at this CSRM is $593.313 million which annualizes to $24.904 million and produces $202.995 million in benefits with $178.091 million in net benefits for an 8.2 benefit-to-cost ratio.

The recommended plan for the Port Arthur and Vicinity CSRM consists of the construction of floodwalls, raising of levees, and replacement of vehicular closure structures. Several sections of floodwall and levee require raising due in order to increase system capacity to prevent system failure. The plan consists of 31,030 LF of earthen levee and 30,090 LF of floodwall. The plan also includes 26 closure gates. First costs for this plan at this CSRM is $729.069 million which annualizes to $29.928 million and produces $136.246 million in benefits with $106.318 million in net benefits for a 4.6 benefit-to-cost ratio. The following summarizes each of the CSRMs with their respective alternatives with the highest net benefits to be included as the recommended plan.

Estimates for OMRR&R received from Cost Engineering generally reflects an even stream of expenditures over the life of the project. For each of the CSRMs grassed levees will have to be regularly mowed and the floodwalls and gate structures routinely maintained. Occasional maintenance and repairs of the roadway on the levee crown will also be required. Due to the gate structures at the Orange CSRM, annual expenditures for OMRR&R spike one year per decade due to significant replacements. OMRR&R expenditures for the existing CSRMs at Freeport and Port Arthur spike as well but at much smaller magnitudes. Annual OMRR&R expenditures are therefore averaged over for the life of the project. OMRR&R estimates for the existing Port Arthur and Freeport CSRMs reflect the additional costs necessary for any potential improvements to the systems above what is currently need to operate and maintain the systems. These costs are depicted in Table 2-39.

Orange CSRM

- Orange 3 New Levee – 11-Foot Levee/Floodwall

Port Arthur and Vicinity CSRM

- 8-10 ft I-Wall Raise (1-Foot)
- Closure Structure Raise (1-Foot)
- I-Wall Raise Near Valero (1-Foot)
- I-Wall Raise Near Tank Farm (1-Foot)

Freeport and Vicinity CSRM

- Dow Barge Canal Gate Structure
- Oyster Creek Levee Raise (1-Foot)
- East Storm Levee Raise (1-Foot)
- Freeport Dock No Fail
- Old River Levee Raise at Dow Thumb (1-Foot)
- Tide Gate I-Wall Raise (1-Foot)

Table 2-40. Interest During Construction for the Recommended Plan
(FY 2017 Price Level/2.875 percent interest rate)

		Orange			Freeport			Port Arthur		
	Calendar Year	Construction Total	Compounded Value	Compound Factor	Construction Total	Compounded Value	Compound Factor	Construction Total	Compounded Value	Compound Factor
Base Year	2030	$192,622,000	$248,597,000	1.2906	$98,886,000	$113,941,000	1.1523	$121,512,000	$140,012,000	1.1523
	2031	$192,622,000	$241,649,000	1.2545	$98,886,000	$110,757,000	1.1201	$121,512,000	$136,100,000	1.1201
	2032	$192,622,000	$234,896,000	1.2195	$98,886,000	$107,662,000	1.0888	$121,512,000	$132,296,000	1.0888
	2033	$192,622,000	$228,332,000	1.1854	$98,886,000	$104,653,000	1.0583	$121,512,000	$128,599,000	1.0583
	2034	$192,622,000	$221,950,000	1.1523	$98,886,000	$101,728,000	1.0288	$121,512,000	$125,005,000	1.0288
	2035	$192,622,000	$215,748,000	1.1201	$98,886,000	$98,886,000	1.0000	$121,512,000	$121,512,000	1.0000
	2036	$192,622,000	$209,718,000	1.0888	0	0	0	0	0	0
	2037	$192,622,000	$203,857,000	1.0583	0	0	0	0	0	0
	2038	$192,622,000	$198,160,000	1.0288	0	0	0	0	0	0
	2039	$192,622,000	$192,622,000	1.0000	0	0	0	0	0	0
Total		$1,926,224,000	$2,195,530,000		$593,313,000	$637,628,000		$729,069,000	$783,523,000	

Summary	Orange	Freeport	Port Arthur
Implementation Costs:	$1,926,224,000	$593,313,000	$729,069,000
Interest During Construction:	$269,306,000	$44,315,000	$54,454,000
Total Construction Costs:	$2,195,530,000	$637,628,000	$783,523,000

Table 2-41. Probability Distribution
(FY 2017 Price Level/2.875 percent interest rate)

		Probability Damage Reduced Exceeds Indicated Values		
CSRM	**Equivalent Annual Damages Reduced (2017 prices)**	**0.75**	**0.50**	**0.25**
Orange	$103,515,000	$43,339,000	$98,190,000	$142,736,000
Freeport	$202,995,000	$23,064,000	$116,158,000	$316,250,000
Port Arthur	$136,246,000	$21,931,000	$27,002,000	$193,941,000

The evaluation incorporated uncertainty surrounding the economic and engineering inputs to generate results that can be used to assess the performance of the Recommended Plan. The percentiles displayed in Table 2-41 reflect the percentage chance that benefits may be greater than or equal to the indicated values. The probability distribution for expected and equivalent annual damages would typically be expected to follow a generally normal bell-shaped distribution with minimal skewing particularly for non-structural or where new structural measures are being proposed. This is case when observing the distribution for damages reduced for the Orange CSRM. For areas that are protected by existing systems, damages will tend to start at much less frequent events and can therefore tend to skew the probability distributions. This is the case for both the Freeport and Port Arthur CSRMs. Significant without-project damages for the Orange CSRM begin at around the 0.075 ACE (13-year event) and do not begin again until the 0.01 ACE (100-year event) under the proposed with-project condition. The distribution is somewhat skewed for the Freeport CSRM No without-project damages occur until approximately the 0.1 ACE (10-year event) and do not begin until the 0.01 ACE (100-year event). The probability distribution is extremely skewed for the Port Arthur CSRM due to no without-project damages starting until the 0.007 ACE (143 year-event) and with-project damages not beginning until the highest model water surface elevation at 0.001 ACE (1,000-year event).

2.11 CRITICAL INFRASTRUCTURE

The following describes the existing critical infrastructure in each project area. Critical infrastructure listed here includes industrial and manufacturing facilities as well as public facilities. This is a qualitative discussion of the future without-project condition focused on the impacts associated with potential storm surge flooding. The inventory of critical infrastructure came from information derived from the Homeland Security Infrastructure Program (HSIP), an infrastructure geospatial data inventory. The critical infrastructure is reported for the project areas by type (school, chemical manufacturing, etc.). A North American Industry Classification System (NAICS) code is included in the full listing of the inventory is at the end of this appendix. The

project areas are listed by county; Orange-Jefferson CSRM includes Orange and Jefferson County; Port Arthur and Vicinity CSRM includes Jefferson County; Freeport includes Brazoria County.

Orange CSRM (Orange County)

Public Facilities – Orange County

- 20 Schools
- 14 Law enforcement
- 2 Hospitals/6 nursing homes
- 11 Fire stations

Industrial and Manufacturing – Orange County

- 20 Chemical manufacturing
- 5 Electric generation
- 0 Petroleum refining
- 1 Airport

Some of the significant industrial and manufacturing facilities located in Orange-Jefferson CSRM include Exxon Mobil, DuPont, Honeywell, Firestone, Petrochemical, Chevron, Phillips, Laxness, Solvay Solexis, and Entergy. Exxon Mobil, located in Beaumont, Texas, on the Neches River, processes 345,000 barrels of crude oil per day and produces 2.5 billion gallons of gasoline annually.

Port Arthur and Vicinity CSRM (Jefferson County)

Public Facilities – Jefferson County

- 42 Schools
- 19 Law enforcement
- 13 Hospitals/7 nursing homes
- 26 Fire stations

Industrial and Manufacturing – Jefferson County

- 54 Chemical manufacturing
- 1 Electric generation
- Petroleum refining
- 1 Airport

Significant industrial and manufacturing facilities located in the Port Arthur and Vicinity CSRM include Valero, Premcor, Total, Motiva Enterprises and Huntsman Petrochemical. Jack Brooks

Regional Airport is also in the project area. Motiva is the largest petroleum refinery in the United States, with a capacity of approximately 600,000 barrels of crude oil per day.

Freeport and Vicinity CSRM (Brazoria County)

Public Facilities – Brazoria County

- 6 Schools
- 3 Law enforcement
- 0 Hospitals/0 nursing homes
- 2 Fire stations

Industrial and Manufacturing – Brazoria County

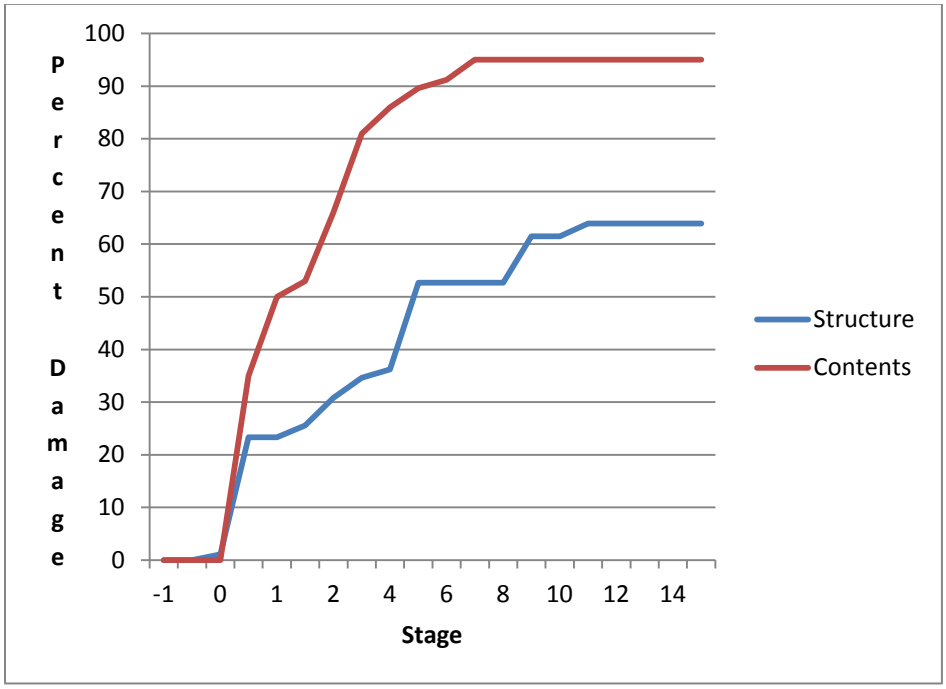
- 24 Chemical manufacturing
- 0 Electric generation
- 0 Petroleum refining

Significant industrial and manufacturing facilities located in the Freeport and Vicinity CSRM include Petroleum Reserve, Dow Chemical, Freeport LNG, Huntsman Gulf Chemicals, Phillips 66 Liquefied Petroleum Gas (LPG) Terminal, SI Group, and NALCO. A detailed description of each critical facility is not provided here; however, to explain one in some detail, Dow Chemical is the largest integrated chemical manufacturing complex in the western hemisphere. The Freeport site produces 44 percent of Dow's products sold in the U.S. and 20 percent of the company's products sold globally. A listing of these facilities is located at the end of this appendix.

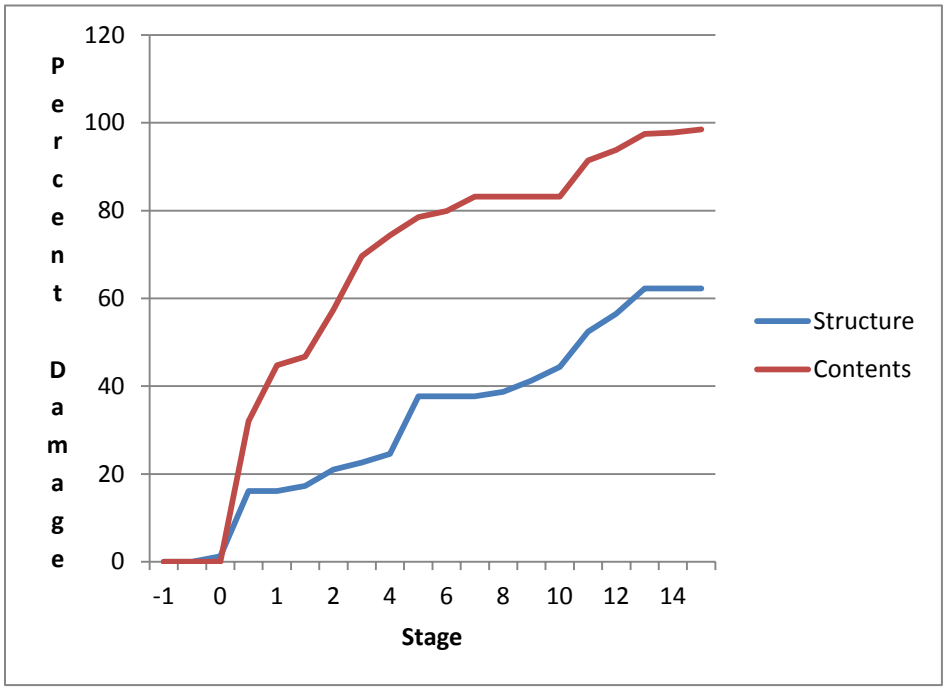
2.12 DEPTH DAMAGE FUNCTIONS

All depth-damage functions were obtained from the New Orleans District as part of their *Lower Atchafalaya and Morganza to the Gulf, Louisiana, Feasibility Study* with the exception of automobiles which are based on EGM, 09-04, *Generic Depth-Damage Relationships for Vehicles.*

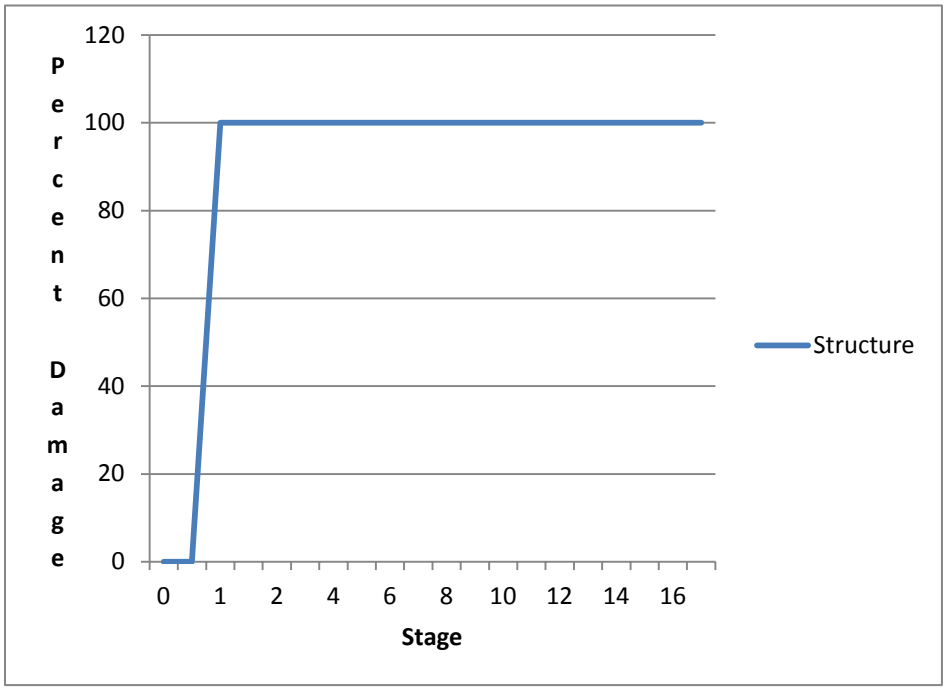
One Story Residence – Slab Foundation



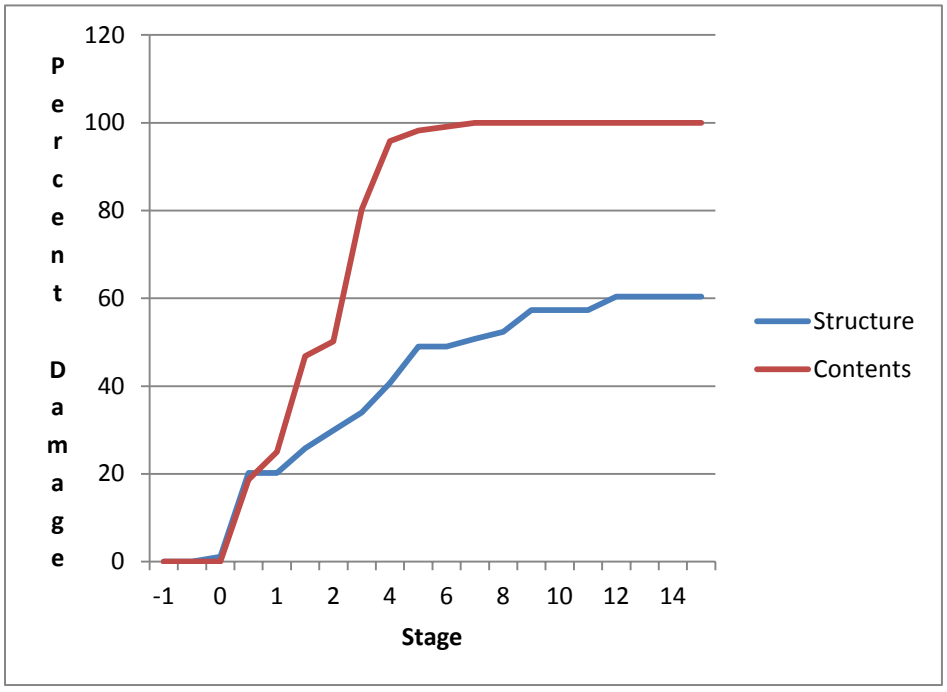
Two Story Residences – Slab Foundation



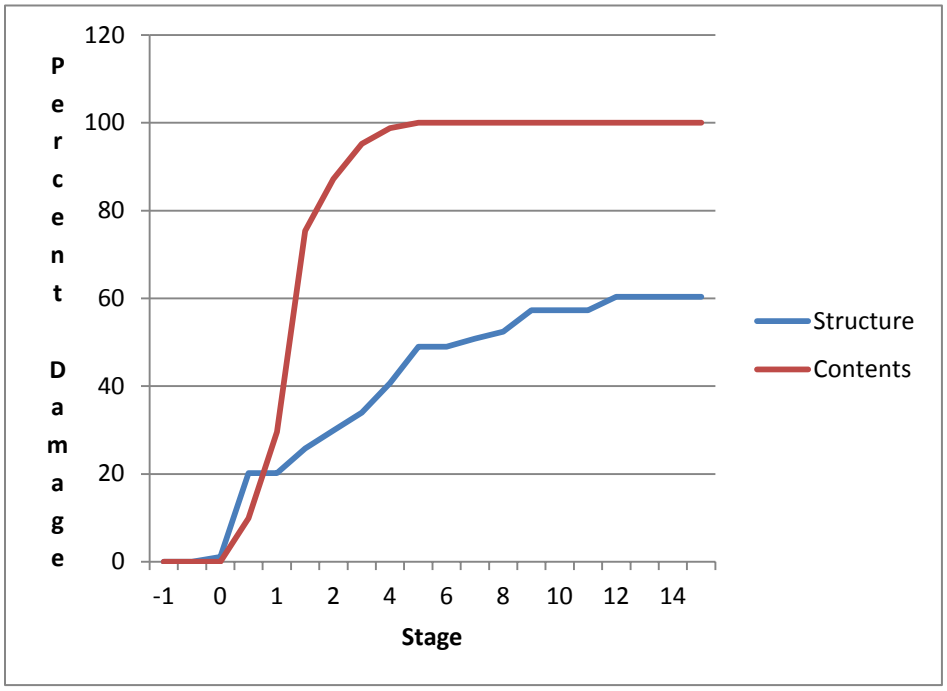
Autos



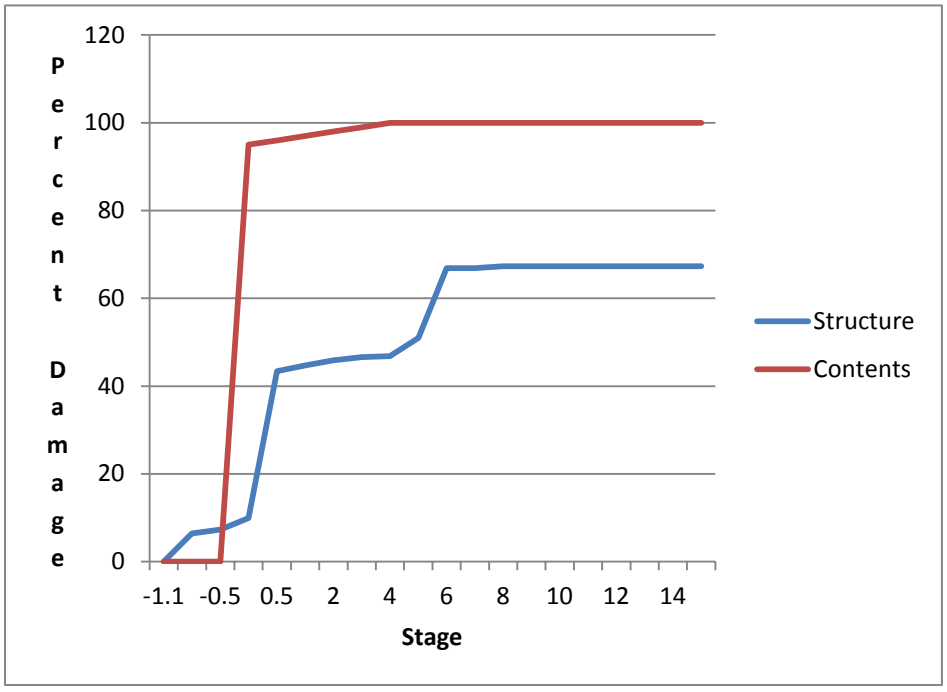
Eating Establishments



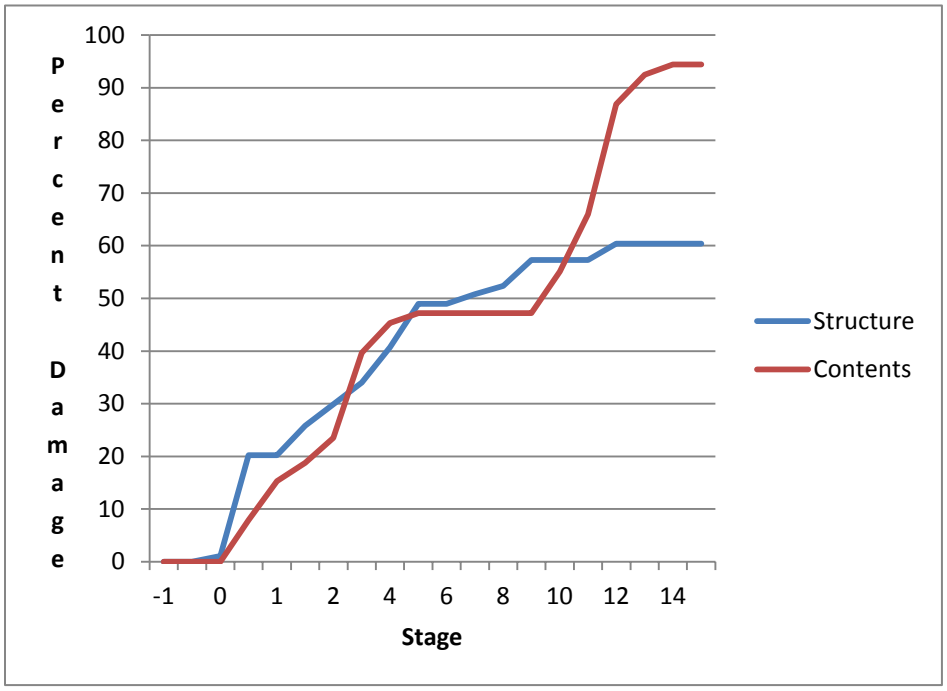
Grocery Stores



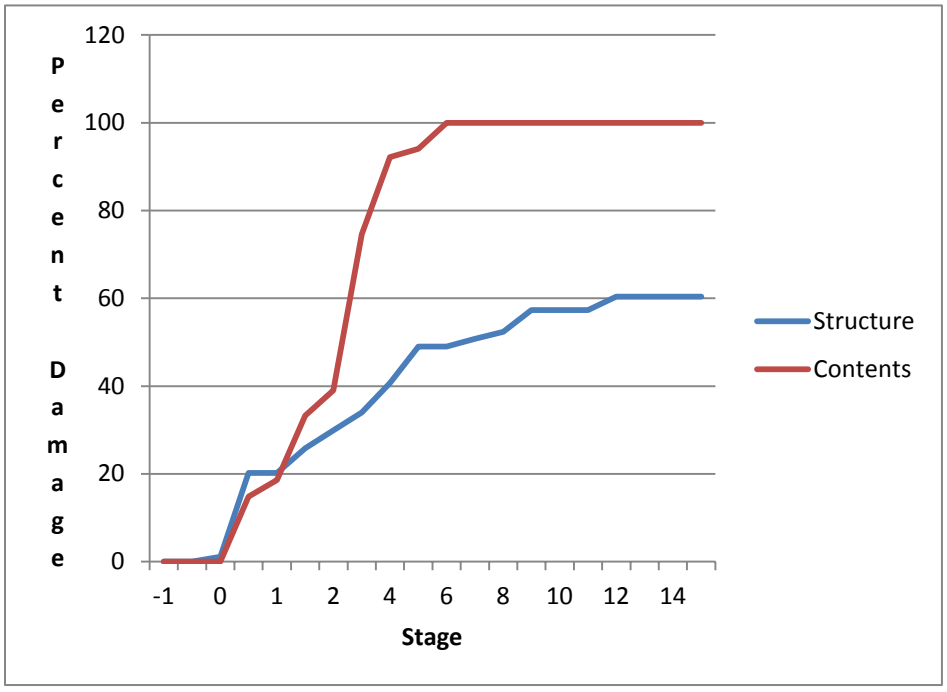
Mobile Residence



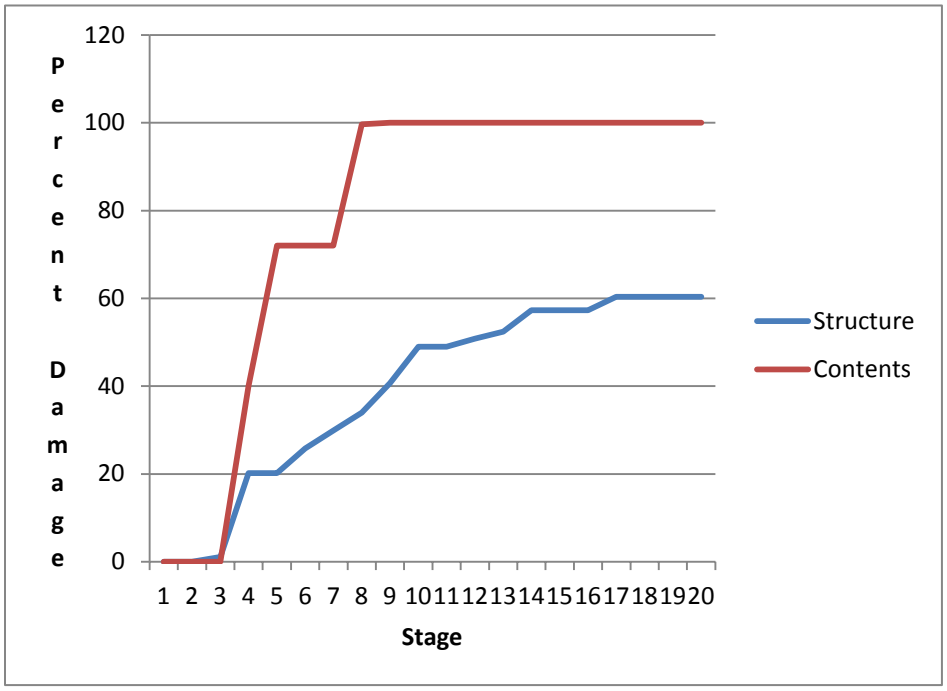
Multi-Family Residence



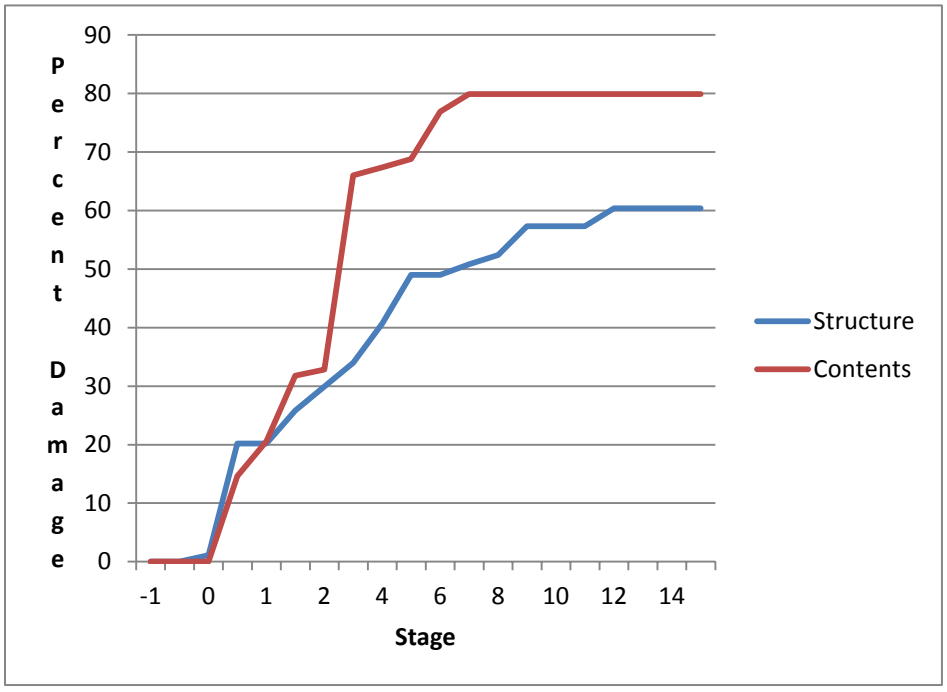
Professional Buildings



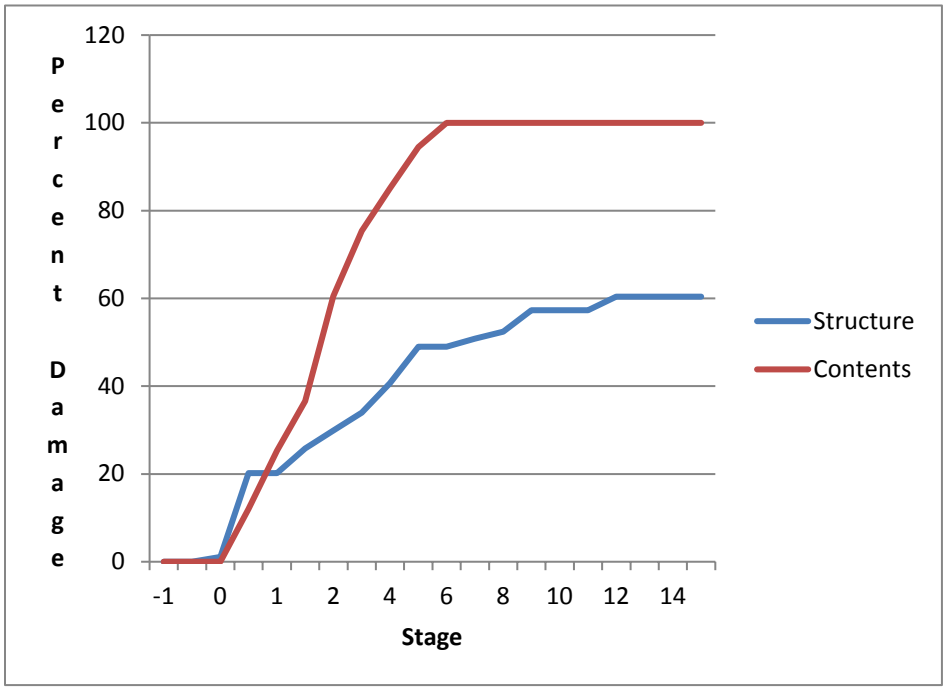
Public Buildings



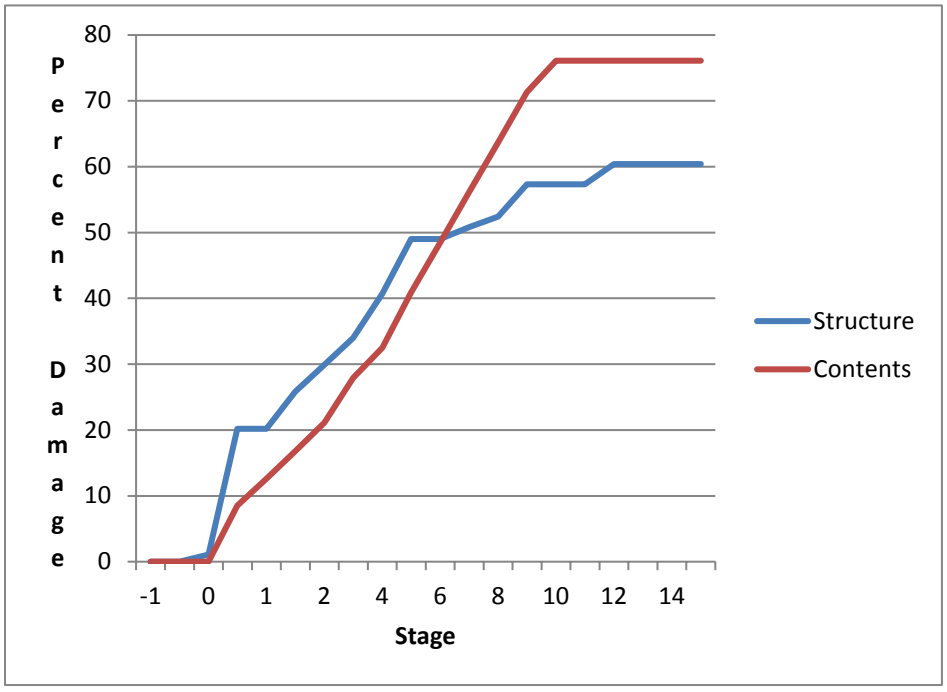
Repair



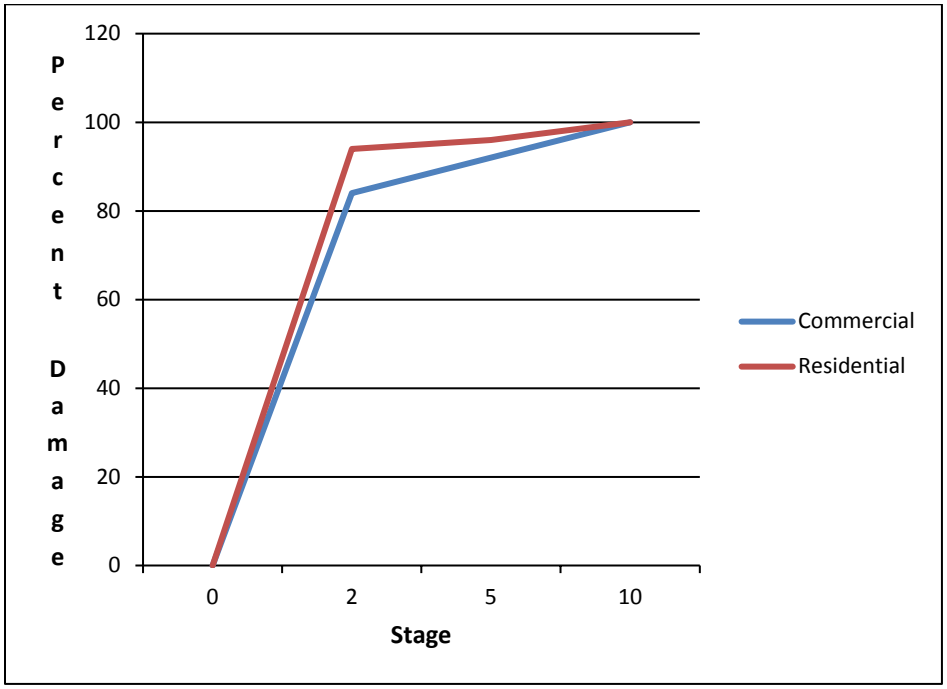
Retail



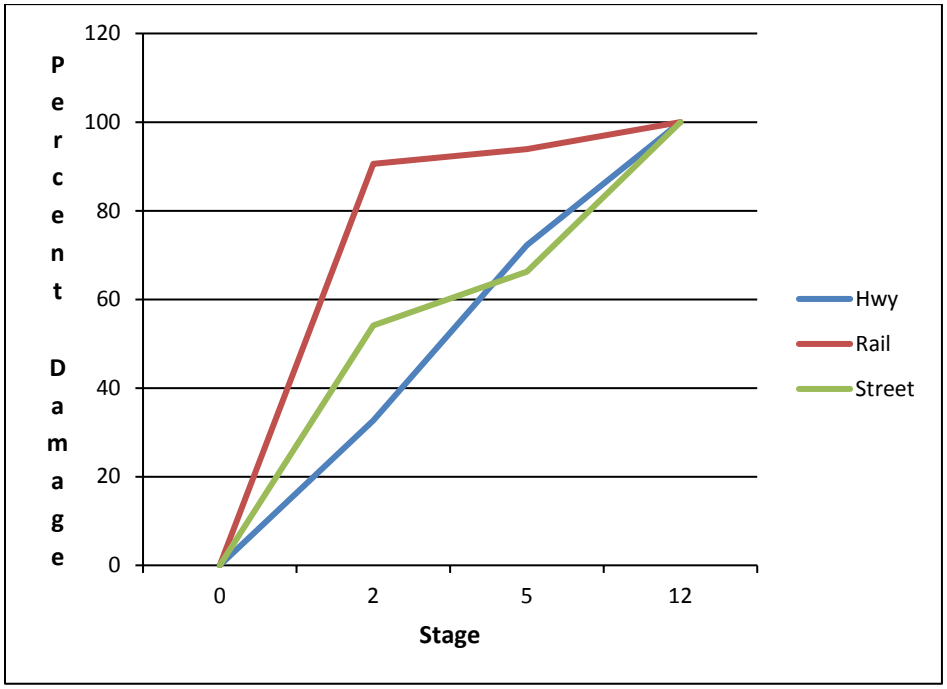
Warehouse



Debris Cleanup



Roads



2.13 LISTING OF CRITICAL INFRASTRUCTURE BY COUNTY

2.13.1 Orange

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
DuPont Sabine River Works	Orange	Pesticide and Other Agricultural Chemical Manufacturing
Solvay America Inc.	Orange	All Other Basic Inorganic Chemical Manufacturing
Latex Supply Inc.	Orange	All Other Basic Inorganic Chemical Manufacturing
Red Bird Supply, Inc.	Orange	Soap and Other Detergent Manufacturing
A Schulman Inc.	Orange	Plastics Material and Resin Manufacturing
Alloy Polymers, Inc.	Orange	Plastics Material and Resin Manufacturing
Clark & Company Inc.	Orange	All Other Basic Inorganic Chemical Manufacturing
Bourg Distributing Inc.	Bridge City	Polish and Other Sanitation Good Manufacturing
Hyett Manufacturing and Instrument Company, Inc.	Bridge City	All Other Basic Inorganic Chemical Manufacturing
Chevron Phillips Chemical Company LP	Orange	Plastics Material and Resin Manufacturing
Fine Line Colognes	Orange	Toilet Preparation Manufacturing
Lanxess Corporation Rubber Division	Orange	Synthetic Rubber Manufacturing
Invista S.A.R.L.	West Orange	Plastics Material and Resin Manufacturing
Chem32 LLC	West Orange	All Other Basic Inorganic Chemical Manufacturing
E. I. DuPont De Nemours and Company	Orange	Plastics Material and Resin Manufacturing
Nitrogen National	Orange	Industrial Gas Manufacturing
Lanxess Corp	Orange	All Other Basic Organic Chemical Manufacturing
Invista Capital Management, LLC	Orange	All Other Basic Organic Chemical Manufacturing
Invista S.A.R.L.	Orange	Plastics Material and Resin Manufacturing
Chevron Phillips Chemical Company LP	Orange	Plastics Material and Resin Manufacturing
Electric Generation		
Engineered Carbons Echo Cogeneration	Little Cypress	
Entergy Texas	Bridge City	
AirLiquide - Sabine Cogeneration LP	West Orange	
DuPont - Sabine River Works	West Orange	
SRW Cogeneration	West Orange	
Hospitals		
Harbor Hospital of Southeast Texas	Orange	

Memorial Hermann Baptist Orange Hospital	Orange
Nursing Homes	
Golden Years Assisted Living	Orange
Orange Villa Nursing and Rehabilitation	Orange
Pinehurst Nursing and Rehabilitation	Orange
Sabine House	Orange
The Meadows of Orange	Orange
Answered Prayer	Orange
Schools	
Little Cypress Jr. High	Orange
Bridge City High School	Bridge City
Bridge City Middle School	Bridge City
Little Cypress-Mauriceville High School	Orange
Little Cypress Elementary School	Orange
Little Cypress Intermediate	Orange
Oak Forest Elementary	Vidor
Vidor Middle School	Vidor
West Orange-Stark Elementary	Orange
West Orange-Stark Middle School	Orange
West Orange-Stark High School	Orange
North Early Learning Center	Orange
Orangefield Elementary	Orangefield
Orangefield High School	Orangefield
Orangefield Jr. High	Orangefield
Hatton Elementary	Bridge City
Bridge City Elementary	Bridge City
Bridge City Intermediate	Bridge City
OISD DAEP	Bridge City
Tekeo Academy of Accelerated Studies	Orange
Law Enforcement	
Orange County Sheriff Dept./Orange County Jail	Orange
Bridge City ISD Police Dept.	Bridge City
Orange Police Dept.	Orange
Rose City Police Dept.	Rose City
Vidor ISD Police Dept.	Vidor
Pine Forest Police Dept.	Vidor
Pinehurst Police Dept.	Orange
Vidor Police Dept.	Vidor
West Orange Police Dept.	Orange
Bridge City Police Dept.	Bridge City
Orange County Constable - Precinct 1	Orange
Orange County Constable - Precinct 2	Orange
Orange County Constable - Precinct 3	Orange

Orange County Constable - Precinct 4	Vidor
Fire Departments	
Bridge City Volunteer Fire and Rescue - Orangefield Station	Orange
Orange County Emergency Services District Station 1	Vidor
Orange County Emergency Services District Station 2	Vidor
Pinehurst Volunteer Fire Dept.	Orange
West Orange Volunteer Fire Dept.	West Orange
Little Cypress Fire and Rescue Station 1	Orange
Bridge City Volunteer Fire and Rescue	Bridge City
McLewis Volunteer Fire Dept.	Orange
City of Orange Fire Dept. Station 1	Orange
City of Orange Fire Dept. Station 2	Orange
City of Orange Fire Dept. Station 3	Orange
Airport	
Orange County Airport	Orange

2.13.2 Jefferson

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
Air Liquide America L.P.	Port Neches	Industrial Gas Manufacturing
Air Liquide America L.P.	Beaumont	Industrial Gas Manufacturing
Air Liquide Industrial U.S. LP	Nederland	Industrial Gas Manufacturing
Air Products and Chemicals, Inc.	Port Arthur	Industrial Gas Manufacturing
Arkema, Inc.	Beaumont	All Other Basic Inorganic Chemical Manufacturing
Ashland Elastomers LLC	Port Neches	Synthetic Rubber Manufacturing
Ashland Inc.	Port Neches	All Other Basic Organic Chemical Manufacturing
BASF Petro Chemicals	Port Arthur	All Other Miscellaneous Chemical Product and Preparation Manufacturing
BASF Petro Chemicals	Port Arthur	All Other Miscellaneous Chemical Product and Preparation Manufacturing
BASF Corporation	Beaumont	All Other Basic Organic Chemical Manufacturing
BASF Corporation	Port Arthur	All Other Basic Organic Chemical Manufacturing
Brock Specialty Services, Ltd.	Beaumont	All Other Basic Inorganic Chemical Manufacturing
Calabrian Corporation	Port Neches	All Other Basic Organic Chemical Manufacturing

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
Chemtrade Refinery Services Inc.	Beaumont	All Other Basic Inorganic Chemical Manufacturing
Chemtreat, Inc.	Nederland	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Chevron Phillips Chemical Company LP	Port Arthur	All Other Miscellaneous Chemical Product and Preparation Manufacturing
DuPont Performance Elastomers L.L.C.	Nederland	Synthetic Rubber Manufacturing
Elegant Designer Essences	Port Arthur	Toilet Preparation Manufacturing
Elixir Incense	Port Arthur	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Ethyl Additives Corporation	Port Arthur	All Other Basic Organic Chemical Manufacturing
Faubion Veterinary Clinic	Nederland	Pharmaceutical Preparation Manufacturing
Flint Hills Resources Port Arthur LLC	Port Arthur	All Other Basic Organic Chemical Manufacturing
G V C Holdings Inc.	Port Neches	Synthetic Rubber Manufacturing
Huntsman Corporation	Port Neches	Plastics Material and Resin Manufacturing
In Your Element Photography	Port Neches	All Other Basic Inorganic Chemical Manufacturing
Ineos Americas LLC	Port Arthur	All Other Miscellaneous Chemical Product and Preparation Manufacturing
J & M Resources	Port Arthur	Toilet Preparation Manufacturing
J F D Enterprises, Inc.	Groves	Toilet Preparation Manufacturing
Kbr Technical Services, Inc.	Beaumont	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Kmtex	Port Arthur	All Other Basic Inorganic Chemical Manufacturing
La Designs	Port Arthur	Toilet Preparation Manufacturing
Nature's Secret	Port Arthur	Medicinal and Botanical Manufacturing
Neo Fuels	Port Arthur	Petrochemical Manufacturing
Oci Partners LP	Nederland	Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing
Pd Glycol LP	Beaumont	Plastics Material and Resin Manufacturing
Penny's Style	Port Arthur	Toilet Preparation Manufacturing
Perfume Palace	Port Arthur	Toilet Preparation Manufacturing
Praxair, Inc.	Groves	Industrial Gas Manufacturing
Pro Star Industries, Inc.	Port Arthur	Polish and Other Sanitation Good Manufacturing
Rbf Port Neches LLC	Port Neches	Petrochemical Manufacturing
Reliable Polymer Services, LP	Port Arthur	Synthetic Rubber Manufacturing
Sally Beauty Supply LLC	Port Arthur	Toilet Preparation Manufacturing
Savage Services Corporation	Port Arthur	All Other Basic Inorganic Chemical Manufacturing

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
Scan Tech, Inc.	Nederland	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Service Offshore, Inc.	Beaumont	Paint and Coating Manufacturing
Smith and Thome Cardiovascular Consultants, L.L.P.	Port Arthur	Pharmaceutical Preparation Manufacturing
Sophia's International LLC	Port Neches	Toilet Preparation Manufacturing
Sunrose Scents	Nederland	Toilet Preparation Manufacturing
Texas Brine Company LLC	Beaumont	All Other Basic Inorganic Chemical Manufacturing
Texas Petrochemicals LP	Port Neches	All Other Basic Organic Chemical Manufacturing
Texas Petrochemicals LP	Port Neches	All Other Basic Organic Chemical Manufacturing
The Chemours Company Fc LLC	Beaumont	Synthetic Rubber Manufacturing
The Valspar Corporation	Beaumont	Paint and Coating Manufacturing
Worldwide Sorbent Products, Inc.	Port Arthur	Plastics Material and Resin Manufacturing
Petroleum Refining		
Exxon Mobil Refining & Supply Co.	Beaumont	
Total Petrochemicals Inc.	Port Arthur	
Motiva Enterprises LLC	Port Arthur	
Premcor Refining Group	Port Arthur	
Valero Refining Co.	Port Arthur	
Electric Generation	**City**	
JCO Oxides Olefins Plant	Port Neches	
Entergy Texas	Beaumont	
Public Schools	**City**	
Al Price State Juvenile Correctional Facility	Beaumont	
Jefferson County Youth Academy	Beaumont	
Preschool Center	Groves	
Groves Elementary	Groves	
Groves Middle School	Groves	
Van Buren Elementary	Groves	
Highland Park Elementary	Nederland	
Nederland High School	Nederland	
Alternative Education School	Nederland	
Helena Park Elementary	Nederland	
Hillcrest Elementary	Nederland	
Lanham Elementary	Nederland	
Central Middle School	Nederland	
Wilson Middle School	Nederland	
Dowling Elementary	Port Arthur	
Houston Elementary	Port Arthur	

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
Port Arthur Alternative Center	Port Arthur	
Stilwell Tech Center	Port Arthur	
Memorial High School	Port Arthur	
Tekeo Academy of Accelerated Studies	Port Arthur	
DeQueen Elementary	Port Arthur	
Jefferson Middle School	Port Arthur	
Lee Elementary	Port Arthur	
Travis Elementary	Port Arthur	
Tyrrell Elementary	Port Arthur	
Wheatley School Of Early Childhood Programs	Port Arthur	
Lincoln Middle School	Port Arthur	
Taft Elementary	Port Arthur	
Austin Middle School	Port Arthur	
Tekeo Academy of Accelerated Studies	Port Arthur	
Tekeo Academy of Accelerated Studies	Port Arthur	
Bob Hope School	Port Arthur	
Performing Arts School Of Technology	Port Arthur	
Staff Sergeant Lucien Adams Elementary	Port Arthur	
Washington Elementary	Port Arthur	
Memorial 9th Grade Academy at Austin	Port Arthur	
Woodcrest Elementary	Port Neches	
Port Neches Elementary	Port Neches	
Port Neches Middle School	Port Neches	
Port Neches-Groves High School	Port Neches	
Ridgewood Elementary	Port Neches	
Alter School	Port Neches	
Nursing Homes	**City**	
Gulf Healthcare Center	Port Arthur	
Magnolia Manor	Groves	
Oak Grove Nursing Home	Groves	
Senior Rehabilitation and Skilled Nursing Center	Port Arthur	
Cypress Glen East Nursing and Rehabilitation	Port Arthur	
Cypress Glen Nursing and Rehabilitation	Port Arthur	
Rose House	Port Arthur	
Hospitals	**City**	
Beaumont Bone and Joint Institute	Beaumont	
Christus Spohn Hospital - Saint Elizabeth	Beaumont	
Christus Spohn Hospital - Saint Mary	Port Arthur	
Dubuis Hospital of Beaumont	Beaumont	
Dubuis Hospital of Port Arthur	Port Arthur	

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
HealthSouth Rehabilitation Hospital - Beaumont	Beaumont	
Kate Dishman Rehabilitation Hospital	Beaumont	
Memorial Hermann Baptist Hospital	Beaumont	
Memorial Hermann Baptist Hospital - Behavioral Health Center	Beaumont	
Mid-Jefferson Extended Care Hospital	Nederland	
Promise Hospital of Southeast Texas	Nederland	
Renaissance Hospital - Groves	Groves	
The Medical Center of Southeast Texas	Port Arthur	
Law Enforcement	**City**	
Lamar University Police Dept.	Beaumont	
Beaumont Police Dept.	Beaumont	
Groves Police Dept.	Groves	
Port of Beaumont Port Authority Police Dept.	Beaumont	
Port Neches Police Department	Port Neches	
Bureau of Alcohol Tobacco & Firearms - Beaumont Field Office	Beaumont	
US Customs and Border Protection - Port of Entry - Port Arthur	Port Arthur	
Port Arthur Police Dept.	Port Arthur	
Jefferson County Sheriff's Office	Beaumont	
Beaumont ISD Police Dept.	Beaumont	
Nederland Police Department	Nederland	
Texas Dept. of Public Safety	Beaumont	
Jefferson County Constable - Precinct 1	Beaumont	
Jefferson County Constable - Precinct 2	Port Arthur	
Jefferson County Constable - Precinct 4	Beaumont	
Jefferson County Constable - Precinct 6	Beaumont	
Jefferson County Constable - Precinct 7	Beaumont	
Jefferson County Constable - Precinct 8	Port Arthur	
US Marshal's Service - Beaumont	Beaumont	
Fire Departments	**City**	
Port Arthur Fire Dept. Central Station	Port Arthur	
Beaumont Fire and Rescue Station 1	Beaumont	
Nederland Fire and Rescue	Nederland	
Beaumont Fire and Rescue Station 10	Beaumont	
Beaumont Fire and Rescue Station 11	Beaumont	
Beaumont Fire and Rescue Station 14	Beaumont	
Beaumont Fire and Rescue Station 2	Beaumont	
Beaumont Fire and Rescue Station 3	Beaumont	
Beaumont Fire and Rescue Station 4	Beaumont	

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
Beaumont Fire and Rescue Station 5	Beaumont	
Beaumont Fire and Rescue Station 6	Beaumont	
Beaumont Fire and Rescue Station 7	Beaumont	
Beaumont Fire and Rescue Station 7	Beaumont	
Beaumont Fire and Rescue Station 9	Beaumont	
Groves Fire Dept.	Groves	
Jefferson Volunteer Fire Dept.	Nederland	
LaBelle - Fannett Volunteer Fire/Emergency Medical Services - Substation	Beaumont	
Lamar Institute of Technology Regional Fire Academy	Beaumont	
Port Arthur Fire Dept. Station 1	Port Arthur	
Port Arthur Fire Dept. Station 2	Port Arthur	
Port Arthur Fire Dept. Station 3	Port Arthur	
Port Arthur Fire Dept. Station 4	Port Arthur	
Port Arthur Fire Dept. Station 5	Port Arthur	
Port Arthur Fire Dept. Station 6	Port Arthur	
Port Arthur Fire Dept. Station 8	Port Arthur	
Port Neches Fire Dept.	Port Arthur	

2.13.3 Brazoria

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
L C Huntsman-Cooper	Freeport	Plastics Material and Resin Manufacturing
Ineos Americas LLC	Freeport	All Other Basic Inorganic Chemical Manufacturing
K-Bin, Inc.	Freeport	Plastics Material and Resin Manufacturing
Air Liquide Large Industries U.S. LP	Freeport	Industrial Gas Manufacturing
Air Liquide Industrial U.S. LP	Freeport	Industrial Gas Manufacturing
S F Sulphur Company	Freeport	All Other Basic Inorganic Chemical Manufacturing
Nalco Energy Services L P	Freeport	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Services Enterprise	Freeport	Polish and Other Sanitation Good Manufacturing
Air Liquide America L.P.	Freeport	Industrial Gas Manufacturing
Shintech Incorporated	Freeport	Plastics Material and Resin Manufacturing
Air Liquide Large Industries U.S. LP	Freeport	Industrial Gas Manufacturing
Air Liquide Large Industries U.S. LP	Freeport	Industrial Gas Manufacturing
Samdac Industries	Freeport	Plastics Material and Resin Manufacturing
Si Group, Inc.	Freeport	Petrochemical Manufacturing

Chemical Manufacturing		
Business Name	**City**	**NAICS Category**
The Dow Chemical Company	Freeport	All Other Basic Inorganic Chemical Manufacturing
Avon	Freeport	Toilet Preparation Manufacturing
Solvay USA, Inc.	Freeport	All Other Basic Inorganic Chemical Manufacturing
The Dow Chemical Company	Freeport	Plastics Material and Resin Manufacturing
Matheson Tri-Gas, Inc.	Freeport	Industrial Gas Manufacturing
Vencorex U.S., Inc.	Freeport	All Other Basic Organic Chemical Manufacturing
Vencorex U.S., Inc.	Freeport	All Other Basic Organic Chemical Manufacturing
BASF Corporation	Freeport	All Other Basic Organic Chemical Manufacturing
Ineos	Freeport	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Americas Styrenics LLC	Freeport	Plastics Material and Resin Manufacturing

Schools	**City**
Brazosport High School	Freeport
OA Fleming Elementary	Freeport
Freeport Intermediate	Freeport
Jane Long Elementary	Freeport
Velasco Elementary	Freeport
O'Hara Lanier Middle School	Freeport

Fire Departments	**City**
Oyster Creek Volunteer Fire Dept.	Freeport
Freeport Fire and Emergency Medical Services Dept.	Freeport

Law Enforcement	**City**
Freeport City Marshals Office	Freeport
Freeport Police Dept.	Freeport
Brazoria County Constable - Precinct 1	Freeport

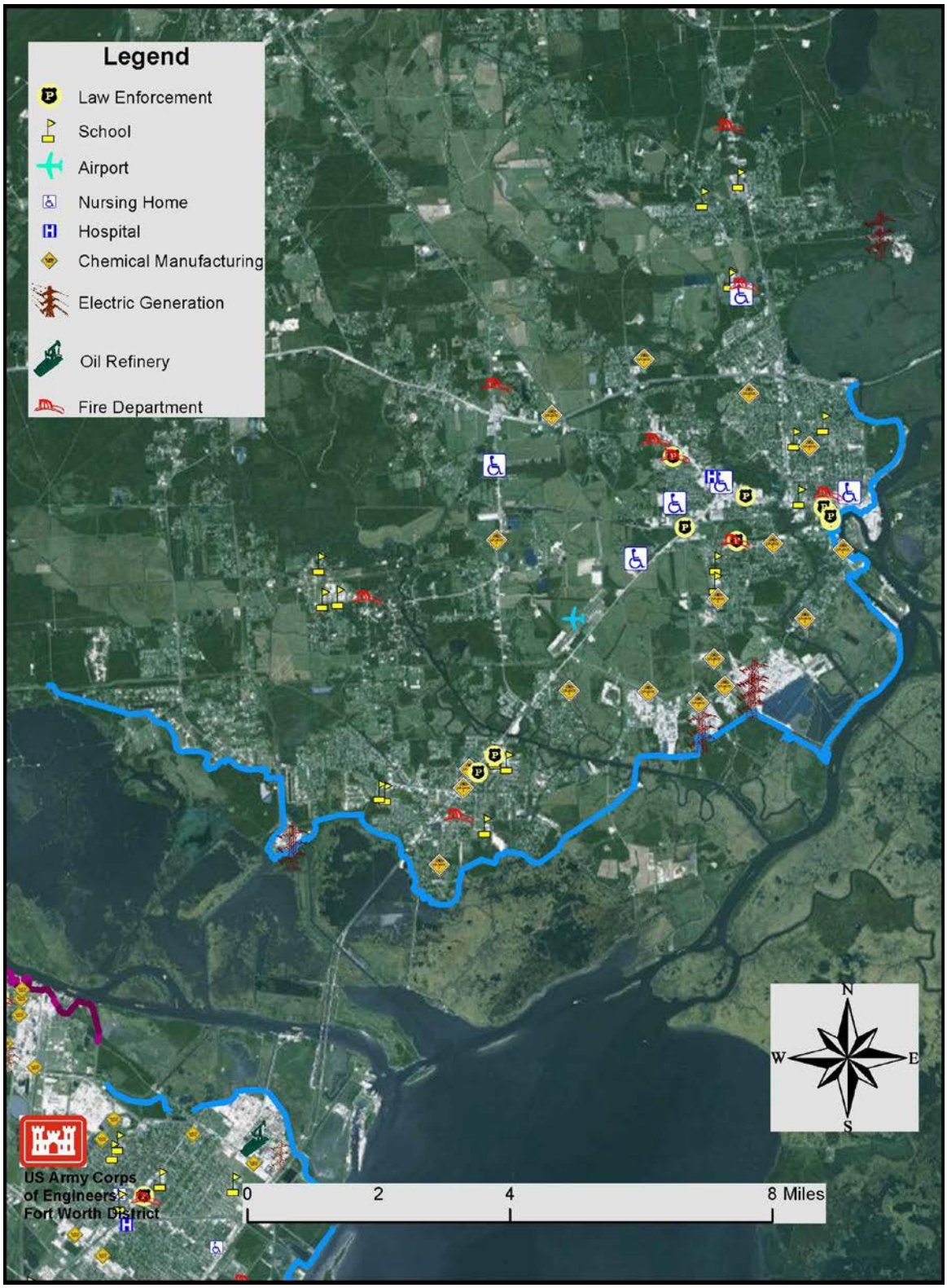


Figure 2-15. Orange County Critical Infrastructure

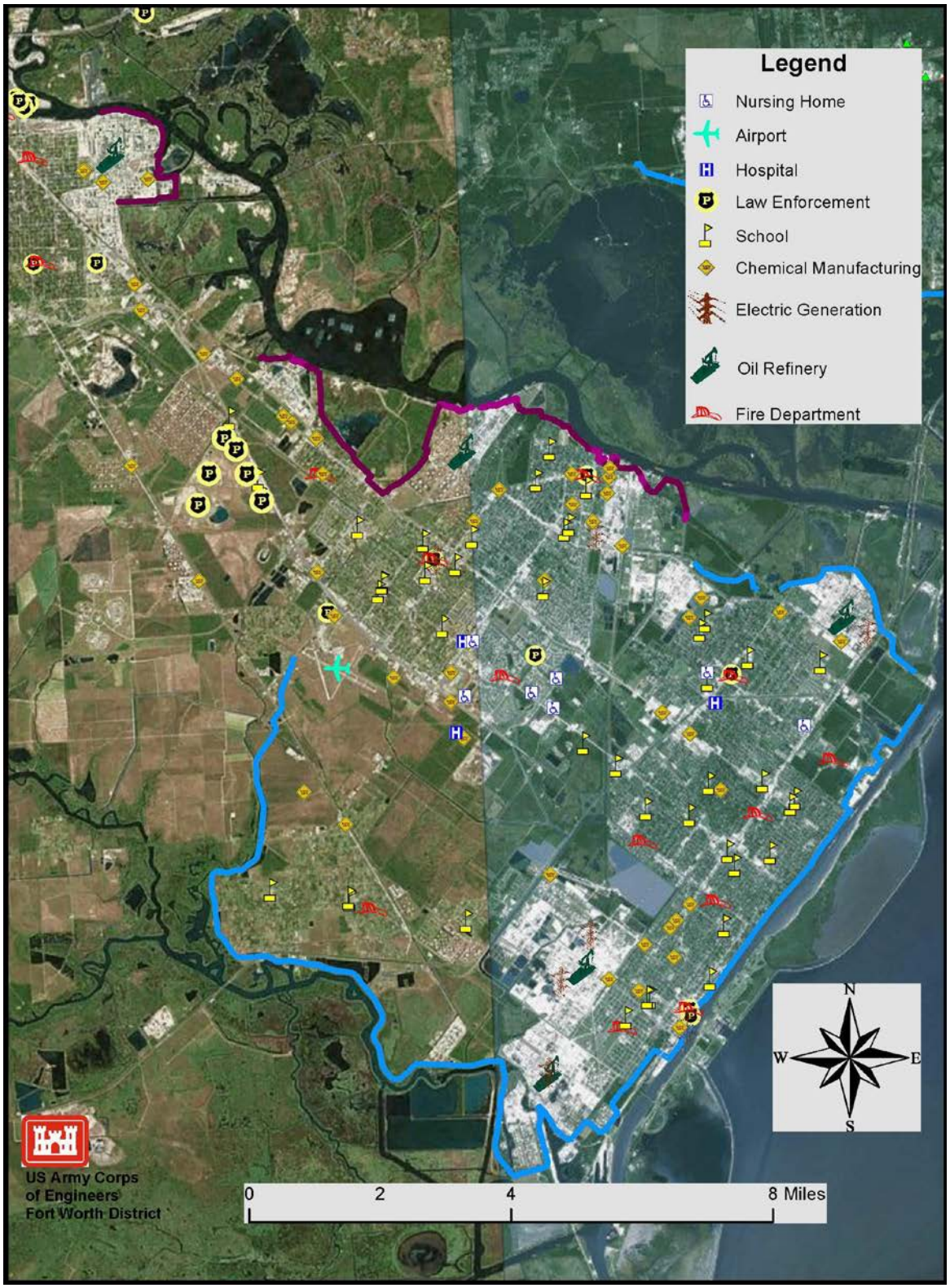


Figure 2-16. Jefferson County Critical Infrastructure

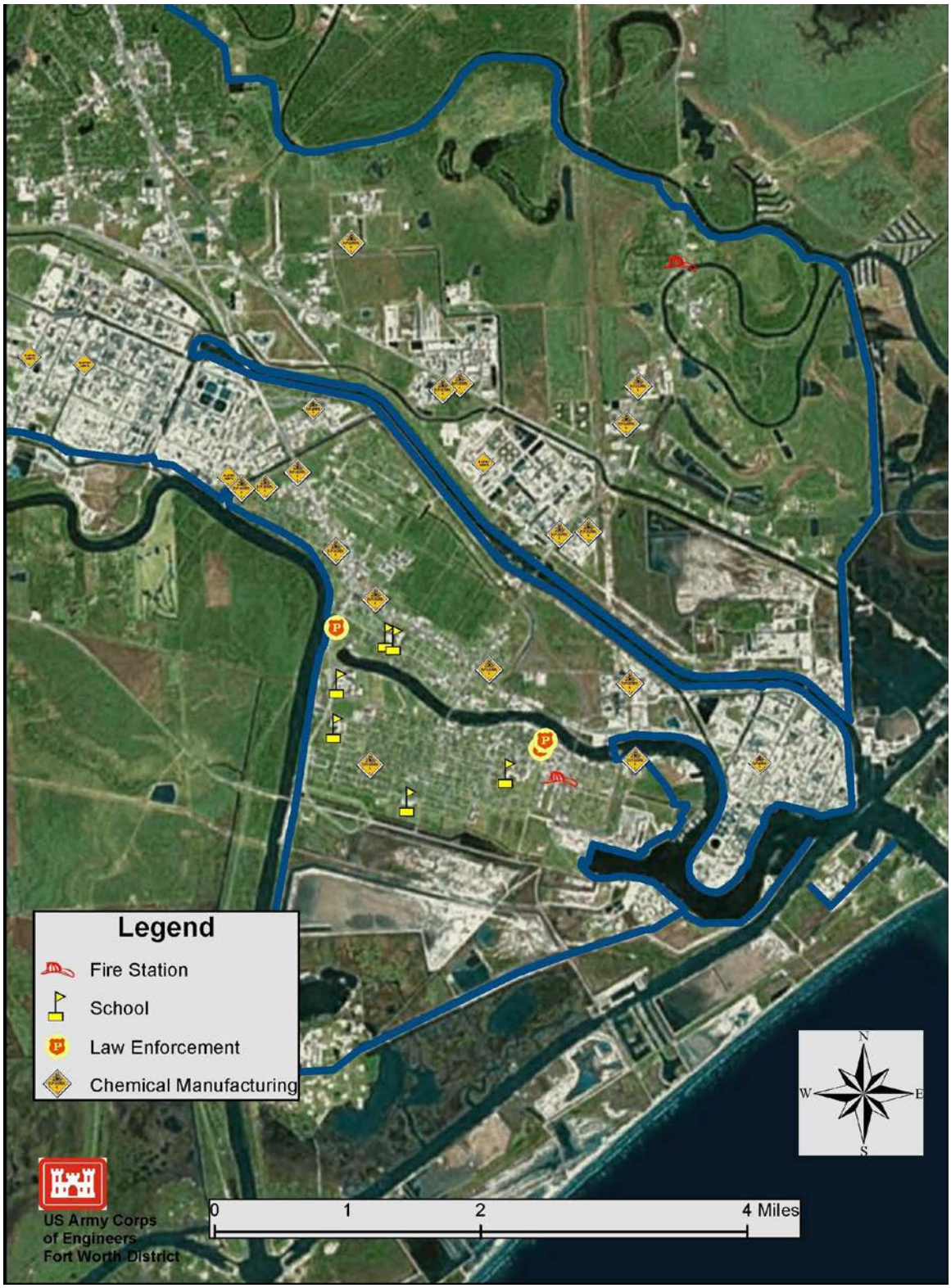


Figure 2-17. Brazoria County Critical Infrastructure

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APPENDIX 9-A
RESULTS OF FUNDING SURVEY FOR FLOOD MANAGEMENT EVALUATIONS, FLOOD MANAGEMENT STRATEGIES, AND FLOOD MITIGATION PROJECTS

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Anderson County	FME	Anderson County Update Flood Hazard Mapping	051000001	2034	$2,236,919	$0	$2,236,919	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FME	Angelina County Update Flood Hazard Mapping	051000002	2034	$3,900,000	$0	$3,900,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FME	Chambers County Update Flood Hazard Mapping	051000003	2034	$652,546	$0	$652,546	*Unknown*	*0%*	*100%*	*100%*
5	Cherokee County	FME	Cherokee County Update Flood Hazard Mapping	051000004	2034	$4,800,000	$0	$4,800,000	*Other*	*0%*	*100%*	*100%*
5	Galveston County	FME	Galveston County Update Flood Hazard Mapping	051000005	2034	$68,502	$0	$68,502	*Unknown*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Update Flood Hazard Mapping	051000006	2034	$1,800,000	$0	$1,800,000	*State or Federal*	*0%*	*100%*	*100%*
5	Henderson County	FME	Henderson County Update Flood Hazard Mapping	051000007	2034	$1,681,614	$0	$1,681,614	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FME	Houston County Update Flood Hazard Mapping	051000008	2034	$1,697,174	$0	$1,697,174	*Unknown*	*0%*	*100%*	*100%*
5	Jasper County	FME	Jasper County Update Flood Hazard Mapping	051000009	2034	$1,210,721	$0	$1,210,721	*State or Federal*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County	FME	Jefferson County Update Flood Hazard Mapping	051000010	2034	$1,900,000	$0	$1,900,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FME	Liberty County Update Flood Hazard Mapping	051000011	2034	$402,626	$0	$402,626	*Unknown*	*0%*	*100%*	*100%*
5	Nacogdoches County	FME	Nacogdoches County Update Flood Hazard Mapping	051000012	2034	$4,400,000	$0	$4,400,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County	FME	Orange County Update Flood Hazard Mapping	051000013	2034	$760,000	$0	$760,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FME	Polk County Update Flood Hazard Mapping	051000014	2034	$375,054	$0	$375,054	*Unknown*	*0%*	*100%*	*100%*
5	Rusk County	FME	Rusk County Update Flood Hazard Mapping	051000015	2034	$1,318,550	$0	$1,318,550	*Unknown*	*0%*	*100%*	*100%*
5	Sabine County	FME	Sabine County Update Flood Hazard Mapping	051000016	2034	$182,571	$0	$182,571	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FME	San Augustine County Update Flood Hazard Mapping	051000017	2034	$904,125	$0	$904,125	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FME	Shelby County Update Flood Hazard Mapping	051000018	2034	$711,827	$0	$711,827	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Smith County	FME	Smith County Update Flood Hazard Mapping	051000019	2034	$1,225,342	$0	$1,225,342	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FME	Trinity County Update Flood Hazard Mapping	051000020	2034	$1,540,238	$0	$1,540,238	*Unknown*	*0%*	*100%*	*100%*
5	Tyler County	FME	Tyler County Update Flood Hazard Mapping	051000021	2034	$1,800,000	$0	$1,800,000	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FME	Van Zandt County Update Flood Hazard Mapping	051000022	2034	$1,111,237	$0	$1,111,237	*Unknown*	*0%*	*100%*	*100%*
5	Anderson County	FME	Anderson County Master Drainage Plan	051000023	2034	$737,953	$0	$737,953	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FME	Angelina County Master Drainage Plan	051000024	2034	$1,700,000	$0	$1,700,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FME	Chambers County Master Drainage Plan	051000025	2034	$1,600,000	$0	$1,600,000	*Unknown*	*0%*	*100%*	*100%*
5	Cherokee County	FME	Cherokee County Master Drainage Plan	051000026	2034	$1,600,000	$0	$1,600,000	*Other*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Master Drainage Plan	051000027	2034	$1,000,000	$0	$1,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Henderson County	FME	Henderson County Master Drainage Plan	051000028	2034	$1,900,000	$0	$1,900,000	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FME	Houston County Master Drainage Plan	051000029	2034	$610,983	$0	$610,983	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jasper County	FME	Jasper County Master Drainage Plan	051000030	2034	$1,200,000	$0	$1,200,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County	FME	Jefferson County Master Drainage Plan	051000031	2034	$1,100,000	$0	$1,100,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FME	Liberty County Master Drainage Plan	051000032	2034	$201,313	$0	$201,313	*Unknown*	*0%*	*100%*	*100%*
5	Nacogdoches County	FME	Nacogdoches County Master Drainage Plan	051000033	2034	$1,900,000	$0	$1,900,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County	FME	Orange County Master Drainage Plan	051000034	2034	$450,000	$0	$450,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FME	Polk County Master Drainage Plan	051000035	2034	$150,021	$0	$150,021	*Unknown*	*0%*	*100%*	*100%*
5	Rusk County	FME	Rusk County Master Drainage Plan	051000036	2034	$1,400,000	$0	$1,400,000	*Unknown*	*0%*	*100%*	*100%*
5	Sabine County	FME	Sabine County Master Drainage Plan	051000037	2034	$76,348	$0	$76,348	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FME	San Augustine County Master Drainage Plan	051000038	2034	$379,732	$0	$379,732	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FME	Shelby County Master Drainage Plan	051000039	2034	$1,250,000	$0	$1,250,000	*Unknown*	*0%*	*100%*	*100%*
5	Smith County	FME	Smith County Master Drainage Plan	051000040	2034	$538,612	$0	$538,612	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FME	Trinity County Master Drainage Plan	051000041	2034	$481,324	$0	$481,324	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Tyler County	FME	Tyler County Master Drainage Plan	051000042	2034	$700,000	$0	$700,000	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FME	Van Zandt County Master Drainage Plan	051000043	2034	$484,386	$0	$484,386	*Unknown*	*0%*	*100%*	*100%*
5	City of Palestine	FME	City of Palestine Master Drainage Plan	051000044	2034	$700,000	$0	$700,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lufkin	FME	City of Lufkin Master Drainage Plan	051000045	2034	$1,000,000	$0	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Jacksonville	FME	City of Jacksonville Master Drainage Plan	051000046	2034	$560,000	$0	$560,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rusk	FME	City of Rusk Master Drainage Plan	051000047	2034	$280,000	$0	$280,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton Master Drainage Plan	051000048	2034	$380,000	$0	$380,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FME	City of Rose Hill Acres Master Drainage Plan	051000049	2034	$200,000	$0	$200,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Silsbee	FME	City of Silsbee Master Drainage Plan	051000050	2034	$320,000	$0	$320,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Athens	FME	City of Athens Master Drainage Plan	051000051	2034	$31,056	$0	$31,056	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	City of Jasper	FME	City of Jasper Master Drainage Plan	051000052	2034	$440,000	$0	$440,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Beaumont	FME	City of Beaumont Master Drainage Plan	051000053	2034	$600,000	$0	$600,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Nederland	FME	City of Nederland Master Drainage Plan	051000054	2034	$240,000	$0	$240,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Nacogdoches	FME	City of Nacogdoches Update Flood Control Study	051000055	2034	$1,080,000	$0	$1,080,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Henderson	FME	City of Henderson Master Drainage Plan	051000056	2034	$480,000	$0	$480,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Arp	FME	City of Arp Master Drainage Plan	051000057	2034	$1,300,000	$0	$1,300,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Tyler	FME	City of Tyler Master Drainage Plan	051000058	2034	$2,200,000	$0	$2,200,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Whitehouse	FME	City of Whitehouse Master Drainage Plan	051000059	2034	$150,000	$0	$150,000	*Other*	*0%*	*100%*	*100%*
5	Angelina County	FME	Willie Nerron Road and Gillan Creek Bridge Replacement	051000060	2034	$325,000	$0	$325,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	City of Diboll	FME	Hall Street over White Oak Creek Bridge Improvements	051000061	2034	$103,000	$0	$103,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Huntington	FME	Preliminary Engineering of Gibsonville Street and Porterville Road Bridges Improvements	051000062	2034	$650,000	$0	$650,000	*Other*	*0%*	*100%*	*100%*
5	City of Huntington	FME	Shawnee Creek Concrete Canal	051000063	2034	$390,000	$0	$390,000	*Other*	*0%*	*100%*	*100%*
5	City of Lufkin	FME	City of Lufkin Detention Pond Construction and Improvements	051000064	2034	$82,500	$0	$82,500	*Unknown*	*0%*	*100%*	*100%*
5	City of Anahuac	FME	Anahuac, North of Canal Drainage	051000065	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FME	Dredging West Fork- Double Bayou	051000066	2034	$1,400,000	$0	$1,400,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FME	Spindletop Bayou Ditch Improvement	051000067	2034	$1,500,000	$0	$1,500,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Anahuac	FME	North Anahuac Drainage	051000068	2034	$800,000	$0	$800,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Anahuac	FME	Southeast Drainage Ditch	051000069	2034	$125,000	$0	$125,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Anahuac	FME	Southwest Anahuac Ditch	051000070	2034	$125,000	$0	$125,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	City of Lumberton	FME	City of Lumberton Adler Ditch Drainage Improvements	051000071	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton East Village Creek Parkway Drainage Improvements	051000072	2034	$125,000	$0	$125,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton Greens Branch Ditch Western Extension	051000073	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton Drainage Chance Cut Off Concrete Lining	051000074	2034	$50,000	$0	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton Detention Pond at FM 421	051000075	2034	$50,000	$0	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FME	City of Lumberton Elevate Taft Road and Brushy Creek Subdivision	051000076	2034	$75,000	$0	$75,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FME	City of Rose Hill Acres Flood Mitigation Improvements	051000077	2034	$500,000	$0	$500,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	City of Nacogdoches	FME	City of Nacogdoches Flood Mitigation Project	051000078	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FME	City of Rose Hill Acres Ditch Improvements	051000079	2034	$50,000	$0	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FME	City of Rose Hill Acres Road and Bridge Elevation	051000080	2034	$50,000	$0	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Silsbee	FME	City of Silsbee Easy Street Drainage Improvements	051000081	2034	$50,000	$0	$50,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Vidor	FME	City of Vidor Schoolhouse Ditch Alternative B	051000082	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Vidor	FME	City of Vidor Schoolhouse Ditch Alternative C	051000083	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Vidor	FME	City of Vidor Drainage Improvements	051000084	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Black Creek Detention Pond	051000085	2034	$150,000	$0	$150,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Boggy Creek Detention Pond	051000086	2034	$150,000	$0	$150,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Cooks Lake Road Bridge Elevation	051000087	2034	$20,000	$0	$20,000	*State or Federal*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Hardin County	FME	Hardin County Reservoir	051000088	2034	$500,000	$0	$500,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County South Area Drainage System	051000089	2034	$1,000,000	$0	$1,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County SE Area Drainage System	051000090	2034	$1,250,000	$0	$1,250,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Pinewood Drainage Improvements	051000091	2034	$350,000	$0	$350,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Coon Marsh Gully Drainage Improvements	051000092	2034	$300,000	$0	$300,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FME	Hardin County Municipal Storm Drain Project	051000093	2034	$2,000,000	$0	$2,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Coffee City	FME	City of Coffee City Flood-prone Roadway and Infrastructure Evaluation	051000094	2034	$25,000	$0	$25,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Moore Station	FME	City of Moore Station Flood-prone Roadway and Infrastructure Evaluation	051000095	2034	$25,000	$0	$25,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Houston County	FME	Houston County Earthen Dike Construction	051000096	2034	$16,972	$0	$16,972	*Unknown*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FME	Ditch 100 A (East Caldwood) Improvements	051000097	2034	$75,000	$0	$75,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FME	Ditch 119 Crossings at Yount and Edson	051000098	2034	$50,000	$0	$50,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FME	Lateral B4A and B4A Ext. Improvements	051000099	2034	$225,000	$0	$225,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Pump Station	051000100	2034	$2,000,000	$0	$2,000,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Upgrade to Lateral B4B	051000101	2034	$50,000	$0	$50,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Beauxart Gardens Central Ditch Improvements	051000102	2034	$50,000	$0	$50,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Houston Upgrade Pumping Equipment	051000103	2034	$250,000	$0	$250,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Grannis Upgrade Pumping Equipment	051000104	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County Drainage District 7	FME	Foley Upgrade Pumping Equipment	051000105	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Lakeside Upgrade Pumping Equipment	051000106	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Upgrade Pumping Equipment	051000107	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	9th Avenue - Upgrade Pumping Equipment	051000108	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Halbouty Add two pumps (open spots in structure)	051000109	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Upper Build new station with associated levee	051000110	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Main C Diversion - Build New Pump Station and Channel	051000111	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Upper Johns Gulley Upgrade Drainage Channel	051000112	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County Drainage District 7	FME	Central Gardens Ditch - Upgrade Drainage Channel	051000113	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Pure Oil Ditch Improvements	051000114	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Gulley Ditch Improvements	051000115	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Main C Diversion Channel Improvements	051000116	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Main B Channel Improvements	051000117	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Main A Channel Improvements	051000118	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Lateral 5 Detention Pond Excavation	051000119	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Halbouty Detention Pond Excavation	051000120	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	9th Avenue Additional Detention Excavation	051000121	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County Drainage District 6	FME	Tevis Diversion	051000122	2034	$100,000	$0	$100,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FME	JCDD7 Hurricane Flood Protection Levee Study	051000123	2034	$777,000	$0	$777,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Crane Bayou Channel Improvements	051000124	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Upper Additional Pump Station	051000125	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 6	FME	South Park Diversion	051000126	2034	$100,000	$0	$100,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FME	Blanchette Diversion	051000127	2034	$100,000	$0	$100,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FME	Rodair Gully System Detention	051000128	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	El Vista Upgrade Pumping Equipment	051000129	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	W. Port Arthur Road Upgrade Pumping Equipment	051000130	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County Drainage District 7	FME	Central - Upgrade Pumping Equipment and Structure	051000131	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Star Lake Upgrade Pumping Equipment	051000132	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Crane Bayou Additional Pumping	051000133	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Lakeview Additional Pumping	051000134	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	City of Daisetta	FME	City of Daisetta Drainage Projects	051000135	2034	$150,000	$0	$150,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FME	Liberty County Culvert Replacement Project	051000136	2034	$100,657	$0	$100,657	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FME	Liberty County Recanalization Feasibility Study	051000137	2034	$26,171	$0	$26,171	*Unknown*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FME	Stadium Upgrade Pumping Equipment	051000138	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Delmar Upgrade Pumping Equipment	051000139	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Jefferson County Drainage District 7	FME	DeQueen Additional Pumping Equipment	051000140	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 7	FME	Shreveport Additional Pumping Equipment	051000141	2034	$100,000	$0	$100,000	*Taxes*	*25%*	*75%*	*100%*
5	Jefferson County Drainage District 6	FME	Delaware Diversion	051000142	2034	$500,000	$0	$500,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FME	Tyrrell Park Detention	051000143	2034	$500,000	$0	$500,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FME	Mayhaw Lateral Improvements	051000144	2034	$2,200,000	$0	$2,200,000	*State or Federal*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Feasibility Assessment for Increase in Size of Culverts and Railroad Trestles on Major Drainage Structures Throughout Orange County	051000145	2034	$150,000	$0	$150,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Orange County Drainage District	FME	Feasibility Assessment of the Capacity of Drainage Ditches and Channels that Convey Stormwater from Neighborhoods Located Within Orange County	051000146	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Orange County DD Harvey Repairs	051000147	2034	$130,000	$0	$130,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Orange County DD SW Detention/ Retention Facilities	051000148	2034	$130,000	$0	$130,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Feasibility Assessment of Widening and Deepening Segments of Tiger Creek	051000149	2034	$150,000	$0	$150,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Feasibility Assessment of Construction of a Stormwater Detention Pond Adjacent to Tiger Creek	051000150	2034	$100,000	$0	$100,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	Identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
5	Orange County Drainage District	FME	Feasibility Assessment of Widening and Deepening Segments of Ten-Mile Creek	051000151	2034	$175,000	$0	$175,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Feasibility Assessment of Widening and Deepening Segments of Anderson Gully	051000152	2034	$325,000	$0	$325,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Bullard	FME	City of Bullard Culvert Upgrades	051000153	2034	$50,000	$0	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	Smith County	FME	Smith County Drainage Capacity Upgrades	051000154	2034	$225,000	$0	$225,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Bridge City Drainage Outfall Improvement Project	051000155	2034	$200,000	$0	$200,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FME	Colonial Outfall Ditch Culvert Improvements	051000156	2034	$200,000	$0	$200,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Beaumont	FME	City of Beaumont Drainage Studies	051000157	2034	$118,750	$0	$118,750	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Anderson County	FMS	Anderson County Flood Education Program	052000001	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	Anderson County	FMS	Anderson County Natural Hazards Education Program Development	052000002	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Frankston	FMS	City of Frankston Flood Education Program	052000003	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FMS	Angelina County Public Education on Mitigation Techniques	052000004	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FMS	Chambers County Public Education on Mitigation Techniques	052000005	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Gallatin	FMS	City of Gallatin “Turn Around Don’t Drown” Campaign	052000006	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Jacksonville	FMS	City of Jacksonville Public Education on Mitigation Actions	052000007	2029	$20,000	*Unknown*	$20,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rusk	FMS	City of Rusk "Turn Around Don't Drown" Campaign	052000008	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	Henderson County	FMS	Henderson County Emergency Training Program	052000009	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Berryville	FMS	City of Berryville Public Education on Mitigation Techniques	052000010	2029	$3,000	*Unknown*	$3,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Brownsboro	FMS	City of Brownsboro Flood Mitigation Education for City Officials and Citizens	052000011	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Henderson County	FMS	City of Brownsboro Public Education on Mitigation Techniques	052000012	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*
5	Henderson County	FMS	City of Chandler Citizen/Business /City Mitigation Strategy Planning	052000013	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	Henderson County	FMS	City of Chandler Public Education on Code Red System	052000014	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Property Elevation and Public Education on NFIP	052000015	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Houston County	FMS	Houston County Public Education Program on Emergency Evacuation	052000016	2029	$22,200	*Unknown*	$22,200	*Unknown*	*0%*	*100%*	*100%*
5	City of Kennard	FMS	City of Kennard Public Awareness Program	052000017	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FMS	JCDD6 Public Education Material Distribution	052000018	2029	$50,000	*Unknown*	$50,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Daisetta	FMS	City of Daisetta Education of City Council on Mitigation Benefits	052000019	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Nacogdoches	FMS	City of Nacogdoches Public Education Program	052000020	2029	$20,000	*Unknown*	$20,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FMS	Polk County Public Education Campaign	052000021	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	San Augustine County	FMS	San Augustine County Public Education on Mitigation Techniques	052000022	2029	$10,600	*Unknown*	$10,600	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Public Education on Hazards	052000023	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Groveton	FMS	City of Groveton Public Education on Mitigation Actions	052000024	2029	$5,100	*Unknown*	$5,100	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FMS	Trinity County Public Education on Mitigation Actions	052000025	2029	$10,200	*Unknown*	$10,200	*Unknown*	*0%*	*100%*	*100%*
5	Anderson County	FMS	Anderson County Code Red System	052000026	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FMS	Angelina County Siren Warning System Installation	052000027	2029	$209,000	*Unknown*	$209,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Houston County	FMS	Houston County Alert/Notification System Installation	052000028	2029	$602,000	*Unknown*	$602,000	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Gage Installation and Monitoring	052000029	2029	$121,000	*Unknown*	$121,000	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Rainfall Observer Program	052000030	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Brownsboro	FMS	City of Brownsboro Code Red System Implementation	052000031	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Chandler	FMS	City of Chandler Warning Siren Maintenance	052000032	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Murchison	FMS	City of Murchison Warning Siren System Installation	052000033	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Jefferson County Drainage District 6	FMS	JCDD6 Increase Flood Predictive Capability for Streams and Creeks	052000034	2029	$100,000	*Unknown*	$100,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FMS	JCDD7 Update Data Operation System-Control Center	052000035	2029	$104,000	*Unknown*	$104,000	*Taxes*	*25%*	*75%*	*100%*
5	Orange County Drainage District	FMS	OCDD Hazard Notification System Development	052000036	2029	$11,000	*Unknown*	$11,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FMS	OCDD Installing Additional Stream Gages	052000037	2029	$534,000	*Unknown*	$534,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FMS	Polk County Improved Hazard Communication	052000038	2029	$3,110,000	*Unknown*	$3,110,000	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Electronic Hazard Warning Message Board Acquisition	052000039	2029	$111,000	*Unknown*	$111,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Shelby County	FMS	Shelby County Warning Siren Installation	052000040	2029	$3,319,000	*Unknown*	$3,319,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Groveton	FMS	City of Groveton Warning System Upgrades	052000041	2029	$11,000	*Unknown*	$11,000	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FMS	Van Zandt County Warning System Acquisition	052000042	2029	$82,000	*Unknown*	$82,000	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FMS	Angelina County Property Acquisition	052000043	2029	$2,100,000	*Unknown*	$2,100,000	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FMS	Angelina County Property Elevation	052000044	2029	$630,000	*Unknown*	$630,000	*Unknown*	*0%*	*100%*	*100%*
5	Hardin County	FMS	Hardin County Voluntary Flood Buyout	052000045	2029	$4,000,000	*Unknown*	$4,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FMS	Hardin County Voluntary Residential Structure Elevation	052000046	2029	$7,500,000	*Unknown*	$7,500,000	*State or Federal*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Kountze	FMS	City of Kountze Flood Buyout	052000047	2029	$6,000,000	*Unknown*	$6,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FMS	City of Lumberton Voluntary Flood Buyout	052000048	2029	$6,000,000	*Unknown*	$6,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FMS	City of Rose Hill Acres Voluntary Flood Buyout	052000049	2029	$5,000,000	*Unknown*	$5,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FMS	City of Rose Hill Acres Voluntary Residential Structure Elevation	052000050	2029	$6,000,000	*Unknown*	$6,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Silsbee	FMS	City of Silsbee Voluntary Flood Buyout	052000051	2029	$6,000,000	*Unknown*	$6,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Sour Lake	FMS	City of Sour Lake Voluntary Flood Buyout	052000052	2029	$6,000,000	*Unknown*	$6,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County	FMS	Jefferson County Property Elevation	052000053	2029	$1,110,000	*Unknown*	$1,110,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FMS	Liberty County Property Acquisition	052000054	2029	$2,140,000	*Unknown*	$2,140,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Nacogdoches	FMS	City of Nacogdoches Study and Ranking of Repetitive Loss Structures	052000055	2029	$327,000	*Unknown*	$327,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Acquisition and Conversion of Flood Prone Properties	052000056	2029	$530,000	*Unknown*	$530,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Structure Elevation	052000057	2029	$318,000	*Unknown*	$318,000	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Property Acquisition	052000058	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FMS	Trinity County Buyout Program Implementation	052000059	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Groveton	FMS	City of Groveton Buyout Program Implementation	052000060	2029	$100,000	*Unknown*	$100,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Diboll	FMS	City of Diboll Ordinance and Regulation Update	052000061	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Cuney	FMS	City of Cuney Bridge and Culvert Inspection Program	052000062	2029	$25,000	*Unknown*	$25,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Cuney	FMS	City of Cuney Seek NFIP Participation	052000063	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Gallatin	FMS	City of Gallatin Multi-Jurisdiction Coordination	052000064	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Jacksonville	FMS	City of Jacksonville Multi-Jurisdiction Coordination	052000065	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Reklaw	FMS	City of Reklaw Improved Enforcement of Ordinances	052000066	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rusk	FMS	City of Rusk Flood Maps Maintenance and Update	052000067	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)	(including state, federal and/ or other funding)	
5	Hardin County	FMS	Hardin County Continued NFIP Participation	052000068	2029	$80,000	*Unknown*	$80,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FMS	Hardin County Drainage District	052000069	2029	$900,000	*Unknown*	$900,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Kountze	FMS	City of Kountze Continued NFIP Participation	052000070	2029	$60,000	*Unknown*	$60,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Lumberton	FMS	City of Lumberton Continued NFIP Participation	052000071	2029	$80,000	*Unknown*	$80,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FMS	City of Rose Hill Acres Continued NFIP Participation	052000072	2029	$80,000	*Unknown*	$80,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Silsbee	FMS	City of Silsbee Continued NFIP Participation	052000073	2029	$50,000	*Unknown*	$50,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Sour Lake	FMS	City of Sour Lake Continued NFIP Participation	052000074	2029	$60,000	*Unknown*	$60,000	*State or Federal*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Mobile Home Inspection	052000075	2029	$61,000	*Unknown*	$61,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Jefferson County Drainage District 6	FMS	JCDD6 Multi-Jurisdiction Coordination	052000076	2029	$20,000	*Unknown*	$20,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FMS	JCDD6 Severe Weather Action Plan	052000077	2029	$60,000	*Unknown*	$60,000	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FMS	JCDD7 Storm Water Management Plan	052000078	2029	$50,000	*Unknown*	$50,000	*Taxes*	*25%*	*75%*	*100%*
5	City of Daisetta	FMS	City of Daisetta Property Construction Ordinance	052000079	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Daisetta	FMS	City of Daisetta Property Elevation Ordinance	052000080	2029	$5,000	*Unknown*	$5,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Hardin	FMS	City of Hardin Subdivision Ordinance Implementation	052000081	2029	$10,000	*Unknown*	$10,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Nacogdoches	FMS	City of Nacogdoches Stormwater Drainage Fee Implementation	052000082	2029	$40,000	*Unknown*	$40,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Nacogdoches	FMS	City of Nacogdoches Codes and Ordinances Update	052000083	2029	$30,000	*Unknown*	$30,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FMS	OCDD Drainage Criteria Manual and Regulations Enforcement	052000084	2029	$20,000	*Unknown*	$20,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FMS	OCDD Support/Create Stricter Floodplain Ordinances	052000085	2029	$40,000	*Unknown*	$40,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Continue NFIP Participation	052000086	2029	$53,000	*Unknown*	$53,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Linsdale	FMS	City of Linsdale Natural Runoff Policies Implementation	052000087	2029	$30,000	*Unknown*	$30,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Linsdale	FMS	City of Linsdale No Adverse Impact Implementation	052000088	2029	$60,000	*Unknown*	$60,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Troup	FMS	City of Troup Floodplain Ordinance Update	052000089	2029	$40,000	*Unknown*	$40,000	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FMS	Trinity County Dam/Levee Failure Data Collection	052000090	2029	$30,600	*Unknown*	$30,600	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FMS	Van Zandt County Higher Standards Incorporation	052000091	2029	$30,000	*Unknown*	$30,000	*Unknown*	*0%*	*100%*	*100%*
5	Anderson County	FMS	Anderson County Culvert Improvements	052000092	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Anderson County	FMS	Anderson County Dam Inspection and Maintenance Program	052000093	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Frankston	FMS	City of Frankston Culvert Improvements	052000094	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Palestine	FMS	City of Palestine Drainage System Expansion and Maintenance	052000095	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Angelina County	FMS	Angelina County Culvert Improvements	052000096	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Burke	FMS	City of Burke Drainage Ditch Capacity Upgrades	052000097	2029	$500,000	*Unknown*	$500,000	*Unknown*	*0%*	*100%*	*100%*
5	Chambers County	FMS	Chambers County Property Protection	052000098	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Cherokee County	FMS	Cherokee County Culvert Upgrades	052000099	2029	$2,000,000	*Unknown*	$2,000,000	*Other*	*0%*	*100%*	*100%*
5	City of Alto	FMS	City of Alto Culvert Improvements	052000100	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Reklaw	FMS	City of Reklaw Drainage System Upgrades	052000101	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rusk	FMS	City of Rusk Culvert Improvements	052000102	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Wells	FMS	City of Wells Culvert Improvements	052000103	2029	$1,000,000	*Unknown*	$1,000,000	*Taxes*	*100%*	*0%*	*100%*
5	Hardin County	FMS	Hardin County Culverts, Ditches, and Channel	052000104	2029	$3,000,000	*Unknown*	$3,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FMS	Hardin County Detention Ponds	052000105	2029	$1,000,000	*Unknown*	$1,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Hardin County	FMS	Hardin County Elevate Roads and Bridges	052000106	2029	$10,000,000	*Unknown*	##########	*State or Federal*	*0%*	*100%*	*100%*
5	City of Kountze	FMS	City of Kountze Culverts and Ditches	052000107	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Kountze	FMS	City of Kountze Elevate Roads and Bridges	052000108	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Kountze	FMS	City of Kountze General Drainage Improvements	052000109	2029	$1,500,000	*Unknown*	$1,500,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Lumberton	FMS	City of Lumberton Culverts, Ditches, and Channels	052000110	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FMS	City of Rose Hill Acres Flood Control Improvements	052000111	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Rose Hill Acres	FMS	City of Rose Hill Acres General Drainage Improvements	052000112	2029	$400,000	*Unknown*	$400,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Silsbee	FMS	City of Silsbee Detention, Culverts, Ditches and Channels	052000113	2029	$1,500,000	*Unknown*	$1,500,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Silsbee	FMS	City of Silsbee Drainage Ditches	052000114	2029	$1,000,000	*Unknown*	$1,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of SIlsbee	FMS	City of Silsbee Flood Mitigation for Hendrix Development	052000115	2029	$5,000,000	*Unknown*	$5,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Sour Lake	FMS	City of Sour Lake Channel Improvements	052000116	2029	$500,000	*Unknown*	$500,000	*State or Federal*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Sour Lake	FMS	City of Sour Lake Drainage Outfalls	052000117	2029	$1,000,000	*Unknown*	$1,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	City of Sour Lake	FMS	City of Sour Lake Stormwater Detention	052000118	2029	$7,000,000	*Unknown*	$7,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Drainage Culvert Upgrades	052000119	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Houston County	FMS	Houston County Flood Infrastructure Maintenance	052000120	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Grapeland	FMS	City of Grapeland Critical Facilities Flood-Proofing	052000121	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Kennard	FMS	City of Kennard Ditch Maintenance Program	052000122	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FMS	Liberty County Drainage Projects	052000123	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	City of Daisetta	FMS	City of Daisetta Culvert Maintenance and Upgrades	052000124	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FMS	OCDD Flood Infrastructure Improvements	052000125	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FMS	Polk County Facilities Hazard Hardening Retrofit	052000126	2029	$1,500,000	*Unknown*	$1,500,000	*Unknown*	*0%*	*100%*	*100%*
5	Polk County	FMS	Polk County Flood Infrastructure Improvements	052000127	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Henderson	FMS	City of Henderson Flood Infrastructure Maintenance	052000128	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Bridge Improvements	052000129	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Culvert Upgrades	052000130	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	San Augustine County	FMS	San Augustine County Facilities Hazard Hardening Retrofit	052000131	2029	$1,500,000	*Unknown*	$1,500,000	*Unknown*	*0%*	*100%*	*100%*
5	San Augustine County	FMS	San Augustine County Detention and Retention Pond Construction	052000132	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of San Augustine/City of Broaddus	FMS	City of San Augustine and City of Broaddus County Facilities Hazard Hardening Retrofit	052000133	2029	$1,000,000	*Unknown*	$1,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Detention and Retention Pond Construction	052000134	2029	$3,000,000	*Unknown*	$3,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Drainage Upgrades	052000135	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Shelby County	FMS	Shelby County Facilities Hazard Hardening Retrofit	052000136	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Shelby County	FMS	Shelby County Roadway/Bridge Elevation	052000137	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Tyler	FMS	City of Tyler Open Channel Improvements	052000138	2029	$1,500,000	*Unknown*	$1,500,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Whitehouse	FMS	City of Whitehouse Drainage Capacity Upgrades	052000139	2029	$1,000,000	*Unknown*	$1,000,000	*Other*	*0%*	*100%*	*100%*
5	Trinity County	FMS	Trinity County Flood Infrastructure Upgrades	052000140	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Trinity County	FMS	Trinity County Flood-prone Infrastructure Upgrades	052000141	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	City of Groveton	FMS	City of Groveton Flood Infrastructure Upgrades	052000142	2029	$750,000	*Unknown*	$750,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Van Zandt County	FMS	Van Zandt County Drainage Capacity Upgrades	052000143	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FMS	Van Zandt County Flood Infrastructure Maintenance	052000144	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Van Zandt County	FMS	Van Zandt County Road Elevation	052000145	2029	$2,000,000	*Unknown*	$2,000,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County	FMS	Liberty County Topographical Mapping Update	052000146	2029	$107,000	*Unknown*	$107,000	*Unknown*	*0%*	*100%*	*100%*
5	Liberty County Drainage District	FMS	Liberty County Drainage District Multi-County Coordination	052000147	2029	$50,000	*Unknown*	$50,000	*Unknown*	*0%*	*100%*	*100%*

Table 19: Results of FME, FMS, and FMP Funding Survey

RFPG Number	Sponsor Entity Name	FMS or FMP or FME	FMS FMP FME Name	FMS/FMP/FME identification number	Target year of full implementation	Estimated costs in plan			Estimated percent (share) of total FMS, FMP, or FME estimated cost			
						Non construction costs	Construction related costs	Total estimated cost	Sponsor Funding		Other Funding Needed (including state, federal and/ or other funding)	TOTAL (auto) sum must 100%
									ANTICIPATED SOURCE of Sponsor funding (e.g., taxes; general revenue; dedicated revenue incl. fees)	FUNDING TO BE FINANCED BY SPONSOR (incl. those local, county, or regional mechanisms available but not yet fully utilized)		
5	Jefferson County Drainage District 6	FMP	Bayou Din Detention Basin	053000001	2034	$0	$85,000,000	$85,000,000	*State or Federal*	*0%*	*100%*	*100%*
5	Orange County Drainage District	FMP	Bessie Heights Drainage Ditch Extension Project	053000002	2034	$0	$4,250,000	$4,250,000	*Unknown*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 6	FMP	Channel 100-A Concrete Repair	053000003	2034	$0	$39,570,866	$39,570,866	*State or Federal*	*0%*	*100%*	*100%*
5	Jefferson County Drainage District 7	FMP	Port Arthur and Vicinity Coastal Storm Risk Management Project	053000004	2035	$0	$863,000,000	$863,000,000	*State or Federal*	*35%*	*65%*	*100%*
5	Orange County Drainage District	FMP	Orange County Coastal Storm Risk Management Project	053000005	2035	$0	$119,900,000	$119,900,000	*State or Federal*	*35%*	*65%*	*100%*

APPENDIX 9-B
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CHAPTER 9. FLOOD INFRASTRUCTURE FINANCING ANALYSIS

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APPENDIX 10-A
COMMENTS RECEIVED ON DRAFT REGIONAL FLOOD PLAN AND RESPONSES

October 6, 2022

Neches River Flood Planning Group
Lower Neches Valley Authority
7850 Eastex Freeway
Beaumont, Texas 77708

Dear Members of the Neches River Flood Planning Group:

On behalf of the National Parks Conservation Association (NPCA), thank you for your time and effort to create the Draft 2023 Neches Regional Flood Plan to mitigate the impacts of flooding to communities and landscape in the Neches River basin. This first plan is extremely important to establish a framework for a strong and effective process to identify and recommend flood management evaluations, strategies and projects to reduce flood risk in the region. Completion of this first draft by the Regional Flood Planning Group (RFPG) is a significant accomplishment.

For over 100 years, NPCA has been dedicated to protecting and preserving America's national parks for current and future generations. Together, with our 1.7 million members and supporters, we speak up for the needs of our national park sites across the country. In southeast Texas, we've worked for more than a decade to enhance the resiliency of the Big Thicket National Preserve. Spread over 113,000 acres of land in 15 units across 7 counties, this national park is a cornerstone for conservation and an economic driver in the region.

Big Thicket National Park hosts upwards of 300,000 visitors annually, with a $28 million economic impact in 2021. The national park site, along with the neighboring landscape, is critical to protecting the long-term resiliency of our communities while increasing the ability to mitigate the growing impacts of climate change in the region. The increasing volatility of extreme weather events causes intense flooding in the region, adversely affecting the communities and residents of southeast Texas and the Big Thicket. These effects include the displacement of wildlife, impacts to park facilities and infrastructure and changes to the historical landscape of the area.

A robust regional flood plan with effective flood management evaluations, strategies and projects is critical to reducing the risks and impacts of flooding to communities and protecting unique treasures like the Big Thicket. We offer the following specific comments on the Draft 2023 Neches Regional Flood Plan to increase its ability to be a tool for protecting the Big Thicket and Neches River region.

- In Table 0-8, the recommended standard that "All municipalities should adopt minimum requirements outlined by FEMA for NFIP participation" is misleading. The accompanying text clearly indicates that requirements adopted should "at the least" meet benchmarks for participation, but this intent is not clear in the table, which is more likely to be read. The RFP should encourage standards above the minimum and clearly communicate this fully in its recommendations.

- While the inclusion in the recommendation is beneficial, the singular location of Nature-Based Solution [sic] as a recommended standard in the category of "New Development" in Table 0-9 is problematic. This conceptualization unnecessarily limits both the kinds of nature-based approaches to be considered and the contexts in which they should be considered. "New Development" can be ideal for such approaches, but so can infill, redevelopment, and brownfields. These approaches do not need to accompany development or construction at all. Nature-Based Solutions should both be elevated to its own category and also integrated into the guiding philosophy of each of the other categories and types.

- The RFPG goal included in Table 0-9 to "consider in all projects and…incorporate nature-based practices and floodplain preservation" is essential and significant, but the associated numerical targets are far too low. Corresponding goals included in the draft plan for the neighboring San Jacinto River basin, as an example, are dramatically higher. Given the expanse of differing needs and options for flood risk reduction in the region, nature-based practices should be included at a high rate from the very beginning.

- The discussion of evaluations of FME/FMS/FMPs states that quantifiable flood risk reduction is a heavily weighted criterion. This metric is a limited approach that discounts and even potentially removes critical tools for preventing flood risk and is contrary to the plan's stated goal of incorporating nature-based approaches. Taking a pre-disaster mitigation approach and preventing flood damage is widely recognized as the preferred approach. This also extends to preventing changes in the watershed that exacerbate future flood risk. Strategies like floodplain preservation and other nature-based approaches would automatically come up short when quantifying reduction alone is prioritized. The draft plan should be updated to more effectively weight criteria to ensure inclusion of flood prevention strategies and projects.

- We support the legislative recommendations to "incentivize buy-out programs to convert frequently flooded properties/neighborhoods into natural beneficial use areas" and "incentivize conservation easements for land in the 100-year floodplains," as well as the flood planning recommendation of promoting nature-based projects. These approaches are significant to meeting the regional flood planning charge to protect against loss of life and property. However, there is a sizable disconnect between these legislative recommendations and the actions included in the plan. The Regulatory and Guidance FMS partially accomplishes this goal to a limited extent. Buyout programs are also somewhat common and can contribute when done correctly. There are not any other FMS, FME, or FMPs described in the plan that adequately consider, much less incorporates, conservation easements or other nature-based approaches. Of over 300 recommended actions, only a few might be covered by these highlighted legislation and flood planning recommendations, and then only partially so. Identifying these as needs is substantial but addressing the glaring gap between goals and tangible action is crucial.

Abundant opportunities exist for flood prevention and reduction that can provide multiple benefits to drive strong local and regional economies while also preserving life and property. The Neches River basin is comprised of some of the highest-quality natural infrastructure and most widespread intact floodplains in Texas and includes many of the state's most feasible ecosystem restoration projects. Preservation and conservation of these resources should be a major component of the flood plan. The Neches Regional Flood Plan should give nature-based approaches the attention they deserve.

Thank you for your consideration of these comments, and your work to ensure a more resilient future for the Neches River basin, its communities, and residents.

Sincerely,

Cary Dupuy
Texas Regional Director

NPCA Texas Regional Office
1601 Clayton Lane, Suite 515W
Austin, Texas 78723

October 10, 2022

TEXAS PARKS & WILDLIFE

Life's better outside.®

Neches River Flood Planning Group
Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708

Re: 2023 Neches River Basin Regional Flood Plan

Honorable Judge Jeff Branick,

In 2019 Senate Bills 7 and 8 established a regional and state flood planning process for Texas, aimed at better managing flood risk to reduce loss of life and property. As part of the process, Texas Parks and Wildlife Department (TPWD) was identified as a member of the regional flood planning groups (Texas Water Code Sec. 16.062). The mission of TPWD is to manage and conserve the natural and cultural resources of Texas and its ability to provide opportunities of hunting, fishing, and outdoor recreation for the use and enjoyment of present and future generations. TPWD values this opportunity to contribute to the flood planning process with the goal of enhancing flood risk management and achieving beneficial flood mitigation outcomes. Toward this effort TPWD members serve a dual role of supporting the voting membership in development of the plans and representing the natural resource interests of the state.

TPWD applauds the Neches Regional Flood Planning Group (RFPG) for their efforts in completing the inaugural regional flood plan (RFP) especially considering the abbreviated timeline. Through the exceptional efforts of the RFPG, this plan will be a meaningful tool for reducing flood impacts to society, especially in those disastrous events that cause loss of life and injury. Because this represents the initial region-wide plan, it has the potential to be precedent setting for subsequent iterations. As such, it is important this plan recognizes the role nature and nature-based solutions can play in flood risk management and promotes opportunities to protect, enhance and restore the flood mitigation benefits provided by natural landforms.

TPWD is supportive of the planning process outlined by the Texas Water Development Board (TWDB) because it aims to achieve an integrative flood risk management (FRM) approach that prioritizes risk reduction through implementation of floodplain management, land use regulations, policy, and a balanced use of grey and natural and nature-based (NNBS) flood mitigation measures that are formed by inclusive participation at all levels of society. TPWD believes this integrative approach, when implemented holistically, will achieve the maximum benefits for society and natural ecosystems while minimizing environmental impacts. Recent published works on FRM and NNBS (Bridges et al 2021, Glick et al 2020, World Wildlife Fund 2016, Sayers et al 2013) support TWDB integrative flood management approach and provide extensive resources for flood planners.

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In the interest of achieving the state's flood risk management goals while protecting the state's fish and wildlife resources, TPWD reviewed regional flood plans based on the TWDB guidance principals as described in 31 TAC § 361 and 362. Special focus was provided on the following subset of guidance principals due to its relevance to fish and wildlife management. Does the draft flood plan use the best available science, data, models, and flood risk mapping?

- Does the draft flood plan consider the potential upstream and downstream effects, including environmental, of potential flood management strategies (and associated projects) of neighboring areas?
- Does the draft flood plan include strategies and projects that provide for a balance of structural and non-structural flood mitigation measures, including projects that use nature-based features that lead to long-term mitigation of flood risk?
- Does the draft flood plan consider natural systems and beneficial functions of floodplains, including flood peak attenuation and ecosystem services?
- Does the draft flood plan encourage flood mitigation design approaches that work with, rather than against, natural patterns and conditions of floodplains?
- Does the draft flood plan seek to not cause long-term impairment to the designated water quality as shown in the state water quality management plan as a result of a recommended flood management strategy or project?
- Does the draft flood plan consider benefits of flood management strategies to water quality, fish and wildlife, ecosystem function, and recreation, as appropriate?
- Does the draft flood plan minimize adverse environmental impacts and be in accordance with adopted environmental flow standards?
- Does the draft flood plan consider multi-use opportunities such as green space, parks, water quality, or recreation, portions of which could be funded, constructed, and or maintained by additional, third-party project participants?

Additionally, TPWD emphasizes that the following FRM concepts identified in the forementioned literature be incorporated into the RFP.

- Flood is a natural process that has many benefits to human and natural systems.
- Promoting some flooding as desirable and making room for water promotes native species, maintains vital ecosystem services, and reduces the chance of flooding elsewhere.
- Natural landscapes and watersheds provide flood mitigation functions that should be promoted, protected, enhanced, and restored.
- Prioritize risk reduction over flood control by focusing first on reducing loss of life and injury.
- Utilize limited resources fairly.
- Address flood risk using a portfolio approach, first implement non-structural (policy, land management, emergency management) followed by structural (grey and natural and nature-based) strategies.

- Criteria for assessing projects strategies should include a comprehensive suite of measures spanning economical, operational, societal, and environmental advantages and disadvantages. Assessments focusing on economics alone (number of buildings, acres) should be avoided.

Neches River Regional Flood Plan Comments

The Neches RFP recommends 157 Flood Management Evaluations (FMEs), five potentially feasible Flood Mitigation Projects (FMPs), and 147 Flood Management Strategies (FMSs) as part of the flood mitigation needs. All flood mitigation needs were evaluated for whether they included nature-based solutions. Out of the 157 FMEs, 37 include nature-based solutions for flood mitigation. No FMSs included nature-based solutions. Activities such as dredging and channelization are particularly impactful to natural environments and the resources that rely on these environments. Projects that include these activities should be evaluated for nature-based inclusions or alternatives. None of the FMPs include nature-based solutions. TPWD encourages NRFPG to continue to support the inclusion of nature-based solutions for flood mitigation and to include the ecological and societal benefits of flooding in any public education program.

Flood controls such as channelization and changes to the riparian zone of a waterbody can disconnect floodplains from the nutrient rich flood waters, degrade stream-side habitat, and impact the availability of resources for species of concern, such as Alligator Snapping Turtles (AST). ASTs were found in a recent study by Rosenbaum, et. al. (In press) to have the highest catch per unit effort in the Neches River. The presence of forest cover was the best predictor of occurrence of ASTs because of the increase in woody debris and available cover. TPWD would like to continue to work with the NRFPG to ensure conservation goals for ASTs and other Species of Greatest Conservation Need are met while also reducing negative impacts of flooding to populations and infrastructure.

Thank you for your consideration of these comments. TPWD looks forward to continuing to work with the planning group to develop flood plans that protect life and property but are also beneficial to the environment. Please contact me at (512) 389 – 8214 or at Marty.Kelly@TPWD.Texas.gov or Kirian Brown (903) 520 – 3821 or Kirian.Brown@TPWD.Texas.gov if you have any questions or comments.

Sincerely,

Marty Kelly
Water Resources Program Coordinator

MK:kb

References

Bridges, T. S., J. K. King, J. D. Simm, M. W. Beck, G. Collins, Q. Lodder, and R. K. Mohan, eds. 2021. International Guidelines on Natural and Nature-Based Features for Flood Risk Management. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Glick, P., E. Powell, S. Schlesinger, J. Ritter, B.A. Stein, and A. Fuller. 2020. The Protective Value of Nature: A Review of the Effectiveness of Natural Infrastructure for Hazard Risk Reduction. Washington, DC:

Rosenbaum, D., D.C. Rudolph, D. Saenz, L.A. Fitzgerald, R.E. Melson, C.S. Collins, T.J. Hibbits, R.W. Maxey, P. Crump, C.M. Schalk. Distribution and demography of the alligator snapping turtle (*Macrochelys temminckii*) in Texas: a 20-year perspective. In press. Southeastern Naturalist.

World Wildlife Fund. 2016. Natural and Nature-based Flood Management: A Green Guide. Washington, DC: World Wildlife Fund. Http://envirodm.org/flood-managment 2016 WWF.

P. Sayers, Y. L.i, G. Galloway, E. Penning-Rowsell, F. Shen, K. Wen, Y. Chen, and T. Le Quesne. 2013. Flood Risk Management: A Strategic Approach. Paris, UNESCO.

My name is Mary Bernard. I am the director of the Big Thicket Biosphere Reserve, a conservation organization located in southern Hardin County.

On occasion, I have been able to phone into the Neches Regional Flood Planning Group meetings and I want to say how much I appreciate the work y'all are doing to improve flood management.

If I could, I'd like to recommend planning measures that enhance the natural functions of floodplains like nature-based applications that contribute to flood resilience.

Nature-based applications like planting trees, enhancing wetlands, or protecting streamside vegetation are a natural investment in flood management.

Nature-based applications can enhance water quality, resist soil erosion, absorb extreme rainfall events, and conserve biodiversity by improving habitats.

Natural vegetation along a river or stream can slow the flow of damaging floodwaters as well as add to the natural beauty of the watercourse.

For example, the Big Thicket Biosphere is currently engaged in grant work to enhance natural landscapes to improve Monarch Butterfly migration habitats by planting flowering plants in the Big Thicket.

Landscapes blanketed in flowering plants offer more than just natural beauty, they are offer an economic benefit in low-maintenance costs: they require no mowing, no pesticides, and no herbicides.

There are variety of innovative applications offered through nature-based flood planning, and we'd be happy to partner with the flood planning group to discuss implementing alternatives.

Good afternoon, Judge Branick, members of the Neches Regional Planning Board and distinguished guests.

I'd first like to Thank you for your service on this important community committee as well as hosting this public comment forum.

My name is Sandra Ramos, Texas Coastal Program Manager for the National Parks Conservation Association and a resident of the city of Beaumont, Jefferson County

For more than a decade, National Parks Conservation Association has served as a leader in building a more resilient Big Thicket, investing time and resources alongside local organizations and community stakeholders to restore, revive and renew this unique region, including restoring the longleaf pine and the upcoming reintroduction of the Red Cockaded Woodpecker into the National Park System's 1st National Preserve.

NPCA is growing a local coalition around the national park to restore important native habitat and connect the landscape to ensure a resilient economic and sustainable future for Big Thicket and the southeast Texas region.

Often referred to as a "biological crossroads," Big Thicket National Preserve contains an unusual mix of vastly different ecosystems, vegetation, land and water resources. From sand hills to swamps to forests and beyond, Big Thicket is a unique natural landscape in Beaumont's backyard, for local communities, families, and visitors from all over to explore and enjoy.

During Hurricane Harvey, Big Thicket experienced unprecedented flooding, with waterways reaching flooding levels never seen or experienced. High flood waters caused erosion and threatened park infrastructure and the storm washed out unpaved roadways in the park, displacing wildlife and left debris throughout the region, requiring extensive and expensive clean up and repairs.

Increased extreme weather and other impacts from structural development are harming the Big Thicket National Preserve and adjacent Southeast Texas communities.

Damages from these more intense and frequent storms and flooding could be reduced by decreasing future development in the flood plain and protecting and restoring land currently in the flood plain.

More importantly, we encourage the Neches Regional Flood Planning Group, as well as all flood planning groups in Texas, to consider and include historically protective, nature-based projects - not concrete infrastructure – to protect low-lying areas and surrounding communities from increasing storms and surging waters in the regional flood plan.

We know that healthy protective watersheds come from thoughtful flood projects.

Flooding is a big issue - a plan is only as good as the projects it moves forward. Historically protective nature-based projects provide more benefits than traditional structural alternatives including:

- Less infrastructure costs up front
- Less cost to maintain – which is important to our local governmental organizations that may not have the budget to maintain concrete and man-made infrastructure.
- Can benefit the community in more creative ways including the bolstering of Tourism including birding and outdoor recreation which in turn Bring in economic value to local communities.

  In 2021, Over 291,000 visitors came to the Big Thicket National Preserve and spent over $20 million in communities near the park. That spending supported 274 jobs in the local economy and this number continues to grow as outdoor recreation becomes more popular and people look to the outdoors as a sanctuary.

We strongly encourage you, as we will, to work with local entities to include more historically protective, nature-based Projects in the Neches Flood Plan moving forward to protect the Big Thicket and the Southeast Texas region.

Thank you for your time.

From: Stacey Francis
Sent: Thursday, October 20, 2022 12:30 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Stacey Francis

From: Ed Perry
Sent: Monday, September 26, 2022 3:40 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Ed Perry

From: Keely McLeod
Sent: Wednesday, September 21, 2022 11:37 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Keely McLeod

From: Roberto Molina
Sent: Monday, September 19, 2022 10:03 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Roberto Molina

From: Melinda Smiljanic
Sent: Monday, September 19, 2022 5:28 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Melinda Smiljanic

From: James Klein
Sent: Monday, September 19, 2022 3:52 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
James Klein

From: Don Barnhill
Sent: Sunday, September 18, 2022 8:42 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Don Barnhill

From: Kim George
Sent: Sunday, September 18, 2022 7:09 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Kim George

From: Sarah Sudheer
Sent: Sunday, September 18, 2022 2:40 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Sarah Sudheer

From: Joyce Ford
Sent: Sunday, September 18, 2022 3:36 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Joyce Ford

From: Jennifer Bowen-Shauver
Sent: Saturday, September 17, 2022 7:47 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Jennifer Bowen-Shauver

From: Gary Graham
Sent: Friday, September 16, 2022 1:46 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Gary Graham

From: Pat Perry
Sent: Friday, September 16, 2022 11:22 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Pat Perry

From: Corrine Alcantar
Sent: Thursday, September 15, 2022 9:52 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Corrine Alcantar

From: Dora Rushing
Sent: Thursday, September 15, 2022 9:35 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Dora Rushing

From: Corinne Pilon
Sent: Thursday, September 15, 2022 7:30 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Corinne Pilon

From: Eileen Mckee
Sent: Thursday, September 15, 2022 6:01 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Eileen Mckee

From: Jay Silver
Sent: Thursday, September 15, 2022 2:29 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Jay Silver

From: Sharon Frank
Sent: Thursday, September 15, 2022 1:30 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Sharon Frank

From: Amber Haseltine
Sent: Thursday, September 15, 2022 1:14 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Amber Haseltine

From: Kaveri Ray
Sent: Thursday, September 15, 2022 1:00 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned resident, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Kaveri Ray

From: Jane Van Praag
Sent: Thursday, September 15, 2022 12:41 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Jane Van Praag

From: Christian Richer
Sent: Thursday, September 15, 2022 12:13 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Christian Richer

From: Rajesh Iyer
Sent: Thursday, September 15, 2022 7:51 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Rajesh Iyer

From: Sabine Williams
Sent: Thursday, September 15, 2022 6:18 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Sabine Williams

From: Cathy Simmons
Sent: Thursday, September 15, 2022 1:52 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Cathy Simmons

From: Janet Delaney
Sent: Thursday, September 15, 2022 12:51 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Janet Delaney

From: Mark Olinger
Sent: Wednesday, September 14, 2022 3:11 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

Five years ago, during Hurricane Harvey, waterways surrounding Big Thicket National Preserve reached flood levels never seen before. High waters caused erosion and washed-out roadways in the park, displacing wildlife, and leaving debris throughout the region, requiring extensive, and expensive, clean-up and repairs.

Big Thicket is a cornerstone of conservation. Its pristine environments and diverse ecosystems preserve rare plants as well as endangered and threatened animals. It protects watersheds that provide safe drinking water and forests that store carbon. And it connects millions of people to the power of nature in ways few other places can. But for parks to be ecologically healthy, so must the surrounding lands and waters.

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Mark Olinger

From: Deborah Dewey
Sent: Wednesday, September 14, 2022 11:30 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Deborah Dewey

From: Thomas Haines
Sent: Wednesday, September 14, 2022 11:05 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Thomas Haines

From: Dallas Windham
Sent: Wednesday, September 14, 2022 10:50 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Dallas Windham

From: Dr. Fielder
Sent: Wednesday, September 14, 2022 10:47 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Dr. Fielder

From: Ellen Isaly
Sent: Wednesday, September 14, 2022 10:16 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Ellen Isaly

From: Alyssa Melton
Sent: Wednesday, September 14, 2022 10:14 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Alyssa Melton

From: Polly Martin
Sent: Wednesday, September 14, 2022 10:08 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Polly Martin

From: Greg Sells
Sent: Wednesday, September 14, 2022 10:04 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Greg Sells

From: Trigg Wright
Sent: Wednesday, September 14, 2022 9:22 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Trigg Wright

From: Karen Kawszan
Sent: Wednesday, September 14, 2022 9:21 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Karen Kawszan

From: Nicholas Gonzales
Sent: Wednesday, September 14, 2022 9:16 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

"A Society grows great when old men plant trees whose shade they know they shall never sit in"

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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"There is none which compares in importance with the great central task of leaving this land even a better land for our descendants than it is for us"

-Theodore Roosevelt

Regards,
Nicholas Gonzales

From: Cody Winstead
Sent: Wednesday, September 14, 2022 9:08 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Cody Winstead

From: Bridgett Rexford
Sent: Wednesday, September 14, 2022 8:47 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Bridgett Rexford

From: Judith Cherry
Sent: Wednesday, September 14, 2022 8:25 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Judith Cherry

From: Nina Davis
Sent: Wednesday, September 14, 2022 7:54 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Nina Davis

From: Christine Lockhart
Sent: Wednesday, September 14, 2022 7:51 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Christine Lockhart

From: Alison Abbott
Sent: Wednesday, September 14, 2022 7:46 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Alison Abbott

From: Chad Fuqua
Sent: Wednesday, September 14, 2022 7:13 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Chad Fuqua

From: Deborah Zarett
Sent: Wednesday, September 14, 2022 6:57 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Deborah Zarett

From: Stephen Englander
Sent: Wednesday, September 14, 2022 6:32 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Stephen Englander

From: Pamela Vangiessen
Sent: Wednesday, September 14, 2022 6:10 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Pamela Vangiessen

From: Cheryl Robison
Sent: Wednesday, September 14, 2022 5:42 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Cheryl Robison

From: Jerry Morrisey
Sent: Wednesday, September 14, 2022 5:31 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Jerry Morrisey

From: Mary Thornton
Sent: Wednesday, September 14, 2022 5:16 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Mary Thornton

From: Dan Roark
Sent: Wednesday, September 14, 2022 5:10 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Dan Roark

From: Edith Brown
Sent: Wednesday, September 14, 2022 5:01 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Edith Brown

From: Garry Kramchak
Sent: Wednesday, September 14, 2022 4:55 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Garry Kramchak

From: Dave Cross
Sent: Wednesday, September 14, 2022 4:35 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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With my sincere gratitude!

Regards,
Dave Cross

From: Leslie Arceneaux
Sent: Wednesday, September 14, 2022 4:28 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Leslie Arceneaux

From: Juanita Romero
Sent: Wednesday, September 14, 2022 4:19 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Juanita Romero

From: Pam Sohan
Sent: Wednesday, September 14, 2022 4:13 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Pam Sohan

From: Kimberly Allen
Sent: Wednesday, September 14, 2022 3:30 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Kimberly Allen

From: Chantal Eldridge
Sent: Wednesday, September 14, 2022 3:27 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Chantal Eldridge

From: Carol Clark
Sent: Wednesday, September 14, 2022 3:15 PM
To: NechesRFPG
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Regards,
Carol Clark

From: Bonni Scudder
Sent: Wednesday, September 14, 2022 3:12 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Bonni Scudder

From: Mark Olinger
Sent: Wednesday, September 14, 2022 3:11 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

Five years ago, during Hurricane Harvey, waterways surrounding Big Thicket National Preserve reached flood levels never seen before. High waters caused erosion and washed-out roadways in the park, displacing wildlife, and leaving debris throughout the region, requiring extensive, and expensive, clean-up and repairs.

Big Thicket is a cornerstone of conservation. Its pristine environments and diverse ecosystems preserve rare plants as well as endangered and threatened animals. It protects watersheds that provide safe drinking water and forests that store carbon. And it connects millions of people to the power of nature in ways few other places can. But for parks to be ecologically healthy, so must the surrounding lands and waters.

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Regards,
Mark Olinger

From: Ladonna Martin
Sent: Wednesday, September 14, 2022 3:04 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Ladonna Martin

From: Jennifer Holburn
Sent: Wednesday, September 14, 2022 2:58 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Jennifer Holburn

From: Sally Votteler
Sent: Wednesday, September 14, 2022 2:44 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Sally Votteler

From: Victoria Shih
Sent: Wednesday, September 14, 2022 2:44 PM
To: NechesRFPG
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Regards,
Victoria Shih

From: joanne burrows
Sent: Wednesday, September 14, 2022 2:25 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
joanne burrows

From: Fred Grimes
Sent: Wednesday, September 14, 2022 2:19 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Fred Grimes

From: Memfis Madyun
Sent: Wednesday, September 14, 2022 2:16 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Memfis Madyun

From: LauraL Vera
Sent: Wednesday, September 14, 2022 2:11 PM
To: NechesRFPG
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Regards,
LauraL Vera

From: Susan Betourne
Sent: Wednesday, September 14, 2022 2:08 PM
To: NechesRFPG
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Regards,
Susan Betourne

From: Mary Hancock
Sent: Wednesday, September 14, 2022 1:47 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Mary Hancock

From: Virginia Boucher
Sent: Wednesday, September 14, 2022 1:43 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Virginia Boucher

From: Bari Brookman
Sent: Wednesday, September 14, 2022 1:12 PM
To: NechesRFPG
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Bari Brookman

From: Ben Liles
Sent: Wednesday, September 14, 2022 1:12 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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From: Stacey Benham
Sent: Wednesday, September 14, 2022 1:12 PM
To: NechesRFPG
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Regards,
Stacey Benham

From: Priscilla Flores
Sent: Wednesday, September 14, 2022 1:11 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Priscilla Flores

From: Sandra La Mont
Sent: Wednesday, September 14, 2022 12:49 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Sandra La Mont

From: Francisco Salazar
Sent: Wednesday, September 14, 2022 12:47 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Francisco Salazar

From: Andrew Jackson
Sent: Wednesday, September 14, 2022 12:46 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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From: Tina Weber
Sent: Wednesday, September 14, 2022 12:45 PM
To: NechesRFPG
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The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Tina Weber

From: Sahand Naghavi
Sent: Wednesday, September 14, 2022 12:41 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Sahand Naghavi

From: Valerie Howell
Sent: Wednesday, September 14, 2022 12:41 PM
To: NechesRFPG
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Regards,
Valerie Howell

From: Linda Schmalstieg
Sent: Wednesday, September 14, 2022 12:37 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Linda Schmalstieg

From: Kelly Massey
Sent: Wednesday, September 14, 2022 12:29 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Kelly Massey

From: Solianni Cantu
Sent: Wednesday, September 14, 2022 12:14 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Solianni Cantu

From: Geanda Guidry
Sent: Wednesday, September 14, 2022 12:10 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Geanda Guidry

From: michael earney
Sent: Wednesday, September 14, 2022 12:09 PM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
michael earney

From: Jerell Lambert
Sent: Wednesday, September 14, 2022 11:57 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

I would like to see a strong framework of effective flood mitigation projects that reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan.

As currently written, our communities could be missing a huge opportunity to do the right thing right for communities and the environment..

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters.

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Regards,
Jerell Lambert

From: Angela Wilkinson
Sent: Wednesday, September 14, 2022 11:47 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Angela Wilkinson

From: Tanya Teneyuque
Sent: Wednesday, September 14, 2022 11:43 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Tanya Teneyuque

From: Stacy Moranville
Sent: Wednesday, September 14, 2022 11:43 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Stacy Moranville

From: Linda Reynolds
Sent: Wednesday, September 14, 2022 11:43 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Linda Reynolds

From: Marce Walsh
Sent: Wednesday, September 14, 2022 11:38 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Marce Walsh

From: Robert Yowell
Sent: Wednesday, September 14, 2022 11:30 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Robert Yowell

From: Deanna Pena
Sent: Wednesday, September 14, 2022 11:30 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Deanna Pena

From: Doug Young
Sent: Wednesday, September 14, 2022 11:23 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Doug Young

From: Sandra Breakfield
Sent: Wednesday, September 14, 2022 11:22 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Sandra Breakfield

From: Julie Sears
Sent: Wednesday, September 14, 2022 11:18 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Julie Sears

From: Claire Bush
Sent: Wednesday, September 14, 2022 11:13 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Claire Bush

From: Donald Cook
Sent: Wednesday, September 14, 2022 11:12 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Donald Cook

From: Andrea Christgau
Sent: Wednesday, September 14, 2022 11:11 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Andrea Christgau

From: Pat LaStrapes
Sent: Wednesday, September 14, 2022 11:10 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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From: joanne groshardt
Sent: Wednesday, September 14, 2022 11:09 AM
To: NechesRFPG
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We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
joanne groshardt

From: Dennis Harper
Sent: Wednesday, September 14, 2022 11:01 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Dennis Harper

From: Taryn Geer
Sent: Wednesday, September 14, 2022 10:59 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Taryn Geer

From: Lisa Renzelmann
Sent: Wednesday, September 14, 2022 10:56 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Lisa Renzelmann

From: Gloria Gannaway
Sent: Wednesday, September 14, 2022 10:54 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Gloria Gannaway

From: Pamela Askew
Sent: Wednesday, September 14, 2022 10:53 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

Please protect Big Thicket and other vital wetlands from dangerous flooding.
As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Pamela Askew

From: Glory Arroyos
Sent: Wednesday, September 14, 2022 10:50 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Glory Arroyos

From: Chris Brunner
Sent: Wednesday, September 14, 2022 10:48 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Chris Brunner

From: Nicole Allison
Sent: Wednesday, September 14, 2022 10:43 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Nicole Allison

From: Leslie Lee
Sent: Wednesday, September 14, 2022 10:41 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Leslie Lee

From: Sara Wood
Sent: Wednesday, September 14, 2022 10:38 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

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Regards,
Sara Wood

From: Karl Fickling
Sent: Wednesday, September 14, 2022 10:33 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Karl Fickling

From: Leslie Richardson
Sent: Wednesday, September 14, 2022 10:33 AM
To: NechesRFPG
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Regards,
Leslie Richardson

From: Catherine Lacroix
Sent: Wednesday, September 14, 2022 10:28 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Catherine Lacroix

From: Andres Venegas
Sent: Wednesday, September 14, 2022 10:25 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Andres Venegas

From: Tracey Bonner
Sent: Wednesday, September 14, 2022 10:25 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Tracey Bonner

From: Jay Crail
Sent: Wednesday, September 14, 2022 10:25 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Jay Crail

From: Carolyn Nieland
Sent: Wednesday, September 14, 2022 10:23 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Carolyn Nieland

From: Thomas Nieland
Sent: Wednesday, September 14, 2022 10:23 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Thomas Nieland

From: John McIntosh
Sent: Wednesday, September 14, 2022 10:20 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
John McIntosh

From: Morris Narunsky
Sent: Wednesday, September 14, 2022 10:15 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Morris Narunsky

From: Benjamin Garrett
Sent: Wednesday, September 14, 2022 10:14 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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We must leave a planet that our grandchildren and their grandchildren can exist on.

Regards,
Benjamin Garrett

From: Debra Atlas
Sent: Wednesday, September 14, 2022 10:13 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Debra Atlas

From: Lori Hester
Sent: Wednesday, September 14, 2022 10:09 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Lori Hester

From: Michael Spradlin
Sent: Wednesday, September 14, 2022 10:08 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Michael Spradlin

From: James Patak
Sent: Wednesday, September 14, 2022 10:07 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
James Patak

From: Thomas Nieland
Sent: Wednesday, September 14, 2022 10:06 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Thomas Nieland

From: Stephanie Cormier
Sent: Wednesday, September 14, 2022 10:02 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

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Regards,
Stephanie Cormier

From: Heather Petkovsek
Sent: Wednesday, September 14, 2022 10:02 AM
To: NechesRFPG
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Regards,
Heather Petkovsek

From: Karen Berning
Sent: Wednesday, September 14, 2022 9:58 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Karen Berning

From: R. M.
Sent: Wednesday, September 14, 2022 9:58 AM
To: NechesRFPG
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Regards,
R. M.

From: Joychine Eaglin
Sent: Wednesday, September 14, 2022 9:55 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Joychine Eaglin

From: Jeff Hoffmann
Sent: Wednesday, September 14, 2022 9:55 AM
To: NechesRFPG
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From: George Holmgreen
Sent: Wednesday, September 14, 2022 9:55 AM
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Regards,
George Holmgreen

From: Rosalyn Forster
Sent: Wednesday, September 14, 2022 9:52 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Rosalyn Forster

From: Linda Mitchell
Sent: Wednesday, September 14, 2022 9:52 AM
To: NechesRFPG
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Regards,
Linda Mitchell

From: Diana Williams
Sent: Wednesday, September 14, 2022 9:50 AM
To: NechesRFPG
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Regards,
Diana Williams

From: Judy Harman
Sent: Wednesday, September 14, 2022 9:49 AM
To: NechesRFPG
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Regards,
Judy Harman

From: Jeanette Honermann
Sent: Wednesday, September 14, 2022 9:48 AM
To: NechesRFPG
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Regards,
Jeanette Honermann

From: Elizabeth Waddill
Sent: Wednesday, September 14, 2022 9:47 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Elizabeth Waddill

From: Alice Russell
Sent: Wednesday, September 14, 2022 9:44 AM
To: NechesRFPG
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Alice Russell

From: Briana Schroeder
Sent: Wednesday, September 14, 2022 9:44 AM
To: NechesRFPG
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Regards,
Briana Schroeder

From: Hank Hammett
Sent: Wednesday, September 14, 2022 9:42 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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From: Tara Potts
Sent: Wednesday, September 14, 2022 9:37 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Tara Potts

From: Larry Gay
Sent: Wednesday, September 14, 2022 9:36 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Larry Gay

From: sandra ramos
Sent: Wednesday, September 14, 2022 9:36 AM
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sandra ramos

From: Cindy Laird
Sent: Wednesday, September 14, 2022 9:36 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

Dear Neches Regional Flood Planning Group,

As a concerned citizen, I would like to see a strong framework and effective flood mitigation projects to reduce the impact of flooding in our communities by using protective nature-based projects in the Neches 2023 Regional Flood Plan. As currently written, our communities could be missing a huge opportunity to do the right thing, right from the start.

We know that healthy watersheds and functioning flood plains and wetlands can absorb and slow down flood waters, and thoughtful nature-based projects to conserve and protect these important lands allow local governments to spend less up front, cost less to maintain, and to do more within the region. Restoring wetlands that provide a natural buffer from increasing storms also create excellent wildlife viewing areas. This in turn provides opportunities for local communities to attract tourism dollars from wildlife and outdoor enthusiasts.

We must understand how the projects that are under consideration will impact our local communities from continual flooding and increasing storms, as well as impact the Big Thicket National Preserve, a national park in our own backyard.

The current plan needs more nature-based solutions to reduce the impacts of flooding, and additional information on how effective projects will be in reducing flooding.

We ask for you to continue strengthening the plan and working with local community leaders to incorporate more nature-based projects in the plan to ensure the natural resiliency and continued protection of the Big Thicket region and our communities.

Regards,
Cindy Laird

From: Phil Shephard
Sent: Wednesday, September 14, 2022 9:34 AM
To: NechesRFPG
Subject: Big Thicket National Preserve needs your help.

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Regards,
Phil Shephard

From: Moon, Steve
Sent: Saturday, October 8, 2022 12:15 PM
To: Rolando Ayala II
Subject: Comments and Recommendations on DRAFT Regional Flood Plan for Region 5: Neches

Please see comments and recommendations (below) on the Region 5 Draft Regional Flood Plan for incorporation into the final submission to the TWDB.

Regards,

Steve Moon

CHAPTER	SECTION	PARAGRAPH/ TABLE/ FIGURE	COMMENT
0	ES 3	Table 0-9	Using only the number of critical facilities is a simplistic measure of impact. Life safety, replacement cost, and economic impact should be considered in the overall assessment measures. There is work underway to explore other measures (like improved Vulnerability Indices) which may be more comprehensive in capturing risk and impact. I recommend that consideration be given to future updates with more comparative/comprehensive indices.
0	ES 3	Table 0-9	Goals: Upon reflection, it is worth the TWDB's consideration to set more aggressive goals for the RFPGs to use for flood mitigation. This will certainly challenge the resources required for

			short and long term mitigations, and requires a more aggressive position for flood mitigation and funding. I recommend the TWDB consider the following: 1 - 80% reduction for critical facilities 2 - Increase funding targets to address flood mitigations projects which have yet to be identified from new flood studies and updates to existing flood studies with Atlas 14 data.
0	ES 4	Table 0-10	This Table does not include cost of industrial facilities' lost production and repairs. FEMA claims do not include estimated costs of industrial facilities' lost production and repairs. This vastly under-records the total dollar value of losses. Recommend including industrial facilities' estimated cost of lost production and repairs in Factors Considered.
0	ES 4	Figure 0-2	Recommend shading be revised so that the flood need score color (red) in Port Arthur, Nederland, and Beaumont is shown rather than the municipality color (gray). Gray color gives the impression flood need is low.
1	1.A.1.a	Figure 1-2	There appears to be two southern boundaries of Region 5 (dark green line.) This is confusing. Recommend revising Figure 1-2 (and subsequent Figures) to show a single southern boundary of Region 5
1	1.B	first paragraph	Add: stormwater pumps to bullet list
1	1.B.2.i	new	Jefferson County Drainage District 7 (DD7) operates and maintains an extensive system of stormwater pump stations. It is not listed in Section 1.B.2; however, this is important information to include in the assessment of protection level in southern Jefferson County.
1	1.B.3.b	first paragraph	Port Arthur Levee/Floodwall system protects a major portion of southern Jefferson County including Cities of Port Arthur, Groves, Neches, Nederland, and Port Neches, and many critical facilities. Recommend an FME be included in this cycle to evaluate the safety of this levee/floodwall system (or confirm this has already been done by USACE or DD7.)
2	2.A.2	Appendix 2-A Map 4 Figure 26 of 29	Appendix 2-A, Map 4, Figure 26 of 29, Existing Condition Flood Hazard, indicates industrial facilities within the DD7 stormwater system are within the existing 0.2% (500 yr.) flood plain. The DD7 stormwater pumps that protect this area are only designed for a 25 yr. (TP 40) event. Recommend the map be revised to show this area as a Flood Prone Area shaded in "pink".

Thank you for your consideration.

Steve Moon

Volume	PDF Page	Chapter	Section	Comments / ?'s
1	15	Exec Sum	LIST OF ACRONYMS AND DEFINITIONS	Include HWM's (high water marks)
1	26	Exec Sum	TABLE 0-3: NON-VOTING MEMBERSHIP OF THE REGION 5 FLOOD PLANNING GROUP	Might want to remove punctuation after Natalie Johnson name
1	28	Exec Sum	ES 2. Flood Risk Analysis	"Flood risks were assessed for the 1 percent annual chance and 0.2 percent annual chance events". May want to additionally specify 'according to Atlas 14 and/or best available data'.
1	29	Exec Sum	ES 2. Flood Risk Analysis	"As a result, most of the flood risk across the region is not well quantified, meaning that people and their property may be unknowingly in harm's way". May want to additioanlly include...'or lack understanding of potential flood depths and frequencies for a particular site'.
1	32	Exec Sum	TABLE 0-8: RECOMMENDED FLOOD MANAGEMENT STANDARDS	New Deveopment, Habitable Structures.... Realisitically, should BFE recommendations for new development be higher than that? For example: 'All habitable structures in coastal communities should be designed such that finished floor elevations are (***a minimum of***) 3 feet above the BFE including the combined riverine and coastal effects'. Similar comment for non-coastal, and also critical facilities.
1	36	Exec Sum	FIGURE 0-2: FLOOD MITIGATION NEED BY HUC12 WATERSHED	Does the gray "mask" over cities need to be on, or could it be turned off (in order to see flood need for those areas?
1	39	Exec Sum	TABLE 0-12: RECOMMENDED FMSS BY STRATEGY TYPE	Maybe use an apostrophe for FMS's, FMP's, etc.?
1	41	Exec Sum	ES 8.Legislative Recommendations	"Establish grant programs for the ongoing operations and maintenance (O&M) of existing flood mitigation and other drainage infrastructure." I get it, politically locals don't want to pay for anything...but would a grant program of this type be more work and headache to apply for and administer than what its worth?
1	41	Exec Sum	ES.8 Regulatory and Administrative Recommendations	I realize that it would seem like radical change, but still think River Authorities are the ideal entity for Floodplain Administration (taking over responsibility from the local communities). Doing so would fix a number of problems (political, technical skill gaps, funding, consistency, etc.). I have no stake in this, just an opinion.
1	48	1	1-1 Intro	"Typical annual precipitation ranges from 38 inches per year near the basin headwaters to 60 inches per year at the mouth". Better description might be, "at the basin's sea-level outlet to Sabine Lake/Gulf of Mexico".
1	52	1	1.A.1.b Economic Activity	Pie chart could be improved with labels (example on right, expand to view) 
1	67	1	1.A.2.b Identification of Flood Prone Areas	"Using these various data sources, it is estimated that approximately 262 square miles, or 2.3% of the watershed, are within potential flood prone areas." Is 2.3% correct?
1	70-71	1	1.A.3.a Historic Events Prior to Current Level of Regulation	Maybe better to say: "On the Angelina River and triburies, peak discharges for this flood were approximated to be 110,000 cubic feet per second (cfs) near Diboll, 125,000 cfs at Evadale, and 130,000 cfs near Lufkin."
1	71	1	1.A.3.a Historic Events Prior to Current Level of Regulation	Might be better to say: "The flood of August 1915 primarily originated with rainfall centered near the city of San Augustine on Ayish Bayou; around 19.8 inches of rainfall fell on the city within a four-day period. Further downstream, this flood also produced the second highest known stage of 34.00 ft at Village Creek near the city of Kountze. Along the Neches River near Evadale, this flood had an estimated peak discharge of 102,000 cfs with a flood stage that was estimated to be 1.70 ft lower than the stage recorded during the aforementioned May 1884 flood."
1	71	1	1.A.3.b Historic Tropical Flooding Events	Might be good to start with a preface such as: "Compared with historical norms dating back to 1900, the period of 2005 to 2022 seen a pronounced increase in frequency and severity of tropical flooding along the Texas Gulf Coast."
1	72	1	1.A.3.d Damages and Flood Claims; Table 1-9	Note 1: Might be good to add totals for dollar flood damges and # of flood claims. Note 2: Might be good to specify 'Flood Insurance Claims' in column header.
1	84	1	1.A.7.d Local and Regional Flood Plans; Table 1-17	A few things could improve Table 1-17. 1) Column headings could be labeled better. 2) Wording of the row entries is a little obscure/hard to interpret
1	88	1	Chapter 1.B (intro, bulleted list)	2nd column of bulleted list vertically offset. Also might be good to create two categories, one for natural features, and a separate one for manmade construction
1	92	1	1.B.2.a Dams, Reservoirs, Levees, and Weirs; Table 1-20	Might be good to verify if all these dams have 'flood control' listed as a 'purpose' in their FERC licenses (and specify the ones that do not). For example, Toledo Bend does not list flood control as one of its purposes (water supply, hydroelectric, recreation only, I think).
1	93	1	1.B.2.a Dams, Reservoirs, Levees, and Weirs; Figure 1-15	Seems like this map could show the reservoirs better. Maybe by adjusting their labeling, or maybe by showing their tributary/waterway connections to the Neches.
1	97	1	1.B.3.a Dam Safety Assessment	At least 2 notable, recent dam failures: 2016 Lake Amanda: https://en.wikipedia.org/wiki/Lake_Amanda; 2022 Wildwood Lake Dam/Village Mills: https://www.12newsnow.com/article/news/local/hardin-county-dam-expected-to-breach-soon-wildwood-resort-city/502-f31bd8c8-cc86-462c-b3eb-f517879ff044
1	100	1	Table 1-22: EXISTING FLOOD MITIGATION PROJECTS IN REGION 5 (page 1-54, Row 3)	In Table 1-22, on page 1-54, Row 3 from the top can be removed (remove second entry of Hardin County FMA Acquisition)
1	100	1	Table 1-22: EXISTING FLOOD MITIGATION PROJECTS IN REGION 5 (page 1-54, Row 4)	In Table 1-22, on page 1-54, Row 4 from the top, Description should change to: "Eliminate flood impacts for 4 properties in Hardin County comprising approximately 44 acres. Parcels will be preserved as open space for beneficial floodplain functions."
1	100	1	Table 1-22: EXISTING FLOOD MITIGATION PROJECTS IN REGION 5 (page 1-54, Row 5)	In Table 1-22, on page 1-54, Row 5 from the top, Project Name should change to: "Rose Hill Acres Property Acquistion". Description should change to: "Eliminate flood impacts for 6 properties in Rose Hill Acres comprising approximately 6 acres. Parcels will be preserved as open space for beneficial floodplain functions."
1	106-107	2	2.A.1.a Best Available Data & Figure 2-2	Might want to include mention in narrative (or Figure 2-2) what areas FAFDS and Fathom is available and are a factor.
1	109	2	2.A.1.b Gaps in Inundation Boundaries	Good comments here, but it seems there is still room for extended discussion of flood forecasting data (existing quality and accuracy in terms of X, Y, Z, T, and P (probability). But it also understood that is a big subject. IMO, this topic (improved accuracy of flood risk analysis) should be one of the highest FME priorities for the region.
1	114	2	2.A.3.a Structures within Flood Hazard Areas	Nice job on this section (and corresponding analysis)! Good choices and utilization of source data.
1	115-116	2	2.A.3.c. Critical Facilities and Public Infra. w/in Flood Hazard Areas & Table 2-4	Very good to include industrial sites (refineries, etc.). "Infrastructure" column of Table 2-4 might be more aptly named 'Industrial Sites'??
1	118	2	2.A.4.d. Water and Wastewater Treatment	This is potentially very important analysis for Silsbee, Lumberton, Beaumont, Vidor, et al. Sensitive topic however.
1	118	2	2.A.4.e. Utilities and Energy Generation	Flooding = loss of stability for electrical power line supports (submerged power poles in mud in strong winds). Also, electric substation inundation potential (elevate?).
1	120-122	2	2.B.1.a. Sea Level Change and Subsidence	Great job on this! 14.55" since 1960, 3 feet (intermediate projection) by 2100 (w/ potential for 6.3 feet)!
1	123-126	2	2.B.1.b. Sedimentation and Major Geomorphic Changes	Great job on this! Land subsidence data is also available. ?
1	127	2	2.B.2. Development of Future Condition Floodplains	This section could maybe benefit from a short narrative explaining why future development could cause flood WSE increase. Two main reasons are A) increased runoff from impervious surfaces; B) increased import/placement of fill for building foundations.
1	133	2	2.B.2.f. Data Gaps and Future Flood Prone Areas	Discussion for this section is good, since it is such a massive topic when considering the multiple future WSE variables. Might be worth stating that every future WSE forecasting variable indicates higher (or increased) future WSEs, despite lack of specific data/models at this time. This also pertains to 2.B.4 (Future Condition Flood Exposure Analysis), which in a nutshell is a 'conservative' analysis for a minimum of increased flood exposure.
1	148	3	FIGURE 3-1: LEVEL OF FLOODPLAIN MGT PRACTICES: LOW OR UNKNOWN	Good map. Remarkable findings (i.e. number of low ratings). Seems accurate though.
1	150	3	FIGURE 3-2: LEVEL OF FLOODPLAIN MGT PRACTICES: MODERATE OR STRONG	GIS/cartography note: Pine Forest purple triangle symbol appears to be Hardin Co. (actually Orange Co.)
1	166-171	4	Chapter 4.A. Flood Mitigation Needs Analysis	Nice job. This is a tough section to make clear based on the subject matter and prescribed method from TWDB.
1	172 -	4	Chapter 4.B.	Nice job. Once again this is a tough section to make clear based on the subject matter and prescribed method from TWDB. FME, FMS, FMP, FMX's, all very tough to methodically and accurately categorize. I still think one of the better things for TWDB/RFPG5 to consider (if possible) is a reclassification of buyout/acquisition as a FME or FMP....and also keeping FMS limited to instituitional or regulatory actions which have no phyical substance.
1	176-	4	Chapter 4.B. (FMX Tables)	Might it be good to separate the FME, FMS, FMP tables with preamble for each that reiterates the FMX definition. Example: 'The following table includes a list of FME's identified by the RFPG. These include evaluations (studies, research, investigations), for potential activities with a flood mitigation purpose.' Similar preamble could be created for FMS, FMPs. This would create separation of the tables to better show the trasitions between each.
1	191	4	Chapter 4.B. (FMP Tables) TABLE 4-12: LIST OF POTENTIALLY FEASIBLE FMPS	In addition to preamble, might be good to mention FMP is a very strict definition per TWDB (and thus only a short list technically qualified).
1	192	4	4.B.1.b. Infeasible FMSs and FMPs	Including a specific table of infeasible FMSs/FMPs might be result in a 'grouchy' or testy response by local communities. Therefore, instead of singling out individual and specific actions and communities, could this section be addressed by including narrative for categories of infeasible actions (generators, contact info databases, PPE, etc.). Just trying to avoid sensitivity and keep things diplomatic.
1	206	4	4.B.2.g. Funding Sources	While it might not be politically palatable/popular, local taxes should be listed as a funding source. For example, Harris County 2018 $2.5 billion Bond Program (HCFCD).
1	215	5	TABLE 5-1: RECOMMENDED FLOOD MANAGEMENT EVALUATION DISTRIBUTION	Good table, good FMEs, reasonalbe scope, scale, results, and cost.
1	216	5	TABLE 5-2: RECOMMENDED FLOOD MANAGEMENT STRATEGY DISTRIBUTION	"Infrastructure Projects' Description. Might need to explain how this is different than FME (unless majority of $109M is dedicated to construction). If so, then might change description to 'design and construct future infrastructure improvements'.
1	217	5	TABLE 5-3: RECOMMENDED FLOOD MITIGATION PROJECTS DISTRIBUTION	Since there is only five (5) total FMPs, it might be good to list them individually rather than a summarized group.
1	225	5	5.D.3.e Orange County Coastal Storm Risk Management Project	Might need to explain how this project is relevant to the greater (upper/lower) Neches Watershed. Theorhetically (and perhaps probably), the levees and floodwalls could increase flooding in the lower Neches.
1	233	6	6.A.1.b. No Adverse Impact	Might want to soften the preamble language to say 'The recommended FMPs do not appear to negatively affect neighboring areas located within or outside of the flood planning region.' See also 5.D.3.e. comments, etc. It's probably the case that someone has attested to the NAI for FMPs, but keeping arms length from such statements might be appropriate.
1	248	7	7.B.6 Hazard Mitigation Action Plans	I realize this might be a TWDB prescribed section, but including HMP listing here seems off topic with regard to flood response (emergency activities).
1	248	7	7.B.6 Hazard Mitigation Action Plans	Also, this seems like an incomplete list. Also, should probably mention all the official partipating jurisdictions in the HMPs for the region (primarily cities covered in County-Multi-Jurisdictional HMPs).
1	255	8	Chapter 8.A. Legislative Recommendations	My opinion, this would be a good place to make the case for increased higher level (state or river basin) involvement, coordination, and construction of flood mitigation work. Legislature could establish a permanent structure and system for doing so. In other words, move away for hyper-local (and the perennial confusion and inefficiency it creates), and move towards state-level coordination. Not sure where this fits.
1	259-	8	Chapter 8.C. Flood Planning Recommendations	Various comments on these. Generally good or very good.
1	264	9	CHAPTER 9. FLOOD INFRASTRUCTURE FINANCING ANALYSIS	Nice job on this Chapter, all very good!
1	272	9	9.B Barriers to Funding	An additional barrier is lack of access to federal databases that contain important flood damage details (HWM's, XYZT$ for flood damage). Primarily FEMA, IA, but also PA and SBA-DL.
1	273-274	9	9.C.1. Flood Infrastructure Financing Survey Results	Minor note, major funding for Hardin County FIF application was awarded but not pursued due to the County unwilling to accept 0% loan for construction balance.

RFPG Comments Regarding Legislative Recommendations, Regulatory and Administrative Recommendations and State Flood Planning Recommendations		
Name	**Flood Plan Recommendations**	**Comments**
Jerry Cotter	**Table 8.1 Legislative**	
	Non regulatory regional flood control or drainage districts should be established and funded for rapidly growing urban areas such as DFW, Houston, San Antonio, etc. Responsibility would be to provide consistency, technical resources, funding and reviews in support of FME's, FMS's. These organizations would also implement or support implementation of FMP's. These organizations would augment communities and counties that just don't have the resources and expertise to manage flooding.	Rapidly developing areas surrounding larger urban centers are at greater risk of having runoff patterns increasing because of development. These urban areas are comprised of many communities and unincorporated county areas. Many of the smaller communities are not funded or resourced to deal with the complexities of floodplain management and therefore there is a lack of or inconsistencies in floodplain management practices.
	Clarify the early 2000's state legislation that provide counties the authority to regulate floodplains to explicidly allow and encorage activiites associated with floodplain management such as development of land use plans, regulatory authorites, e.g. permitting.	Although state legislation was passed in the early 2000's which gave counties the ability to regulate floodplains, interpretation of these regulations varies widely from county to county. The legislate bill lacks implementation guidance in the form of administrative rules. If development is occuring in unincorporated areas, this development can dynamically impact flood risk.
Jerry Cotter	**Table 8.2 Regulatory**	
	Require the use of n-values and channel conditions which would likely result if the channel or project were not maintained. Exceptions would be golf courses or other areas where an organization exists which would maintain the channel in perpetuity. Disallow maintence by marginal organizations such as home owners associations to justify acceptance of lower n-values as this is an unrealistric expectation.	When channels are constructed, most often channel bed, banks and overbanks are cleared; however; with many miles of these channels, it is often difficult for communities to maintain those beds, banks and overbanks at their design conditions. Generally, there is a lack of channel maintenance to ensure flood conveyance areas, established as part of a development or improvement projects, to retain their design level n-values. This results in unexpected changes in channel conveyance and increased flooding. Channel maintenance is very expensive activity that can trigger environmenatl permitting requirements.
	No loss of valley storage to the 500-year level. Communities could allow redistribution of valley storage to allow interactions with natural areas but no loss of storage.	Land development in upstream areas increases runoff in downstream areas. This happens because of increased impervious cover and decreased tree cover, and therefore less ability to absorb rainfall. Additionally, development, in most communities, encroaches into riparian areas and decreases the amount of storage available to accommodate flood waters. Just the main thread of the Trinity River though DFW stors more flood waters during of flood than any three of the USACE reservoirs that provide flood protection for DFW. The many other stream provide even more storage than the main stem. There is limited capacity in rivers and streams to convey floodwaters. This means that all areas above any given conveyance point have to stor flood water until sufficient time has laps to pass the water away from the impacted area. The streams are where this water is stored and depleting these storage areas will impact DS areas.
	Establish future land use plans for unincorporated areas associated with rapidly growing urban areas.	"
	Use of ultimate development land use conditions in the development of future flows. Require use of future flows for regulation of floodplains and development of FMP's.	"
Jerry Cotter	**Table 8.3 State Flood Planning Recommendations**	
	None	
	Potential FMS	
	Encorage storm shifting to validate 100-yr estimates and to provide a broader understanding of communities actual flood risk Storms identified and cataloged as part of the GLO funded USACE led Texas Storm Study could be the primary source of storms to be shifted.	Notes: Great deal of uncertainty in 100-yr estimates. Use of observed storms that approximately match depth duration data from NOAA Atlas 14 or other precipitation frequency sources validates 100-yr estimates. Additionally wet, dry and average conditions as well as conditions at the time the storm occured can be presented. Additionally, communities have and can experience storms that exceed the 100-yr. While not regulatory, this information will provide additional hazard mitigation data so communities can address critical infrastructure impacts and be better prepared.
	Add detail to Watersshed Hydrology Assessments (WHA) for communities within basins with completed WHA's. The WHA for the Trinity has been completed.	The WHA's, funded by FEMA, are considered the best available flood flow frequency estimates, e.g. 100-yr. These estimates consider the latest precipitation frequencies, the variations in watershed response and determine critical flood drivers by employing a wide range of sensitivity analysis for each computation point.
	Update WHA's when future precipitation frequency estimates become available. Efforts to develop future precipitation frequency estimates for Texas are starting.	
	Establish regional efforts, for large urban centers to develop future land use data for all developing areas, not just encorporated areas, for use in developing future flood flow frequency estimates and future 100-yr (and other recurrence interval) hazard boundaries.	

RFPG #5 Comments on the Neches Draft Regional Flood Plan		
Reviewer Name	**Draft Flood Plan Reference**	**Comments**
Helena Mosser, USACE	Table 0-8 RECOMMENDED FLOOD MANAGEMENT STANDARDS	Table 0-8 outlines the recommended flood management standards for "all communities." Since much of the Neches flood risk area lies in unincorporated county areas, recommend clarifying in the report which standards are recommended to be applied by Counties versus Cities & Municipalities.
Helena Mosser, USACE	Table 0-8 RECOMMENDED FLOOD MANAGEMENT STANDARDS: Critical Facilities	In Table 0-8, why are critical facilities in non-coastal communities given the same criteria (2-feet above the 100-yr WSE) as other habitable structures? For Critical Facilities, at least 2-feet above the 500-yr WSE is normally recommended.
Helena Mosser, USACE	ES 8. Administrative, Regulatory, and Legislative Recommendations	In Section ES 8, under Legislative Recommendations, although state legislation was passed in the early 2000's which gave counties the ability to regulate floodplains, interpretation of these regulations varies widely from county to county. The previous legislation lacked implementation guidance in the form of administrative rules. Recommend a legislative action that includes specific implementation guidance from the State on how counties can regulate their floodplains.
Helena Mosser, USACE	ES 8. Administrative, Regulatory, and Legislative Recommendations	In Section ES 8, suggest adding a recommendation that non-regulatory regional flood districts (or regional drainage districts) should be established and funded by state legislature. Responsibility of these regional flood districts would be to provide regional consistency, technical resources, funding and reviews in support of FME's, FMS's. These organizations would also implement or support implementation of FMP's. These organizations would augment communities and counties that do not have adequate staff, resources and/or expertise to devote to the complexities of floodplain management.
Helena Mosser, USACE	ES 8. Administrative, Regulatory, and Legislative Recommendations	In Section ES 8 under Regulatory and Administrative Recommendations, suggest adding a recommendation that communities and counties regulate to a criteria of no loss of valley storage to the 500-year level for non-coastal areas. Communities could allow redistribution of valley storage to allow interactions with natural areas, but no loss of storage. Preserving the natural valley storage of the existing floodplain prevents a large portion of the cumulative adverse impacts from future development.
Helena Mosser, USACE	2.8.2.a Future Conditions for Large Rivers and Figure 2.14	In Figure 2-14, the "NECHES RIVER SEGMENT WITH MAINTAINED EXISTING CONDITIONS" is shown to extend from B.A. Steinhagen Lake to near Beaumont, TX. This assumption overestimates the impacts of Sam Rayburn Reservoir. Sam Rayburn Reservoir only regulates 45% of the drainage area above B.A. Steinhagen Lake, so large increases in future floods could still result from the uncontrolled drainage area. A more appropriate assumption would be that there is no change to existing conditions for the short reach of the Angelina River below Sam Rayburn Reservoir, but that the mainstem Neches River below B.A. Steinhagen Lake would face a similar increase in future flood risk as the rest of the watershed.
Helena Mosser, USACE	CHAPTER 7 – FLOOD RESPONSE INFORMATION AND ACTIVITIES	In addition to the tools and resources listed in Chapter 7, the InFRM Flood Decision Support Toolbox (FDST) is another publicly available tool that can be used for emergency preparedness and emergency response (https://webapps.usgs.gov/infrm/fdst/). The FDST contains interactive flood inundation mapping libraries for 13 gage locations in the Neches Basin. The FDST maps automatically update to show the map for the current NWS flood forecast for emergency response, but can also be used to map "what if" scenarios for emergency preparedness. As the number of gages in the Neches basin increases according to the RFP goals, the mapping locations in the FDST can also be expanded.
Helena Mosser, USACE	Table 9-1 in Chapter 9	In Table 9-1, under Partnerships with USACE, recommend adding USACE's Floodplain Management Services Program (FPMS), which can provide up to 100% in federal funds for floodplain mapping and flood planning related activities. A bit more detail on the FPMS program and Planning Assistance to States (PAS) programs could also be added under section 9.A.3.c.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

October 21, 2022

Scott Hall
General Manager
Lower Neches Valley Authority
P.O. Box 5117
Beaumont, Texas 77726-5117

RE: Texas Water Development Board Comments on Region 05 Neches RFPG's Draft Regional Flood Plan Contract No. 210792490.

Dear Mr. Hall:

Texas Water Development Board (TWDB) staff has performed a review of the draft regional flood plan submitted by August 1, 2022, on behalf of the Region 05 Neches Regional Flood Planning Group (RFPG). The attached comments will follow this format:

- **LEVEL 1**: Comments and questions that must be satisfactorily addressed to meet specific statute, rule, or contract requirements; and,

- **LEVEL 2**: Comments and suggestions for consideration that may improve the readability and/or overall understanding of the regional flood plan

Please note that while Level 2 comments are provided for the planning group's consideration, Level 1 comments must be addressed prior to the submission of final Regional Flood Plans by the January 10, 2023, deadline.

It is expected that the data contained in all written report sections, tables, excel spreadsheets, and the geodatabase will be consistent throughout. In cases where there are any discrepancies in data, the geodatabase dataset will supersede other data and the TWDB will utilize the geodatabase dataset when developing the state flood plan.

TWDB review of the draft regional flood plans is comprised of many spot checks of data across several deliverables and is not an all-encompassing data review. Please note that TWDB's review does not imply accuracy of the draft regional flood plan. Each RFPG is responsible for ensuring the completeness and accuracy of the plan and all associated data.

To facilitate efficient and timely completion, and Board approval, of your final regional flood plan, please provide your TWDB Regional Flood Planner with a draft of your response to these comments (e.g., informally via email) on the draft RFP as soon as possible. This will allow TWDB staff to provide preliminary feedback on proposed RFPG responses to assist you in meeting your RFPG's timeline for approval and submission to TWDB of the final plan by the deadline. It will also help to minimize the need for subsequent follow-ups after final regional flood plan submission to TWDB.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

Title 31 TAC §361.50(c) requires the regional flood planning group to consider any written or oral Comment received from the public on the draft regional flood plan (RFP); and the EA's written comment on the draft RFP prior to adopting a final RFP. Section 361.50(d) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response, for each, explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the RFPG's responses must be included in the final, adopted RFP. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments or questions, as necessary, regarding data integrity related to the Board's State Flood Plan Database (that is built from the 15 regional databases), even after submission of the final plan to TWDB.

Standard to all RFPGs is the need to include certain content in the final RFPs that was not yet available at the time that drafts were prepared and submitted. In your final RFP, please be sure to incorporate in the final submitted plan, documentation, for example, that a public meeting to receive comments was held as required and that comments received on the draft RFP were considered in the development of the final plan [31 TAC §361.50(d)].

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Richard Bagans at 512-936-0129 or via email at richard.bagans@twdb.texas.gov. TWDB staff are available to assist you in any way possible to ensure successful completion of your final regional flood plan.

Lastly, on behalf of TWDB, I would like to thank you, the sponsor, the RFPG members and the technical consultants for accomplishing this major milestone of a herculean effort and advancing the flood risk reduction mission in our state.

Sincerely,

Reem J. Zoun, PE, CFM, ENV SP
Director
Flood Planning

Attachment: TWDB Comments

Cc: Judge Jeff Branick , RFPG Chair
Risa Barber, Lower Neches Valley Authority
Jason Afinowicz, Freese and Nichols, Inc.
Rolando Ayala, Freese and Nichols, Inc.
Matt Nelson, TWDB
James Bronikowski, TWDB
Anita Machiavello, TWDB
Richard Bagans, TWDB

October 21, 2022

TWDB Comments on Region 05 Neches Regional Flood Planning Group's Draft Regional Flood Plan

Level 1: Comments and questions must be satisfactorily addressed to meet statutory, agency rule, and/or contract requirements.

General Comments

1. Please ensure that all "Submittal requirements" identified in each of the Exhibit C Guidance document sections are submitted in the final flood plan.
2. For all mapbooks with inset maps, please also include a region-wide map displaying the data (e.g., Maps 4, 6, 8, 10, 11, and 12) [Exhibit C 3.10].

SOW Task 1

3. Planning Area Description, Text:
    a. Section 1.A.4. states that there are 79 cities within the region, however, Section 1.A.1. states that there are 33 incorporated cities. Please review and reconcile as necessary.
    b. Section 1.A.4. states that 66 municipalities participate in the NFIP, however, Section 1.A.7.a. states that 35 cities and counties utilize ordinances. If a city or county participates in the NFIP, then it must have appropriate ordinances in place. Please review and reconcile as necessary [31 TAC §361.30 (1-7)].
4. Entities GIS Feature Class, *Entities*: It appears that some entities crossing regional boundaries do not start with "00" as required. For entities crossing region boundaries, this is expected to start with "00" and 'RFPG_NAME' should be left NULL. For additional entities crossing region boundaries, an ID should be requested from TWDB. ENTITY_IDs should match those provided by TWDB. Regions may create their own IDs for additional entities entirely within the region. Please refer to the Summary of Updates to Exhibit D document available on the TWDB website.
5. Existing Projects, Text: Table 1-22 does not appear to include the expected year of completion. Please include the estimated year of completion for existing projects listed in Table 1-22, or include an appropriate table reference in the text of Chapter 1 to where this information is located in Exhibit C Table 2 [31 TAC §361.32].
6. Existing Projects GIS Feature Class, *ExFldProjs*:
    a. It appears that some fields contain invalid entries, including 'COST' and 'COMP_YR'. Please confirm that all NULL values utilized represent either "not applicable" or "unknown". Please ensure all required fields are populated with valid entries per Exhibit D Table 8 .
    b. Please refrain from using numeric placeholders (such as '999999') in numeric fields such as 'COST', 'COMP_YR', and 'EXHAZ_ID' as this causes errors in calculations. Please leave NULL when the field is not applicable or unknown. Please reconcile [31 TAC §361.32].

SOW Task 2A

7. Existing Condition Flood Exposure (Exhibit C Table 3): The day and night populations in Table 3 do not appear to match those in the *ExFldExpAll* feature class. Please ensure the population count in Table 3 is the maximum of day and night population. "Population (daytime)" and "Population (nighttime)" columns may be added to the left of "Population" in Table 3 to facilitate this check. Please review and reconcile [31 TAC §361.33 & Exhibit C 2.2.A.3].
8. Model Coverage, Text: Existing model coverage within the Flood Planning Region is only discussed relative to models used in FMPs. If more than 3 models exist within the Flood Planning Region, please include a specific, albeit brief, summary in Chapter 2 which summarizes H&H model availability across the region (not only those used in FMPs) [31 TAC §361.33(b)(2)].

SOW Task 3A

9. Existing Floodplain Management Practices (Exhibit C Table 6): The count of entities in Table 3-1 is 107, however, Table 6 appears to list 103 entities. Please ensure entries in Table 6 match chapter summary tables and the *ExFpMp* table [31 TAC §361.35 & Exhibit C 2.3.A].
10. Existing Floodplain Management Practices GIS Feature Class, *ExFpMp*:
    a. Please review and confirm entities listed as having flood-related authority. It is not clear that all entities listed have flood-related authority.
    b. It appears that some fields contain invalid entries, including 'LEV_ENFRC'. Please ensure all required fields are populated with valid entries per Exhibit D Table 20 [31 TAC §361.35 & Exhibit D 3.7].

SOW Task 4B

11. Flood Management Evaluations (FME) Map (Exhibit C Map 16): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study [31 TAC §361.38(m) & Exhibit C 2.4.B].
12. Flood Mitigation Projects (FMP) (Text, Exhibit C Tables 13 & 16, *FMP*, *FMP_Details*, *FMP_HazPost*): It appears that there are inconsistencies in the cost listed in the Chapter 5 Table 5-2, Exhibit C tables, and the geodatabase. For example, FMP_ID 053000003 in Chapter 5 Table 5-2, Exhibit C Tables 13, 16, and the Project Details excel files all list a project cost of $39,570,866 while the *FMP* feature class and *FMP_Details* table list the project cost as $39,570,860. Please review and ensure data consistency across the plan [31 TAC §361.38(c-e)].

SOW Task 5

13. Flood Management Evaluation (FME) Recommendations Map (Exhibit C Map 19): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study [31 TAC §361.39 & Exhibit D 3.10].
14. Flood Mitigation Project (FMP) Recommendations: Each recommended FMP must be accompanied with an associated model or supporting documentation to show no negative

impact. Please confirm that this was done and provide reference to supporting materials. As per the draft report (page 4-36), "For structural FMPs and FMSs, signed and sealed reports were checked for certified statements that the associated project or strategy would not cause negative impacts upstream, downstream, or within the project area in events up to and including the 1% ACE flood event. For FMPs and FMSs that certified statements could not be located for, existing H&H models were reviewed to confirm the absence of negative impacts as defined above." For each recommended FMP, please identify in the plan how no negative impact was determined as required by the Exhibit C Section 3.6.A (page 108), either via a model or a study, and submit the associated model or include the study name in tabular format.

15. Flood Mitigation Project (FMP) Recommendations GIS Feature Class, *FMP_Details*: Please refrain from using numeric placeholders (such as "999999") in numeric fields such as 'REMSTRUC500' as this causes errors in calculations. Please leave NULL when the field is not applicable or unknown. Please ensure valid entries for all required fields per Exhibit D Table 24 [31 TAC §361. 38(c-e)].

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional flood plan.

General Comments

16. To better align with our agency's preferred nomenclature, please consider using the name, "Cursory Floodplain Data" instead of "Fathom" or Cursory Fathom Data" throughout the regional flood plan.

SOW Task 1

17. Planning Area Description, Text:
    a. Please consider providing a description of how Low Water Crossings were identified within the text of Chapter 1.
    b. Please consider including the full list of entities with flood related authority as an appendix.
    c. Please consider adding more detailed region-specific analysis regarding farming, ranching, and natural resources most impacted by flooding under Section 1.A.6.
18. Entities GIS Feature Class, *Entities*: Please consider including the FEMA-assigned community number (6-digit with the first two being "48" for Texas) or CID for entities.
19. Watersheds GIS Feature Class, *Watersheds*: Please consider linking this feature class to any relevant FME, FMS, or FMP when appropriate by populating the associated ID fields.
20. Previous Studies, Text: Chambers County Master Drainage Plan (Volume I) appears to be listed twice in Table 1-18. Please review.
21. Existing Projects Map (Exhibit C Map 2): Please consider revising the map to more easily differentiate the locations and extents of proposed or ongoing projects.

SOW Task 2A

22. Existing Condition Flood Hazard Analysis, Text: Please include total land areas (square miles) of each flood risk by flood risk type, county, region, and frequency as per guidance document (Exhibit C page 24): Submittal requirement number 2.

23. Existing Condition Flood Exposure GIS Feature Class, *ExFldExpAll*: If the 'CRITICAL' field contains a 'No' entry, then please leave 'CRIT_TYPE' as NULL.
24. Existing Condition Flood Exposure Map (Exhibit C Map 6): Please consider modifying the map to improve legibility.
25. Model Coverage (GIS Feature Class *ModelCoverage*, Exhibit C Map 22): Please consider including all models generated or modified to support the development of this regional flood plan.

SOW Task 2B

26. Future Condition Flood Hazard Analysis, Text: Please include total land areas (square miles) of each flood risk by flood risk type, county, region, and frequency as per guidance document (Exhibit C page 33): Submittal requirement number 3.
27. Future Condition Hazard Map (Exhibit C Map 8): Please consider reviewing certain map elements to avoid obscuring data. For example, the legend appears to cover a portion of the Future Condition Flood Hazard extent on Figure 17 of 29 (Sabine County).
28. Future Condition Flood Exposure GIS Feature Class, *FutFldExpAll*: If the 'CRITICAL' field contains a "No" entry, then please leave 'CRIT_TYPE' as NULL.
29. Future Condition Flood Exposure Map (Exhibit C Map 11): Please consider modifying the map to improve legibility.

SOW Task 3A

30. Existing Floodplain Management Practices, Text: Section 3.A.1. states "cities, counties, and flood districts" have flood-related authority, but the associated Tables 1-12 and 3-1 include water supply and utility districts, and drainage districts, respectively, as having flood-related authority. Please consider reviewing and reconciling as necessary.
31. Existing Floodplain Management Practices (Exhibit C Table 6): It appears that some entities listed, including Moore Station, New Chapel Hill, and Browndell, may not be active NFIP participants. Please consider reviewing list of NFIP participants to confirm status.

SOW Task 3B

32. Goals, Text: Please consider including region-specific detail on "Transformed and Residual Risk" in addition to defining these terms.
33. Goals Table (Exhibit C Table 11): Please consider reviewing Table 11 as some goals state "Long Term (50 years)", whereas the stated target year is "2053". For example, Goal IDs 05000023 and 05000025.

SOW Task 4B

34. Streams GIS Feature Class, *Streams*: Please consider linking this feature class to any relevant FME, FMS, or FMP when appropriate by populating the associated ID fields.
35. Flood Management Evaluation (FME), Text:
    a. FME_ID 051000156 description states "Installation of New Culverts." FMEs should generally focus on planning and feasibility study efforts rather than construction. Please consider verifying that all entries should be classified as FMEs and not as FMPs or FMSs.

b. For some county-wide FMEs it appears that a majority of the county falls outside of the RFPG boundary, for example FME_IDs 051000019 and 051000022. Please consider including justification on how the FME benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.
c. There are several FMEs that appear to overlap with a TWDB-funded, FIF Category 1 study, but the TWDB-funded, FIF Category 1 study does not appear to be listed. For example, FME_ID 05100091 should utilize FIF_ID 40034. FME_ID 05100050 may be a duplication of FIF_ID 40022. Please consider verifying that FMEs do not duplicate efforts of any TWDB-funded, FIF Category 1 study.
d. For areas in RFPG with existing FIF, BLE, GLO, or other models and/or ongoing studies, please consider stating how the FME will improve upon the preexisting model/study.
e. Please consider adding identifiers to all models in the "Model Description" column, for example FIF_ID 40022.

36. Flood Management Evaluation (FME) GIS Feature Class, *FME*: It appears that some fields may be missing, including 'ASSOCIATED'. Please consider completing all fields with valid entries per Exhibit D Table 23.
37. Flood Mitigation Project (FMP), Text: Please consider including a written list of FMPs that were identified but determined by the RFPG to be infeasible, including the primary reasons for them being infeasible.
38. Flood Management Strategy (FMS), Text: Please consider including a written list of FMSs that were identified but determined by the RFPG to be infeasible, including the primary reasons for them being infeasible.

<u>SOW Task 5</u>

39. Flood Management Evaluation (FME) Recommendations, Text:
    a. FME_ID 051000156 description states "Installation of New Culverts." FMEs should generally focus on planning and study efforts rather than construction. Please verify that all entries should be classified as FMEs and not as FMPs or FMSs.
    b. For some county-wide FMEs it appears that a majority of the county falls outside of the RFPG boundary, for example FME_IDs 051000019 and 051000022. Please include justification on how the FME benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.
    c. There are several FMEs that appear to overlap with a TWDB-funded, FIF Category 1 study, but the TWDB-funded, FIF Category 1 study does not appear to be listed. For example, FME_ID 05100091 should utilize FIF_ID 40034. FME_ID 05100050 may be a duplication of FIF_ID 40022. Please verify that FMEs do not duplicate efforts of any TWDB-funded FIF Category 1 study.
    d. For areas in RFPG with existing FIF, BLE, GLO, or other models and/or ongoing studies, please consider stating how the FME will improve upon the preexisting model/study.
    e. Please consider adding identifiers to all models in the 'Model Description' column, for example FIF_ID 40022.
40. Flood Management Evaluation (FME) Recommendations GIS Feature Class, *FME*:

a. It appears that the field 'ASSOCIATED' is missing from the FME feature class. Please consider adding and populating this field with valid entries per the TWDB broadcast email sent on June 3, 2022.
b. Please consider populating 'MODEL_DESC' field for clarity on existing studies to be used. Please make sure to document existing or ongoing BLE and TWDB-funded FIF Category 1 studies.

SOW Task 6B

41. Contributions and Impacts to Water Supply, Text: The plan includes a statement that "no anticipated measurable impacts" would occur. Please consider clarifying whether this includes potential measurable impacts (negative or positive) to water availability and/or supply.

SOW Task 7

42. Flood Response Information and Activities, Text: Please consider renaming the header “Hazard Mitigation Action Plans”, if appropriate, to the more common term ‘Hazard Mitigation Action Plans’.

APPENDIX 10-B
RESPONSES TO COMMENTS RECEIVED ON DRAFT PLAN

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 18, 2022

Cary Dupuy
Regional Director, Texas and Oklahoma
National Parks Conservation Association

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Dupuy,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The recommended standard in Table 0-8 which previously stated that “All municipalities should adopt minimum requirements outlined by FEMA for NFIP participation” will be revised to instead read that " All municipalities should adopt minimum requirements outlined by FEMA for NFIP participation. Where appropriate, consider adopting higher standards to provide higher levels of protection against loss of life and property due to flooding."

Comments regarding the incorporation of nature-based solutions have been noted. TWDB is initiating a project to develop a guidance manual on nature-based solutions (NBSs) focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single, statewide manual for Texas communities. The intent is to help address flood risk, water quality, groundwater recharge, habitat improvement, and community enhancement needs with either independent NBSs or in combination with traditional flood mitigation infrastructure. This guidance will be referenced in the development of future regional flood plans.

Comments regarding RFPG goal of incorporating nature-based practices and floodplain preservation have been noted. The goals presented in the RFP were adopted based on discussion held at several Regional Flood Planning Group meetings. These goals were defined to be specific, measurable, attainable, relevant, and time-bound.

Comments regarding the discussion of evaluating FME/FMS/FMPs have been noted. Quantifiable flood risk reduction is a TWDB required evaluation for these RFPs. This is attributed to Texas Water Code Section 16.061, which states that the state (regional) flood plan must protect against the loss of life and property. Additionally, quantifiable flood risk reduction is one of 16 different criteria that will be evaluated by TWDB when ranking FMPs in the state flood plan. Other criteria include the percentage of the project based on NBSs by project cost and environmental benefits. The RFPG does not rank projects in their respective plans but recommends them for inclusion in the

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overall state flood plan. The NRFPG agrees that floodplain preservation and nature-based approaches are important elements and have been incorporated as goals, recommended standards, and additional regional flood planning recommendations.

Comments regarding the disconnect between legislative recommendations and action included in the plan have been noted. FMEs, FMSs, and FMPs evaluated were identified from a variety of sources including but not limited to federal funding applications, hazard mitigation plans, past flood studies, drainage master plans, capital improvement programs, and other contributions from stakeholders/sponsors. The NRFPG welcomes additional evaluations, strategies, and projects for potential inclusion in the RFP from any potential sponsors.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 18, 2022

Marty Kelly

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Kelly,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

Comments regarding the inclusion of nature-based solutions in the identified FMSs and FMPs in the region have been noted. FMEs, FMSs, and FMPs evaluated in the plan were identified from a variety of sources including but not limited to federal funding applications, hazard mitigation action plans, past flood studies, drainage master plans, capital improvement programs, and other contributions from stakeholders/sponsors. The NRFPG welcomes additional evaluations, strategies, and projects for potential inclusion in the RFP from any potential sponsors. Additionally, TWDB is initiating a project to develop a guidance manual on nature-based solutions (NBS) focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single statewide manual for Texas communities. This can be used to help sponsors in the development of FMEs, FMSs, and FMPs for inclusion in the plan.

Comments regarding future coordination between TPWD and the NRFPG have been noted. The NRFPG welcomes coordination with TPWD to ensure that conservation goals for species native to the region are met while working to reduce the negative impact of flooding to life and property.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Mary Bernard
Big Thicket Biosphere Reserve
Lumberton, Texas

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Bernard,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 Regional Flood Plan.

Comments regarding the incorporation of nature-based applications have been noted. The NRFPG agrees that nature-based applications important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Neches RFP. Some of these examples include:

- The incorporation of nature-based practices and floodplain preservation as one of the Flood Mitigation and Floodplain Management Goals covered in Chapter 3.
- A recommendation to promote nature-based projects for new development, included in Chapter 8.
- The recommendation of several FMEs, listed in Appendix 5-B, that include the evaluation of nature-based solutions as conceptual alternatives.

Additionally, TWDB is initiating a project to develop a guidance manual on nature-based solutions (NBS) focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single, statewide manual for Texas communities. The intent is to help address flood risk, water quality, groundwater recharge, habitat improvement, and community enhancement needs with either independent NBSs or in combination with traditional flood mitigation infrastructure. This guidance will be referenced in the development of future regional flood plans.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Sandra B. Ramos
Texas Coastal Program Manager
National Parks Conservation Association

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Ramos,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

Comments regarding the incorporation of nature-based projects have been noted. The promotion of nature-based projects is covered in various sections of the Neches RFP. Some of these examples include:

- The incorporation of nature-based practices and floodplain preservation as one of the Flood Mitigation and Floodplain Management Goals covered in Chapter 3.
- A recommendation to promote nature-based projects for new development, included in Chapter 8.
- The recommendation of several FMEs, listed in Appendix 5-B, that include the evaluation of nature-based solutions as conceptual alternatives.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Desiree Lege

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Lege,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

Comments regarding the RFPG goal of using larger storm events as the basis of design for flood infrastructure projects have been noted. The goals presented in the RFP were adopted based on discussion held at several NRFPG meetings. These goals were defined to be specific, measurable, attainable, relevant, and time-bound.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Alice Russell
620 W 19th St
Houston, TX 77008

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Russell,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
- Recommendation to promote nature-based projects for new development.
- Several recommended FMEs include the evaluation of nature-based solutions as conceptual alternatives.

Additionally, TWDB is initiating a project to develop a guidance manual on NBSs focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single, statewide manual for Texas communities. The intent is to help address flood risk, water quality, groundwater recharge, habitat improvement, and community enhancement goals with either independent NBSs or in combination with traditional flood mitigation infrastructure. This guidance will be referenced in the development of future RFPs.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Alison Abbott
23613 Youpon Lake Ln
Spring, TX 77373

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Abbott,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
- Recommendation to promote nature-based projects for new development.
- Several recommended FMEs include the evaluation of nature-based solutions as conceptual alternatives.

Additionally, TWDB is initiating a project to develop a guidance manual on NBSs focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single, statewide manual for Texas communities. The intent is to help address flood risk, water quality, groundwater recharge, habitat improvement, and community enhancement goals with either independent NBSs or in combination with traditional flood mitigation infrastructure. This guidance will be referenced in the development of future RFPs.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Alyssa Melton
903 Briarcliff Ct
Arlington, TX 76012

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Melton,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
- Recommendation to promote nature-based projects for new development.
- Several recommended FMEs include the evaluation of nature-based solutions as conceptual alternatives.

Additionally, TWDB is initiating a project to develop a guidance manual on NBSs focused on flood mitigation in different regions of Texas. The goal of this project is to synthesize available guidance on the use of nature-based flood mitigation solutions into a single, statewide manual for Texas communities. The intent is to help address flood risk, water quality, groundwater recharge, habitat improvement, and community enhancement goals with either independent NBSs or in combination with traditional flood mitigation infrastructure. This guidance will be referenced in the development of future RFPs.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

Amber Haseltine
8906 Pocono Cove
Austin, TX 78717

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Haseltine,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Andrea Christgau
1505 Lost Lake Dr
Keller, TX 76248

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Christgau,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Andres Venegas
413 De Leon Dr
El Paso, TX 79912

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Venegas,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Andrew Jackson
14131 Bishop Bend Ln
Houston, TX 77047

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Jackson,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Angela Wilkinson
149 Village Green
Universal City, TX 78148

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Wilkinson,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Bari Brookman
6391 Hilldale Ct
Fort Worth, TX 76116

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Brookman,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Ben Liles
11116 Salado Springs Cir
Salado, TX 76571

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Liles,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Benjamin Garrett
108 Drew Ln
Heath, TX 75032

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Garrett,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Bonni Scudder
1606 Discovery Blvd
Cedar Park, TX 78613

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Scudder,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Briana Schroeder
7821 Crystalbrook W
Austin, TX 78724

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Schroeder,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Bridgett Rexford
226 Rainbow Dr
Livingston, TX 77399

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Rexford,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Carol Clark
8495 91st Terrace
Seminole, FL 33777

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Clark,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Carolyn Nieland
415 Oakwood Dr
Alamo, TX 78516

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Nieland,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Catherine Lacroix
2444 Lakeshore Dr
Grapevine, TX 76051

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Lacroix,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Cathy Simmons
3306 Cherrywood Rd
Austin, TX 78722

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Simmons,

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Chad Fuqua
3411 Springrock Ln
Houston, TX 77080

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Fuqua,

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Chantal Eldridge
6526 Needham Ln
Austin, TX 78739

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Eldridge,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Cheryl Robison
3820 Pershing Ave
Fort Worth, TX 76107

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Robison,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
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Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Chris Brunner
403 Spring Leaf Ct
Allen, TX 75002

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Brunner,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Christian Richer
7417 Venice Dr
Corpus Christi, TX 78413

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Richer,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Christine Lockhart
24360 Lake Dr
Porter, TX 77365

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Lockhart,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Cindy Laird
219 Main St
Haslet, TX 76052

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Laird,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Claire Bush
1214 Norwood Rd
Austin, TX 78722

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Bush,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Cody Winstead
711 W Camellia St
Tyler, TX 75701

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Winstead,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Corinne Pilon
1910 Bevington Oaks Cir
Katy, TX 77450

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Pilon,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Corrine Alcantar
PO Box 18445
San Antonio, TX 78218

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Alcantar,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dallas Windham
2101 S Hill Dr
Irving, TX 75038

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Windham,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dan Roark
14434 Sunrose Ln
Farmers Branch, TX 75234

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Roark,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dave Cross
116 Schooner Dr
Lakeway, TX 78738

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Cross,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Deanna Pena
9027 Concho St
Houston, TX 77036

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Pena,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Deborah Dewey
15806 Twisting Springs Dr
Cypress, TX 77433

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Dewey,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Deborah Zarett
8127 Sunshine Trail Dr
San Antonio, TX 78244

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Zarett,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Debra Atlas
1413 W 6th St
Weslaco, TX 78596

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Atlas,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dennis Harper
PO Box 1111
Fulshear, TX 77441

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Harper,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Diana Williams
304 Park Meadow Way
Coppell, TX 75019

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Williams,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Don Barnhill
4438 Grove Park Dr
League City, TX 77573

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Barnhill,

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Donald Cook
7954 Glenheath St
Houston, TX 77061

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Cook,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dora Rushing
11755 Spring Club Dr
San Antonio, TX 78249

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Rushing,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Doug Young
9410 Cam Venado
Helotes, TX 78023

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Young,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Dr. Fielder
2234 Carmel Dr
Carrollton, TX 75006
Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Dr. Fielder,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Ed Perry
1532 Rosewood Terrace
New Braunfels, TX 78132

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Perry,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Edith Brown
4204 Esters Rd
Irving, TX 75038

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Brown,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Eileen Mckee
5815 McCommas Blvd
Dallas, TX 75206

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Mckee,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Elizabeth Waddill
2301 Winton Terrace W
Fort Worth, TX 76109

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Waddill,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Ellen Isaly
2923 Rambling Dr
Dallas, TX 75228
Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Isaly,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Francisco Salazar
214 N Walnut St
El Paso, TX 79901

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Salazar,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Fred Grimes
3406 Green Tree Park
Houston, TX 77007

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Grimes,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Garry Kramchak
8542 Dairy View Ln
Houston, TX 77072

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Kramchak,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Gary Graham
11144 Tammy Cir
Plantersville, TX 77363

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Graham,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Geanda Guidry
201 E 21st St
Austin, TX 78705

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Guidry,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

George Holmgreen
3505 Abes Landing Dr
Granbury, TX 76049

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Holmgreen,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Gloria Gannaway
3002 Oak Park Dr
Austin, TX 78704

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Gannaway,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Glory Arroyos
3100 Garden Villa Ln
Austin, TX 78704

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Arroyos,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Greg Sells
3300 Parker Ln
Austin, TX 78741

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Sells,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Hank Hammett
616 Blaylock Dr
Dallas, TX 75203

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Hammett,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Heather Petkovsek
2308 Townes Ln
Austin, TX 78703

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Petkovsek,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

James Klein
3501 Monterrey St
Corpus Christi, TX 78411
Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Klein,

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Neches Regional Flood Planning Group Technical Consultant Team

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November 30, 2022

James Patak
3009 Linda Dr
Ennis, TX 75119

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Patak,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jane Van Praag
131 N Evie St
Bartlett, TX 76511

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Praag,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Janet Delaney
5406 Western Hills Dr
Austin, TX 78731

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Delaney,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jay Crail
3320 Lake Trail Dr
Lancaster, TX 75146

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Crail,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jay Silver
422 Dockside Ct
Sugar Land, TX 77478

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Silver,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jeanette Honermann
111 W Jones Ave
San Antonio, TX 78215

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Honermann,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jeff Hoffmann
4292 Bass Pro Dr
Garland, TX 75043

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Hoffmann,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jennifer Bowen-Shauver
1322 Arrow Hill
San Antonio, TX 78258

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Bowen-Shauver,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jennifer Holburn
8871 Liptonshire Dr
Dallas, TX 75238

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Holburn,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jerell Lambert
2617 Crownspoint Dr
Austin, TX 78748

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Lambert,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Jerry Morrisey
19631 Encino Way
San Antonio, TX 78259

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Morrisey,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Joanne Burrows
11411 Briar Rose Dr
Houston, TX 77077

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Burrows,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Joanne Groshardt
302 Trailridge Dr
Richardson, TX 75081

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Groshardt,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

John McIntosh
4622 Stillbrooke Dr
Houston, TX 77035

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. McIntosh,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Joyce Ford
9325 R J Wood Rd
El Paso, TX 79924

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Ford,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Joychine Eaglin
1110 W Brompton Dr
Pearland, TX 77584

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Eaglin,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Juanita Romero
1233 Elaine Pl
Fort Worth, TX 76106

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Romero,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Judith Cherry
761 Trinity Hills Dr
Austin, TX 78737

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Cherry,

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Neches Regional Flood Planning Group Technical Consultant Team

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Telephone 409-892-4011

November 30, 2022

Judy Harman
2222 Winton Terrace E
Fort Worth, TX 76109

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Harman,

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November 30, 2022

Julie Sears
320 Canyon Ridge Dr
Richardson, TX 75080

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Sears,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Karen Berning
3612 E Washburn Ave
Fort Worth, TX 76107

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Berning,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Karen Kawszan
19206 Holly Shade Ct
Spring, TX 77379

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Kawszan,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Karl Fickling
4720 Lincolnshire Dr
Grand Prairie, TX 75052

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Fickling,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Kaveri Ray
2626 Madeline Grove Dr
Houston, TX 77008

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Ray,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
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November 30, 2022

Keely McLeod
3009 Yoakum St
Fort Worth, TX 76108

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. McLeod,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Kelly Massey
421 W Tanglewood Dr
New Braunfels, TX 78130

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Massey,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Kim George
330 W Spinner Rd
Desoto, TX 75115

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. George,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Kimberly Allen
18208 Preston Rd
Dallas, TX 75252

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Allen,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Ladonna Martin
405 Whalin Ln
Fort Worth, TX 76126

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Martin,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Larry Gay
2223 Postoak Ct
San Antonio, TX 78248

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Gay,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Laura L. Vera
2731 Mary Ln
Dickinson, TX 77539

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Vera,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Leslie Arceneaux
2422 Brookdale Dr
Houston, TX 77339

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Arceneaux,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Leslie Lee
6030 Prospect Ave
Dallas, TX 75206

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Lee,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Leslie Richardson
387 Covent Dr
Kyle, TX 78640

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Richardson,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Linda Mitchell
105 River Tree Cove
Georgetown, TX 78628

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Mitchell,

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Neches Regional Flood Planning Group Technical Consultant Team

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Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Linda Reynolds
2519 W Kiest Blvd
Dallas, TX 75233

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Reynolds,

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November 30, 2022

Linda Schmalstieg
2429 Bissonnet St
Houston, TX 77005

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Schmalstieg,

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7850 Eastex Freeway
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November 30, 2022

Lisa Renzelmann
301 N Ray Roberts Pkwy
Tioga, TX 76271

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Renzelmann,

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November 30, 2022

Lori Hester
5001 N MacArthur Blvd.
Warr Acres, OK 73122

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Hester,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Marce Walsh
5326 Foresthaven Dr
Houston, TX 77066

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Walsh,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Mark Olinger
840 County Rd 2920
Pittsburg, TX 75686

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Olinger,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Mary Hancock
9124 Riverfalls Dr
Fort Worth, TX 76118

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Hancock,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Mary Thornton
3901 Race St
Fort Worth, TX 76111

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Thornton,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Melinda Smiljanic
3122 Morrison St
Houston, TX 77009

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Smiljanic,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Memfis Madyun
709 Saddlebrook Dr
Desoto, TX 75115

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Madyun,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Michael Earney
2700 Del Curto Rd
Austin, TX 78704

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Earney,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Michael Spradlin
4610 Shavano Birch
San Antonio, TX 78230

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Spradlin,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Morris Narunsky
7650 Streamside Dr
Houston, TX 77088

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Narunsky,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Nicholas Gonzales
731 Sycamore Moon
San Antonio, TX 78216

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Gonzales,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Nicole Allison
717 Red Wing Dr
Lewisville, TX 75067

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Allison,

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Nina Davis
30 Muirfield Greens Ln
Lakeway, TX 78738

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Davis,

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Pam Sohan
222 Autumn Chase
New Braunfels, TX 78132
Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Sohan,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Pamela Askew
6944 Santa Maria Ln
Dallas, TX 75214

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Askew,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Pamela Vangiessen
2604 White Oak Dr
Houston, TX 77009

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Vangiessen,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Pat LaStrapes
9703 Santa Monica Blvd
Houston, TX 77089

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. LaStrapes

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Pat Perry
923 Haden St
Tyler, TX 75701

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Perry,

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Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Phil Shephard
3301 Broken Spoke Trail
Georgetown, TX 78628

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Shephard,

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November 30, 2022

Polly Martin
6424 Central City Blvd
Galveston, TX 77551

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Martin,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
- Recommendation to promote nature-based projects for new development.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Priscilla Flores
6238 Arch Bridge Dr
El Paso, TX 79934

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Flores,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

R. M.
3 Laguna Madre Dr
Laguna Vista, TX 78578

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear R.M.,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Rajesh Iyer
101 Cascada Lane
Round Rock, TX 78681

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Iyer,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Robert Yowell
2207 Landscape Way
Richmond, TX 77406

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Yowell,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Roberto Molina
6611 Stonecross Creek Ln
Katy, TX 77449

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Molina,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Rosalyn Forster
2215 Running Springs Dr
Humble, TX 77339

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Forster,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sabine Williams
3502 Lakecrest Dr
Killeen, TX 76549

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Williams,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sahand Naghavi
3231 Allen Pkwy
Houston, TX 77019

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Naghavi,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sally Votteler
4427 Pomona Rd
Dallas, TX 75209

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Votteler,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sandra Breakfield
5610 Cliff Haven Dr
Dallas, TX 75236

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Breakfield,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sandra La Mont
16 Enchanted Oaks St
Orange, TX 77630

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. La Mont,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sandra Ramos
1160 N 7th St
Beaumont, TX 77702

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Ramos,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sara Wood
10718 Opal Ridge Dr
Houston, TX 77095

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Wood,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sarah Sudheer
10500 Salt Block Cir
Austin, TX 78750

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Sudheer,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Sharon Frank
2006 Pheasant Dr
Lewisville, TX 75077

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Frank,

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Solianni Cantu
2390 Santa Maria Ln
Corpus Christi, TX 78415

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Cantu,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Stacey Benham
110 Quarry Point
New Braunfels, TX 78132

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Benham,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Stacey Francis
4606 Everest Lane
Austin, Texas 78727

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Francis,

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Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Stacy Moranville
7445 Jubil Ln SE
Salem, OR 97317

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Moranville,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

- Incorporation of nature-based practices and floodplain preservation as a stated goal.
- Recommendation to promote nature-based projects for new development.
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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Stephanie Cormier
4900 Pear Ridge Dr
Dallas, TX 75287

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Cormier,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Stephen Englander
2308 Westrock Dr
Austin, TX 78704

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Englander,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Susan Betourne
18902 Rustling Ridge Dr
Tomball, TX 77377

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Betourne,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Tanya Teneyuque
2390 Bastrop St
Houston, TX 77004

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Teneyuque,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
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Telephone 409-892-4011

November 30, 2022

Tara Potts
11205 Limoncillo Ct
Austin, TX 78750

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Potts,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Taryn Geer
2721 Ashley Meadow
Schertz, TX 78154

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Geer,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Thomas Haines
2608 N Leighton Cir
Wichita Falls, TX 76309

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Haines,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Thomas Nieland
415 Oakwood Dr
Alamo, TX 78516

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Nieland,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Tina Weber
1510 Garrison St
Arlington, TX 76018

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Weber,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Tracey Bonner
1707 Castle Rd
Arlington, TX 76014

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Bonner,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Trigg Wright
19206 Holly Shade Ct
Spring, TX 77379

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Wright,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Valerie Howell
3633 Hendrick Dr
Plano, TX 75074

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Howell,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Victoria Shih
7617 Brodick Way
Plano, TX 75025

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Shih,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

November 30, 2022

Virginia Boucher
3701 Candleknoll Cir
San Antonio, TX 78244

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Boucher,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The NRFPG agrees that nature-based solutions (NBSs) are important to consider when evaluating flood mitigation and management measures. The promotion of nature-based projects is covered in various sections of the Draft RFP. Some of these examples include:

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Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

December 13, 2022

Steve Moon

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Moon,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The following updates have been made to the plan:

- **Executive Summary:** Figure 0-2 been edited to use points for cities rather than gray polygons.

- **Chapter 1:** Stormwater pumps have been to the list of natural and constructed features at the start of Chapter 1.B. In addition, a new section in Chapter 1 has been added to discuss the presence of stormwater pumps within the region. Map 1 has also been updated to reflect this additional infrastructure.

- **Chapter 4:** The Technical Consultant agrees that the number of critical facilities is a simplistic measure of impact in the overall assessment of flood mitigation needs for the planning region. However, the intent of Task 4B (Flood Mitigation Needs Analysis) is to perform a screening level determination of region-wide flood risk and identify areas with the greatest known risk. This was completed using datasets that are available across the entire state and furnished by TWDB. A recommendation will be added to Chapter 8 to address this comment. The recommendation will focus on incorporating additional factors such as structure value loss in the identification of areas with the greatest known flood risk.

  The Technical Consultant also agrees that the cost of industrial facilities' lost production and repair is an important factor to consider for the flood mitigation needs for the region. An additional recommendation will be added to Chapter 8 to address this comment. The recommendation will focus on incorporating additional factors such as estimated costs of lost production for industrial facilities.

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

Comments regarding the following items have been noted:

- **Chapter 1:** Figure 1-2 has been reviewed to verify that there are not two southern boundaries. The region boundary was provided by TWDB and the dual southern boundary is likely due to the region boundary having a gap at the Gulf Intercoastal Waterway located in the southern area of Jefferson County.

  Concerning the Port Arthur Levee/Floodwall system, USACE regularly inspects levees within its Levee Safety Program to monitor their overall condition, identify deficiencies, verify that needed maintenance is taking place, determine eligibility for federal rehabilitation assistance (in accordance with P.L. 84-99), and provide information about the levees on which the public relies. The last assessment was completed 08/15/2017.

- **Chapter 2:** Figure 26/29 in Map 4 has been reviewed to verify the extent and classification of the existing condition flood hazard areas around industrial facilities within the DD7 stormwater system. The delineations shown in the map are correct and are consistent with delineations from the floodplain quilt provided by TWDB.

- **Chapter 3:** It is worth the TWDB's consideration to set more aggressive goals for the RFPGs to use for flood mitigation. The Neches RFPG acknowledges the desire for more aggressive goals; however, the goals presented in the Neches Regional Flood Plan were adopted based on discussion held at several Regional Flood Planning Group meetings. Adjustment to these goals will be considered during the preparation of the next Regional Flood Plan.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

December 12, 2022

Greg Wobbe

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Wobbe,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

Editorial comments for the Executive Summary, Chapters 1, 4B, and 7 have been incorporated in the Neches Regional Flood Plan. These updates include:

- **Executive Summary**: An item for High Water Marks (HWMs) has been added to the list of acronyms and definitions for both Volume I and Volume II.
- **Chapter 1:** Figure 1-3 has been edited for clarity to include the industry category underneath each value on the pie chart. Additionally, Figure 1-15 has been edited to better label and show the locations of each reservoir within the region for clarity. The 262 square miles representing potential flood prone areas does indeed reflect 2.3% of the Neches region.
- **Chapter 4B:** "Local Taxes" has been added as an item to Table 4-19 under the Funding Source column.
- **Chapter 7:** Table 7-1 has been updated per input received.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
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Neches Regional Flood Planning Group
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7850 Eastex Freeway
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December 13, 2022

Jerry Cotter

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Mr. Cotter,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The following updates have been made to the plan:

- **Chapter 8:** Consistent interpretation of floodplain regulations is recognized as an important issue - additional language has been added to clarify that implementation guidance for consistent interpretation and execution of model standards should also be included in their development.

Comments regarding the following items have been noted:

- **Chapter 8:** The need to provide floodplain management assistance to smaller communities is recognized by the NRFPG. Section 8.B.3. already mentions providing technical assistance to smaller jurisdictions in the region. This recommendation includes assistance in preparing funding applications and provisions of a funding mechanism for smaller communities to acquire funds for studies that help identify FMPs and FMSs.

  The NRFPG shares the same concerns related to the difficulties related to the operation and maintenance (O&M) of flood mitigation and other drainage infrastructure. The establishment of grant programs for O&M of this infrastructure is included as a recommendation in the plan.

  The NRFPG believes that floodplain preservation is a critical component of floodplain management. Mitigation of fill in the 500-year floodplain is a standard for some communities; however, this is a measure that is beyond minimum floodplain management standards. The NRFPG has elected to recommend minimum standards that serve as a starting point.

  It is important to note that the flood planning recommendations included in the chapter are intended to provide recommendations the planning group believes are needed and desirable to achieve regional flood mitigation and floodplain management goals. Detailed modeling efforts are not the focus of the planning effort.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

REGION 5
NECHES
REGIONAL FLOOD PLANNING GROUP

Neches Regional Flood Planning Group
c/o Lower Neches Valley River Authority
7850 Eastex Freeway
Beaumont, Texas 77708
Telephone 409-892-4011

December 13th, 2022

Helena Mosser

Re: Comments on Draft Region 5 Neches 2023 Regional Flood Plan

Dear Ms. Mosser,

The Neches Regional Flood Planning Group (NRFPG) has received and reviewed your comments on the Draft Region 5 Neches 2023 Regional Flood Plan (RFP). The NRFPG appreciates your input in the public process associated with development of the 2023 RFP.

The following updates have been made to the plan:

- **Chapter 3:** Additional language has been added that all recommended standards apply to every entity that regulates development in the region.

- **Chapter 7:** A new section, Section 7.B.8, has been added to provide a summary of the InFRM Flood Decision Support Toolbox (FDST).

- **Chapter 8:** Additional language has been added to clarify that implementation guidance for consistent interpretation and execution of model standards should be included in their development.

- **Chapter 9:** USACE's Floodplain Management Services Program has been added to Table 9-1 as a potential funding source.

Comments regarding the following items have been noted:

- **Chapter 2B:** The methodology for the data collection process behind the Future Conditions Analysis in Task 2 was approved by TWDB by submission of a memorandum on February 8, 2022. The influence of Sam Rayburn Reservoir on the drainage area above B.A. Steinhagen Lake will be considered in future planning cycles as the data collection effort behind Task 2 is reworked and refined.

- **Chapter 3**: The flood management standards listed in the plans are minimum recommendations and the NRFPG encourages communities to implement higher standard when appropriate. These recommendations serve as a starting point for communities without standards.

- **Chapter 8**: Non-regulatory regional flood districts (or regional drainage districts) should be established and funded by state legislature. Responsibility of these regional flood districts would be to provide regional consistency, technical resources, funding, and reviews in support of FMEs and FMSs. This is a potential action that can be performed by the Texas Association of Regional Councils as it has defined members and counties it provides such assistance to.

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The NRFPG believes that floodplain preservation is a critical component of floodplain management. Mitigation of fill in the 500-year floodplain is a standard for some communities; however, this is a measure that is beyond minimum floodplain management standards. The NRFPG has elected to recommend minimum standards that serve as a starting point.

Thank you again for providing your comments on the Draft RFP.

Sincerely,

Neches Regional Flood Planning Group Technical Consultant Team

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Comments From: TWDB

Project: Region 5 - Neches Regional Flood Plan

Document: Draft RFP TWDB Comment Responses

Review Date: 12/08/22

ID	Comment Level	SOW Task	Comment	Response/Resolution
1	Level 1	General	Please ensure that all "Submittal requirements" identified in each of the Exhibit C Guidance document sections are submitted in the final flood plan.	FNI will review the submittal requirements again and adjust as needed to ensure all items are in the plan.
2	Level 1	General	For all mapbooks with inset maps, please also include a region-wide map displaying the data (e.g. Maps 4,6,8,10,11, and 12)	Map 4 has been updated to include an overview map which displays existing condition flood hazard for the entire region. Map 6 has been updated to include an overview map which displays existing condition flood exposure for the entire region. Map 7B has been updated to include an overview map which displays existing condition vulnerability for the entire region. Map 8 has been updated to include an overview map which displays future condition flood hazard for the entire region. Map 10 has been updated to include an overview map which displays extent of increase for existing condition flood hazard for the entire region. Map 11 has been updated to include an overview map which displays future flood exposure for the entire region. Map 12B has been updated to include an overview map which displays future condition vulnerability for the entire region.
3a	Level 1	Task 1	Section 1.A.4. states that there are 79 cities within the region, however, Section 1.A.1. states that there are 33 incorporated cities. Please review and reconcile as necessary.	New text to be added in Chapter 1: **"The region contains all or portions of 24 counties as well as 79 municipalities."**
3b	Level 1	Task 1	Section 1.A.4. states that 66 municipalities participate in the NFIP, however, Section 1.A.7.a. states that 35 cities and counties utilize ordinances. If a city or county participates in the NFIP, then it must have appropriate ordinances in place. Please review and reconcile as necessary	New text to be added in Chapter 1: **"In Region 5, 66 municipalities and 24 counties have been determined to utilize adopted ordinances to regulate floodplain development by virtue of their participation in the NFIP."**
4	Level 1	Task 1	Entities GIS Feature Class, Entities: It appears that some entities crossing regional boundaries do not start with "00" as required. For entities crossing region boundaries, this is expected to start with "00" and 'RFPG_NAME' should be left NULL. For additional entities crossing region boundaries, an ID should be requested from TWDB. ENTITY_IDs should match those provided by TWDB. Regions may create their own IDs for	Entities GIS feature class edited to comply with TWDB comment and guidance.
5	Level 1	Task 1	Existing Projects, Text: Table 1-22 does not appear to include the expected year of completion. Please include the estimated year of completion for existing projects listed in Table 1-22, or include an appropriate table reference in the text of Chapter 1 to where this information is located in Exhibit C Table 2 [31 TAC §361.32].	New text in Chapter 1: **"Table 1-22 details the existing structural and non-structural flood mitigation projects identified in the current planning cycle for the Neches region. Additional information on each project, such as the anticipated year of completion, can be found in Table 2 in Appendix 1-C."**

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	6a	Level 1	Task 1	(ExFldProjs) It appears that some fields contain invalid entries, including 'COST' and 'COMP_YR'. Please confirm that all NULL values utilized represent either "not applicable" or "unknown". Please ensure all required fields are populated with valid entries per Exhibit D Table 8 .	ExFldProjs GIS feature class edited to comply with TWDB comment and guidance.
	6b	Level 1	Task 1	(ExFldProjs) Please refrain from using numeric placeholders (such as '999999') in numeric fields such as 'COST', 'COMP_YR', and 'EXHAZ_ID' as this causes errors in calculations. Please leave NULL when the field is not applicable or unknown. Please reconcile [31 TAC §361.32].	ExFldProjs GIS feature class edited to comply with TWDB comment and guidance.
	7	Level 1	Task 2A	Existing Condition Flood Exposure (Exhibit C Table 3): The day and night populations in Table 3 do not appear to match those in the ExFldExpAll feature class. Please ensure the population count in Table 3 is the maximum of day and night population. "Population (daytime)" and "Population (nighttime)" columns may be added to the left of "Population" in Table 3 to facilitate this check. Please review and	The methodology behind the population calculations has been re-worked following clarification and guidance from TWDB. The highest daytime or nighttime population for each county was taken as the population to be used for the county.
	8	Level 1	Task 2A	Model Coverage, Text: Existing model coverage within the Flood Planning Region is only discussed relative to models used in FMPs. If more than 3 models exist within the Flood Planning Region, please include a specific, albeit brief, summary in Chapter 2 which summarizes H&H model availability across the region (not only those used in FMPs) [31 TAC §361.33(b)(2)].	New text in Chapter 2: **"Existing model coverage not tied to those used to generate NFHL data are summarized in Table 2 2. These models were created using a variety of different software and are detailed in the table. It is important to note that not all the models included were utilized in the construction of the existing conditions flood hazard layer."**
	9	Level 1	Task 3A	Existing Floodplain Management Practices (Exhibit C Table 6): The count of entities in Table 3-1 is 107, however, Table 6 appears to list 103 entities. Please ensure entries in Table 6 match chapter summary tables and the ExFpMp table [31 TAC §361.35 & Exhibit C 2.3.A].	Edits made to Table 3-1, Table 6, and the ExFpMP GIS table to ensure consistency between all three tables. Notable additions include Harris County, Angelina and Neches River Authority, and the Trinity River Authority of Texas.
	10a	Level 1	Task 3A	(ExFpMP) Please review and confirm entities listed as having flood-related authority. It is not clear that all entities listed have flood-related authority.	Edits made to Table 3-1, Table 6, and the ExFpMP GIS table to ensure consistency between all three tables. Notable additions include Harris County, Angelina and Neches River Authority, and the Trinity River Authority of Texas.
	10b	Level 1	Task 3A	(ExFpMP) It appears that some fields contain invalid entries, including 'LEV_ENFRC'. Please ensure all required fields are populated with valid entries per Exhibit D Table 20 [31 TAC §361.35 & Exhibit D 3.7].	ExFpMP GIS table edited to comply with TWDB comment and guidance.
	11	Level 1	Task 4B	Flood Management Evaluations (FME) Map (Exhibit C Map 16): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study [31 TAC §361.38(m) & Exhibit C 2.4.B].	Map 16 edited to delineate which FMEs are associated with previously studied areas or if the area does not have any existing or anticipating flood mapping or models.
	12	Level 1	Task 4B	Flood Mitigation Projects (FMP) (Text, Exhibit C Tables 13 & 16, FMP, FMP_Details, FMP_HazPost): It appears that there are inconsistencies in the cost listed in the Chapter 5 Table 5-2, Exhibit C tables, and the geodatabase. For example, FMP_ID 053000003 in Chapter 5 Table 5-2, Exhibit C Tables 13, 16, and the Project Details excel files all list a project cost of $39,570,866 while the FMP feature class and FMP_Details table	FMP GIS Feature Class and FMP_Details GIS Table to adjust cost to end in 866 to reflect what was listed on the FEMA BRIC application.

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	13	Level 1	Task 5	Flood Management Evaluation (FME) Recommendations Map (Exhibit C Map 19): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study [31 TAC §361.39 & Exhibit D 3.10].	Map 19 edited to delineate which FMEs are associated with previously studied areas or if the area does not have any existing or anticipating flood mapping or models.
	14	Level 1	Task 5	Flood Mitigation Project (FMP) Recommendations: Each recommended FMP must be accompanied with an associated model or supporting documentation to show no negative impact. Please confirm that this was done and provide reference to supporting materials. As per the draft report (page 4-36), "For structural FMPs and FMSs, signed and sealed reports were checked for certified statements that the associated project	Additional documentation has been acquired to certify no adverse impact. Technical Memorandums obtained for both the Bayou Din and Orange County CSRM FMPs have been added to Appendix 5-E. Text in Chapter 5 has been added to specifically call out Appendix 5-E as possessing evidence of no adverse impact for each FMP. A new table was also added to summarize what was used to ascertain no adverse impact for each FMP.
	15	Level 1	Task 5	Flood Mitigation Project (FMP) Recommendations GIS Feature Class, FMP_Details: Please refrain from using numeric placeholders (such as "999999") in numeric fields such as 'REMSTRUC500' as this causes errors in calculations. Please leave NULL when the field is not applicable or unknown. Please ensure valid entries for all required fields per Exhibit D Table 24 [31 TAC §361. 38(c-e)].	FMP GIS feature class edited to comply with TWDB comment and guidance.
	16	Level 2	General	To better align with our agency's preferred nomenclature, please consider using the name, "Cursory Floodplain Data" instead of "Fathom" or Cursory Fathom Data" throughout the regional flood plan.	All instances of "Fathom" or "Cursory Fathom Data" replaced with "Cursory Floodplain Data" throughout the plan.
	17a	Level 2	Task 1	Please consider providing a description of how Low Water Crossings were identified within the text of Chapter 1.	New text in Chapter 2: **"Information on Low Water Crossings in the region was taken from data collected by the Texas Natural Resources Information System (TNRIS). A survey was sent out to stakeholders in the region that requested information on additional low water crossings that may have not been accounted for in TNRIS's data, but no additional LWCs were acquired from the survey."**
	17b	Level 2	Task 1	Please consider including the full list of entities with flood related authority as an appendix.	New text in Chapter 1: **"This table includes all entities within the region that have been identified as having flood-related authority, regardless of their current participation status in the NFIP."**
	17c	Level 2	Task 1	Please consider adding more detailed region-specific analysis regarding farming, ranching, and natural resources most impacted by flooding under Section 1.A.6.	Corresponding sections in Chapter 1 have been edited to further detail impacts floods may have on farming and ranching operations within the region.
	18	Level 2	Task 1	(Entities) Please consider including the FEMA-assigned community number (6-digit with the first two being "48" for Texas) or CID for entities.	Entities GIS feature class edited to comply with TWDB comment and guidance.
	19	Level 2	Task 1	(Watersheds) Please consider linking this feature class to any relevant FME, FMS, or FMP when appropriate by populating the associated ID fields.	Watershed GIS feature class edited to comply with TWDB comment and guidance.

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	20	Level 2	Task 1	Previous Studies, Text: Chambers County Master Drainage Plan (Volume I) appears to be listed twice in Table 1-18. Please review	The second entry of the Chambers County Master Drainage Plan in Table 1-18 has been rectified to "Volume II."
	21	Level 2	Task 1	Existing Projects Map (Exhibit C Map 2): Please consider revising the map to more easily differentiate the locations and extents of proposed or ongoing projects.	Map 2 has had its symbology edited to better differentiate existing and ongoing projects.
	22	Level 2	Task 2A	Existing Condition Flood Hazard Analysis, Text: Please include total land areas (square miles) of each flood risk by flood risk type, county, region, and frequency as per guidance document (Exhibit C page 24): Submittal requirement number 2.	Tables 3 and 5 in Appendix 2-B have been edited to include information on total land areas of each flood risk by flood risk type, county, and frequency. The same information is also now conveyed in six new tables included in Chapter 2.
	23	Level 2	Task 2A	(ExFldExpAll) If the 'CRITICAL' field contains a 'No' entry, then please leave 'CRIT_TYPE' as NULL.	ExFldExpAll GIS feature class edited to comply with TWDB comment and guidance.
	24	Level 2	Task 2A	Existing Condition Flood Exposure Map (Exhibit C Map 6): Please consider modifying the map to improve legibility.	The Symbology for exposed features in Map 6 has been updated to use different colors and different shapes for various types of exposed features.
	25	Level 2	Task 2A	Model Coverage (GIS Feature Class ModelCoverage, Exhibit C Map 22): Please consider including all models generated or modified to support the development of this regional flood plan.	The models contained in the Model Coverage GIS feature class already represent the models that were used to support development of the regional flood plan.
	26	Level 2	Task 2B	Future Condition Flood Hazard Analysis, Text: Please include total land areas (square miles) of each flood risk by flood risk type, county, region, and frequency as per guidance document (Exhibit C page 33): Submittal requirement number 3.	Tables 3 and 5 in Appendix 2-B have been edited to include information on total land areas of each flood risk by flood risk type, county, and frequency. The same information is also now conveyed in six new tables included in Chapter 2.
	27	Level 2	Task 2B	Future Condition Hazard Map (Exhibit C Map 8): Please consider reviewing certain map elements to avoid obscuring data. For example, the legend appears to cover a portion of the Future Condition Flood Hazard extent on Figure 17 of 29 (Sabine County).	Map 4, Map 6, Map 8. Map7B, Map 11, and Map 12B have all been edited to fix the issue of data being obscured.
	28	Level 2	Task 2B	Future Condition Flood Exposure GIS Feature Class, FutFldExpAll: If the 'CRITICAL' field contains a "No" entry, then please leave 'CRIT_TYPE' as NULL	FutFldExpAll GIS feature class edited to comply with TWDB comment and guidance.

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	29	Level 2	Task 2B	Future Condition Flood Exposure Map (Exhibit C Map 11): Please consider modifying the map to improve legibility.	The Symbology for exposed features in Map 8 has been updated to use different colors and different shapes for various types of exposed features.
	30	Level 2	Task 3A	Existing Floodplain Management Practices, Text: Section 3.A.1. states "cities, counties, and flood districts" have flood-related authority, but the associated Tables 1-12 and 3-1 include water supply and utility districts, and drainage districts, respectively, as having flood related authority. Please consider reviewing and reconciling as necessary	Table 1-12 edited to remove water supply districts and also to reflect the 8 river authorities and drainage districts in the region with flood-related authority.
	31	Level 2	Task 3A	Existing Floodplain Management Practices (Exhibit C Table 6): It appears that some entities listed, including Moore Station, New Chapel Hill, and Browndell, may not be active NFIP participants. Please consider reviewing list of NFIP participants to confirm status.	Moore Station, New Chapel Hill, and Browndell all removed from Table 6.
	32	Level 2	Task 3B	Goals, Text: Please consider including region-specific detail on "Transformed and Residual Risk" in addition to defining these terms.	No action was deemed necessary upon meeting with TWDB representatives.
	33	Level 2	Task 3B	Goals Table (Exhibit C Table 11): Please consider reviewing Table 11 as some goals state "Long Term (50 years)", whereas the stated target year is "2053". For example, Goal IDs 05000023 and 05000025.	Goals changed as necessary to have a long-term planning horizon of 30 years.
	34	Level 2	Task 4B	Streams GIS Feature Class, Streams: Please consider linking this feature class to any relevant FME, FMS, or FMP when appropriate by populating the associated ID fields.	FutFldExpAll GIS feature class edited to comply with TWDB comment and guidance.
	35a	Level 2	Task 4B	FME_ID 051000156 description states "Installation of New Culverts." FMEs should generally focus on planning and feasibility study efforts rather than construction. Please consider verifying that all entries should be classified as FMEs and not as FMPs or FMSs.	Description changed to: "**H&H Study to analyze most efficient alternatives to install new culverts along FM 1442 (Bridge City) at Colonial Outfall Ditch.**"
	35b	Level 2	Task 4B	For some county-wide FMEs it appears that a majority of the county falls outside of the RFPG boundary, for example FME_IDs 051000019 and 051000022. Please consider including justification on how the FME benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.	County-wide FMEs found to overlap with FMEs found in Trinity, Sabine, or San Jacinto Flood Planning Regions had their costs altered to reflect the county area within the region.
	35c	Level 2	Task 4B	There are several FMEs that appear to overlap with a TWDB-funded, FIF Category 1 study, but the TWDB-funded, FIF Category 1 study does not appear to be listed. For example, FME_ID 05100091 should utilize FIF_ID 40034. FME_ID 05100050 may be a duplication of FIF_ID 40022. Please consider verifying that FMEs do not duplicate efforts of any TWDB-funded, FIF Category 1 study.	New text in Chapter 4 - "**Additionally, it is intended that the FMEs identified in the Regional Flood Plan will utilize existing information from FIF Category 1 studies to better identify alternatives for reducing flood risk within the region.**"

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	35d	Level 2	Task 4B	For areas in RFPG with existing FIF, BLE, GLO, or other models and/or ongoing studies, please consider stating how the FME will improve upon the preexisting model/study.	New text in Chapter 4: **"It is important to note that some of the FMEs identified as part of this effort are intended to expand upon previous studies conducted for BLE, the GLO Combined Rivers Basin Study, and FIF grants. For FMEs identified in areas that have FIF or GLO studies, there is potential for the FME itself to identify alternatives that had initially not been examined in the studies. Additionally, the studies associated with FIF, BLE, and GLO focus on riverine flooding whereas some identified FMEs in the region pertain to urban flooding – the difference in flooding type will necessitate a change in modeling approach. It is intended that the FMEs identified in the Regional Flood Plan will utilize existing information from pervious study efforts to better identify alternatives for reducing flood risk within the region."**
	35e	Level 2	Task 4B	Please consider adding identifiers to all models in the "Model Description" column, for example FIF_ID 40022.	FIF ID added behind TWDB FIF identifier in the "MODEL_DESC" field in the FME GIS feature class.
	36	Level 2	Task 4B	Flood Management Evaluation (FME) GIS Feature Class, FME: It appears that some fields may be missing, including 'ASSOCIATED'. Please consider completing all fields with valid entries per Exhibit D Table 23.	FME GIS feature class edited to comply with TWDB comment and guidance.
	37	Level 2	Task 4B	Flood Mitigation Project (FMP), Text: Please consider including a written list of FMPs that were identified but determined by the RFPG to be infeasible, including the primary reasons for them being infeasible.	A list of infeasible FMPs had already been included in Chapter 4.
	38	Level 2	Task 4B	Flood Management Strategy (FMS), Text: Please consider including a written list of FMSs that were identified but determined by the RFPG to be infeasible, including the primary reasons for them being infeasible.	A list of infeasible FMSs had already been included in Chapter 4.
	39a	Level 2	Task 5	FME_ID 051000156 description states "Installation of New Culverts." FMEs should generally focus on planning and feasibility study efforts rather than construction. Please consider verifying that all entries should be classified as FMEs and not as FMPs or FMSs.	Description changed to: "**H&H Study to analyze most efficient alternatives to install new culverts along FM 1442 (Bridge City) at Colonial Outfall Ditch."**
	39b	Level 2	Task 5	For some county-wide FMEs it appears that a majority of the county falls outside of the RFPG boundary, for example FME_IDs 051000019 and 051000022. Please consider including justification on how the FME benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.	County-wide FMEs found to overlap with FMEs found in Trinity, Sabine, or San Jacinto Flood Planning Regions had their costs altered to reflect the county area within the region.
	39c	Level 2	Task 5	There are several FMEs that appear to overlap with a TWDB-funded, FIF Category 1 study, but the TWDB-funded, FIF Category 1 study does not appear to be listed. For example, FME_ID 05100091 should utilize FIF_ID 40034. FME_ID 05100050 may be a duplication of FIF_ID 40022. Please consider verifying that FMEs do not duplicate efforts of any TWDB-	New text in Chapter 4 - **"Additionally, it is intended that the FMEs identified in the Regional Flood Plan will utilize existing information from FIF Category 1 studies to better identify alternatives for reducing flood risk within the region."**

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	39d	Level 2	Task 5	For areas in RFPG with existing FIF, BLE, GLO, or other models and/or ongoing studies, please consider stating how the FME will improve upon the preexisting model/study.	New text in Chapter 4: **"It is important to note that some of the FMEs identified as part of this effort are intended to expand upon previous studies conducted for BLE, the GLO Combined Rivers Basin Study, and FIF grants. For FMEs identified in areas that have FIF or GLO studies, there is potential for the FME itself to identify alternatives that had initially not been examined in the studies. Additionally, the studies associated with FIF, BLE, and GLO focus on riverine flooding whereas some identified FMEs in the region pertain to urban flooding – the difference in flooding type will necessitate a change in modeling approach. It is intended that the FMEs identified in the Regional Flood Plan will utilize existing information from pervious study efforts to better identify alternatives for reducing flood risk within the region."**
	39e	Level 2	Task 5	Please consider adding identifiers to all models in the "Model Description" column, for example FIF_ID 40022.	FIF ID added behind TWDB FIF identifier in the "MODEL_DESC" field in the FME GIS feature class.
	40a	Level 2	Task 5	It appears that the field 'ASSOCIATED' is missing from the FME feature class. Please consider adding and populating this field with valid entries per the TWDB broadcast email sent on June 3, 2022.	FME GIS feature class edited to comply with TWDB comment and guidance.
	40b	Level 2	Task 5	Please consider populating 'MODEL_DESC' field for clarity on existing studies to be used. Please make sure to document existing or ongoing BLE and TWDB-funded FIF Category 1 studies.	Wherever available, the FIF ID was added behind the TWDB FIF identifier in the "MODEL_DESC" field in the FME GIS feature class.
	41	Level 2	Task 6B	Contributions and Impacts to Water Supply, Text: The plan includes a statement that "no anticipated measurable impacts" would occur. Please consider clarifying whether this includes potential measurable impacts (negative or positive) to water availability and/or supply.	New text in Chapter 6: "...**no negative anticipated measurable impacts to water supply, water availability, or strategies in the State Water Plan would occur from implementation. It was also determined that the recommended FMSs and FMPs would not provide measurable benefits to water supply, water availability, or strategies."**
	42	Level 2	Task 7	Flood Response Information and Activities, Text: Please consider renaming the header "Hazard Mitigation Action Plans", if appropriate, to the more common term 'Hazard Mitigation Action Plans'.	All instances of "Hazard Mitigation Action Plans" substituted with "Hazard Mitigation Plans."

APPENDIX 10-C
BIBLIOGRAPHY

CHAPTER 10. ADOPTION OF PLAN AND PUBLIC PARTICIPATION

"FEMA Flood Map Service Center: Welcome!" FEMA, U.S. Department of Homeland Security, https://msc.fema.gov/portal/home.

"Flood Planning." Texas Water Development Board, https://www.twdb.texas.gov/flood/planning/index.asp.

"Government Code Title 10, Subtitle F, Chapter 2254, Subchapter A." Texas Constitution and Statutes, https://statutes.capitol.texas.gov/Docs/GV/htm/GV.2254.htm.

"Meetings." *Neches Flood Planning Group*, Region 5, Lower Neches Valley Authority, https://nechesfloodplanning.org/meetings/.

"Neches Regional Flood Planning Group." Region 5, Lower Neches Valley Authority, https://nechesfloodplanning.org/.

"Texas Administrative Code Title 31, Part 10, Chapter 362, Subchapter A, Rule 362.3." Texas Registrar, https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=31&pt=10&ch=362&rl=3.

"Texas Administrative Code Title 31, Part 10, Chapter 361, Subchapter B, Rule 361.21." Texas Registrar, https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=31&pt=10&ch=361&rl=21.

"Texas Administrative Code Title 31, Part 10, Chapter 361, Subchapter D, Rule 361.50." Texas Registrar, https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=31&pt=10&ch=361&rl=50.

"Texas Administrative Code Title 31, Part 10, Chapter 361, Subchapter B, Rule 361.20." Texas Registrar, https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=31&pt=10&ch=361&rl=20.