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REGION 6
SAN JACINTO

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PREPARED FOR THE **SAN JACINTO REGIONAL FLOOD PLANNING GROUP**

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Appendix 4-7:
Technical Memorandum Documenting Task 12 Prioritization Framework

MEMORANDUM

DATE: October 17th, 2022

TO: San Jacinto Regional Flood Planning Group

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PROJECT NO.: 10-220120-00

PROJECT: TWDB San Jacinto Regional Flood Plan

SUBJECT: Task 12 Prioritization Framework

Executive Summary

Torres & Associates and Freese and Nichols, Inc. have developed preliminary selection criteria and a prioritization framework for assisting the San Jacinto Regional Flood Planning Group (RFPG) with prioritizing the flood management evaluations (FME) for use during Task 12. The objective of Task 12 as described by the Texas Water Development Board (TWDB) is to perform identified FMEs to recommend additional potentially feasible flood mitigation projects (FMP). The goal of the prioritization framework was to develop a transparent framework for ranking the FMEs based on available data developed as part of Task 4A, Task 4B, and Task 5 of the Draft Region Flood Plan project. The prioritization of the FMEs will be used by the Technical Consultant to execute FMEs in order of prioritization until Task 12 funds are exhausted. Execution of a FME is contingent on any comments received to the draft plan and concurrence by the sponsor entity. If a sponsor is unresponsive or does not wish to pursue a particular FME then a reasonable effort can be made to identify another sponsor for the FME. If no other sponsor is found, then next FME in order will be pursued. Based on the analysis described within this memorandum, a draft prioritization framework was developed for the FMEs within the San Jacinto region with criteria based on available data used to develop a score for each FME that is in line with the goals of the San Jacinto RFPG. The prioritization framework is provided in **Appendix 01** with a spatial visual of the prioritized FMEs within the San Jacinto region provided in **Exhibit 01**.

The need for a prioritization framework was determined based on the constraints inherent to Task 12 including budget, schedule, a significant number of recommended FMEs (374 FMEs), and a wide array of sponsors. Based on these constraints, certain FMEs were filtered from the prioritization evaluation including FMEs with a level of effort exceeding $150,000 to maximize the number of FMEs evaluated, FMEs labeled as "Not Recommended" by the RFPG, FMEs that will not likely produce an FMP, and FMEs identified by public comment as duplicates or ongoing efforts. The filtering process reduced the number of FMEs from 374 to 191 FMEs included in the prioritization effort. **Exhibit 02** provides a visual of the FMEs that were excluded from the prioritization analysis.

The prioritization framework is comprised of different criteria based on available data to differentiate the FMEs. Each criterion was chosen as important factors to achieve the RFPGs overall goals for the Task 12 effort. The criteria used include the following: level-of-effort, model/data availability, known flood risk, number of entities benefitted, critical facilities at risk, structures at risk, nature-based solutions, social vulnerability index (SVI), mobility, population at risk, unique sponsor, and sub-watershed priority. For each criteria listed above, different thresholds were used to determine if an FME was a low, medium, or high priority for a certain criterion to differentiate the FMEs and prioritize FMEs with a higher need. A statistical analysis was conducted for several of the criteria to determine effective thresholds to set for low, medium, and high priority. Documentation of the statistical analysis is provided in **Appendix 05**.

Weights were assigned to each of the criteria based on the ranking of the selection criteria gathered from the survey results of the Technical Committee and RFPG (**Appendix 03 and 04**) and further discussion during the October 2022 RFPG meeting. Criteria at the top of the survey results were assigned a weight of 1 while criteria further down on the list have a corresponding weight. These weights were multiplied with the priority ranking of the criteria and factored into the overall prioritization rank. Based on the feedback received from the RFPG during the October RFPG meeting, additional investigation of the results of the prioritized list was warranted to determine if any refinements could be made that would elevate some FMEs from smaller entities and provide a more diverse mix of FMEs higher in the prioritized list. The consultant team reviewed the FME prioritized list and criteria and determined that multiple criteria are similar and each capture different aspects of flood risk which influenced the overall ranking to be primarily reflective of flood risk. Based on this observation, the "Known Flood Risk", "Critical Facilities at Risk", "Structures at Risk", and "Population at Risk" had their respective weighting revised from one (1) to 0.25

to represent an overall category of flood risk. The “Unique Sponsor” and “Subwatershed Priority” criteria were also revised to a value of one (1) to help elevate different sponsors and geographic representation.

The results of the prioritization framework show the higher priority FMEs are mainly located in the middle to lower portion of the San Jacinto Region with a spread between sponsors however, many of the FMEs executed during the Task 12 effort may be for a limited number of sponsors as a function of the number of FMEs certain sponsors have that are only missing a BCA and the likelihood that there may be limited response to proceed with an FME from many sponsors. There are also FMEs included in the prioritized list that may be evaluated by the sponsor themselves. These FMEs are primarily benefit cost analyses (BCA). Based on coordination efforts, the City of Houston and City of Friendswood have indicated a potential for conducting the FMEs internally by the sponsor to elevate the FMEs to FMPs. Coordination is ongoing to ensure that there is no duplicated effort for Task 12. The completed draft prioritization framework is provided in **Appendix 01** with a spatial visual of the prioritized FMEs within the San Jacinto region provided in **Exhibit 01**. **Appendix 06** includes the FME One-Page fact sheets in ranked order for reference and **Appendix 07** includes the ranked FME list in excel form to provide an overall summary of the FMEs with the data used in the analysis and the FMEs removed based on different constraints.

Feedback from RFPG and Technical Committee

A preliminary prioritization framework was presented to the San Jacinto RFPG Technical Committee on September 2nd, 2022, and to the full RFPG on September 8th, 2022, to facilitate discussion and obtain feedback on the initial list. **Appendix 02** provides the preliminary prioritization framework presented at the meeting for reference. The preliminary framework has been refined based on the feedback from the RFPG and Technical Committee and is provided in **Appendix 01**. General feedback from the Technical Committee included the addition of criteria in line with the RFPG's overall goals including a criterion for nature-based solutions, mobility, and spatial prioritization by sub-watershed. A survey was conducted to gather feedback from the Technical Committee (**Appendix 03**). The overall desired outcome of Task 12 from the Technical Committee was to maximize the reduction in flood risk and exposure followed by FMP benefit coverage. The importance of the selection criteria to the Technical Committee was in line with the overall goal with criteria focused on reduction in flood risk and exposure being towards the top of the survey list. The Technical Committee also preferred a distribution of FMEs evaluated under Task 12 that were primarily benefit cost analyses with a few moderate effort FMEs.

General feedback gathered from the RFPG during the September 8th meeting added an emphasis on the importance to consider nature-based solutions in the prioritization framework and focus on elevation of as many FMEs to FMPs as possible within the constraints of Task 12. The same survey presented to the Technical Committee was performed to gather feedback from the entire RFPG (**Appendix 04**). The overall desired outcome of Task 12 from the RFPG was in line with the Technical Committee with the goal to maximize the reduction in flood risk and exposure followed by Number of FMPs and then FMP benefit coverage. The importance of the selection criteria to the RFPG was in line with the overall goal with criteria focused on reduction in flood risk and exposure being towards the top of the survey list. There were some differences in the overall ranking of importance of the selection criteria between the Technical Committee and the RFPG, however the overall tendencies appear to be similar. The RFPG had a tie in ranking between performing all benefit cost analyses and a distribution of FMEs evaluated under Task 12 that were primarily benefit cost analyses with a few moderate effort FMEs.

A refined framework and weighting were provided to the RFPG for review for the October 13th meeting to discuss any further refinements to the criteria if necessary. Based on the feedback received from the RFPG, additional investigation of the results of the prioritized list was warranted to determine if any

refinements could be made that would elevate some FMEs from smaller entities and provide a more diverse mix of FMEs that may be performed through Task 12. The consultant team reviewed the FME prioritized list and criteria and determined that multiple criteria are similar and each capture different aspects of flood risk which influenced the overall ranking to be primarily reflective of flood risk while discounting the influence of other criteria. Based on this observation, the "Known Flood Risk", "Critical Facilities at Risk", "Structures at Risk", and "Population at Risk" had their respective weighting revised from one (1) to 0.25 to represent an overall category of flood risk. The "Unique Sponsor" and "Subwatershed Priority" criteria were also revised to a value of one (1) to help elevate different sponsors and geographic representation. **Table 1** provides a summary of the previous criteria weights and the revised weights that account for the overemphasis on flood risk and elevation of different sponsors and geographic representation.

Table 1. Summary of Criteria Weights and Revision

Criteria	Weight presented at RFPG Meeting (10/13)	Revised Weight
Level of Effort	1.0	1.0
Model/Data Availability	0.7	0.7
Known Flood Risk	**1.0**	**0.25**
Number of Entities Benefitted	0.2	0.2
Critical Facilities at Risk	**1.0**	**0.25**
Structures at Risk	**1.0**	**0.25**
Nature-Based Solutions	0.5	0.5
Social Vulnerability Index (SVI)	0.5	0.5
Mobility	0.3	0.3
Population at Risk	**1.0**	**0.25**
Unique Sponsor	**0.2**	**1.0**
Subwatershed Priority	**0.6**	**1.0**

Prioritization Criteria

The prioritization framework is comprised of different criteria based on available data to differentiate the FMEs. Each criterion was chosen as important factors to achieve the RFPGs overall goals for the Task 12 effort. The criteria used include the following: level-of-effort, model/data availability, known flood risk, number of entities benefitted, critical facilities at risk, structures at risk, nature-based solutions, social vulnerability index (SVI), mobility, population at risk, unique sponsor, and sub-watershed priority. For each criteria listed above, different thresholds were used to determine if an FME was a low, medium, or high priority for a certain criterion to differentiate the FMEs and prioritize FMEs with a higher need. The overall prioritization framework is provided in **Table 1**. A low priority criterion determined for the FME receives a value of 1, medium priority receives a value of 3, and high priority receives a value of 5. The values were chosen to provide variation between low, medium, and high priority. Once the criterion priorities were determined, they were summed together to generate an overall priority score that was used to determine the ranking of the individual FMEs. A statistical analysis was conducted for several of the criteria to determine effective thresholds to set for low, medium, and high priority. Documentation of the statistical analysis is provided in **Appendix 05**.

Table 2. Summary of DRAFT Prioritization Framework (Appendix 01)

Recommended Criteria	Priority Ranking		
	Low Priority (1)	Medium Priority (3)	High Priority (5)
Level of Effort	Effort may be outside of budget constraints ($150k to > $100k)	Reasonable Effort based on budget/schedule ($100k to > $30k)	Low Effort and can likely be completed quickly and efficiently (≤ $30k)
Model/Data Availability	No model/project data available	Some project data readily available	Necessary models and project data readily available
Known Flood Risk	Low Known Flood Risk	Medium Known Flood Risk	High Known Flood Risk
Number of Entities Benefitted	1-2	3	Greater than 3
Critical Facilities at risk	Less than Median	Above Median	Above Average
Structures at risk	Less than Median	Above Median	Above Average
Population at risk	Less than Median	Above Median	Above Average
Unique Sponsor	Another FME has higher priority for Sponsor	NA	Highest priority FME of Unique Sponsor
Nature Based Solutions	No Nature Based Solution considered in the evaluation	NA	Nature Based Solution(s) considered in the evaluation
Priority within Subwatershed (HUC10)	Another FME has higher priority for Subwatershed based on other criteria	NA	Highest priority FME of Subwatershed based on other criteria
Social Vulnerability Index (SVI)	Low (Less than 0.33)	Medium (0.33-0.66)	High (Greater than 0.66)
Mobility/Length of Inundated Roadway	Less than Median	Above Median	Above Average

Level-of-Effort

Level-of-Effort refers to the amount of effort based on an estimated cost needed to complete the evaluation and turn the FME into an FMP. This is an important factor due to a limited budget and schedule for Task 12 to promote an FME to an FMP. Based on feedback from the RFPG, maximizing the number of FMEs that are evaluated in the Task 12 effort is one of their priorities and is captured by this criterion. **Exhibits 3-5** provide visualization of three different level-of-effort scenarios with different threshold values. **Table 2** provides the different thresholds shown in **Exhibits 3-5**. After reviewing the data and distribution for this field, it was determined that the high priority FMEs are based on those that can be completed quickly and efficiently including FMEs with an estimated level-of-effort less than or equal to $30,000. The medium priority FMEs are those that are believed to have a reasonable level-of-effort greater than $30,000 to $100,000. The low priority FMEs are those that may be significant in effort compared to the budget and schedule greater than $100,000 to $150,000. The low priority was determined based on the logic that if one of those FMEs were selected for evaluation, the level-of-effort captures around one-third of the total effort allocated for Task 12 and would limit the number of FMEs that would be evaluated.

Table 3. Summary of Threshold Alternatives for Level of Effort

Criteria Alternative	Low Priority	Medium Priority	High Priority
Level of Effort Alternative 1	**$150,000 to greater than $100,000**	**$100,000 to greater than $30,000**	**Less than or equal to $30,000**
Level of Effort Alternative 2	$150,000 to greater than $80,000	$80,000 to greater than $30,000	Less than or equal to $30,000
Level of Effort Alternative 3	$150,000 to greater than $100,000	$100,000 to greater than $20,000	Less than or equal to $20,000

Model/Data Availability

Model and data availability is a factor in determining an FMEs priority. If a project does not have any data available, then the FME would be ranked as a low priority as it might suggest that the FME would need more effort to complete and thus also raise the cost to elevate the FME to an FMP. For those FMEs that have data readily available would be considered high priority as it will indicate that the evaluation will not require any significant additional effort. Lastly, in small cases an FME can have some project data available and may take a little effort to collect the remaining information needed. These FMEs are labeled as

medium priority. **Exhibit 6** provides visualization of the spatial distribution of low, medium, and high priority for model and data availability.

Known Flood Risk

An FME that is within an area of known flood risk is an important factor aligning with the San Jacinto RFPG's desired outcome for Task 12. A spatial join between the FMEs and the flood risk map developed for Task 4A was conducted in GIS to determine the known flood risk. From the spatial analysis, the FMEs were labeled as high, medium, or low depending on the flood risk associated. The flood risk map is provided in **Figure 1**. **Exhibit 7** provides visualization of the spatial distribution of low, medium, and high priority for known flood risk.

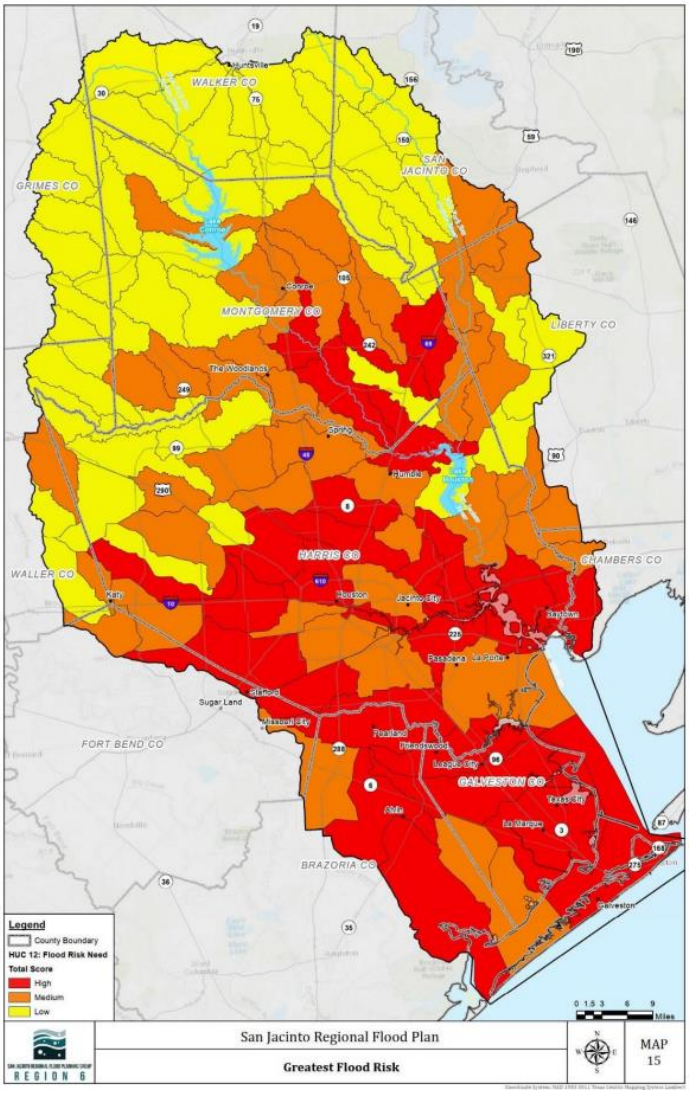


Figure 1. San Jacinto Region Greatest Flood Risk Map

Number of Entities Benefitted

Entities are classified as political subdivisions with flood-related authority within the San Jacinto region. An entity can be a city, county, river authority, soil and water conservation district, water control and improvement districts, etc. This criterion is based on the number of entities that may see direct benefit from an FME and gives high priority to FMEs that benefit multiple entities. **Exhibits 8-10** provide visualization of three different number of entities benefitted scenarios with different threshold values. **Table 3** provides the different thresholds shown in **Exhibits 8-10**. Based on the analysis, an FME considered as a high priority benefit more than 3 entities as it will scale and help more communities than an FME that only benefits one entity. An FME that benefits 3 entities are labeled as a medium priority and anything below that threshold is considered low priority. These thresholds were chosen based on the available data from all FMEs and distributing the data in a way to emphasize the difference in benefits between FMEs.

Table 4. Summary of Threshold Alternatives for Number of Entities Benefitted

Criteria Alternative	Low Priority	Medium Priority	High Priority
Number of Entities Alternative 1	**1-2**	**3**	**Greater than 3**
Number of Entities Alternative 2	1-2	3-4	Greater than 4
Number of Entities Alternative 3	1	2-3	Greater than 3

Critical Facilities at Risk

The critical facilities at risk represents the number of facilities within the 1% AEP floodplain within an FME area that provide services and functions essential to a community, especially during and after a disaster. Typical critical facilities include hospitals, fire stations, police stations, storage of critical records, utilities, and similar facilities. Larger number of critical facilities at risk within an FME area should have a higher priority. A statistical review was conducted for this criterion to determine the thresholds of low, medium, and high priority. This data has a right-skewed distribution (or positively skewed distribution) in which most values are clustered around a smaller number of critical facilities at risk while the larger values vary significantly. In addition, the standard deviation of the distribution is high, even when removing outliers. Different threshold values were looked at to determine the best distribution of priority of FMEs for this criterion. Many different scenarios were analyzed in this effort and visualization of three different threshold groups are provided in **Exhibits 11-13**. **Table 4** provides the different thresholds shown in **Exhibits 11-13**. Based on the statistical analysis, the average and median values appear to be

representative threshold values for this dataset meaning that if the number of critical facilities at risk is greater than the average value, then the FME would be ranked as a high priority or if the number is less than the median value, then the FME would be as a low priority for this criterion.

Table 5. Summary of Threshold Alternatives for Critical Facilities at Risk

Criteria Alternative	Low Priority	Medium Priority	High Priority
Critical Facilities Alternative 1	**Less than Median**	**Greater than Median**	**Greater than Average**
Critical Facilities Alternative 2	Less than Average	Greater than Average	Greater than Average + 1 Standard Deviation
Critical Facilities Alternative 3	Less than Median	Greater than Median	Greater than Median + 1 Standard Deviation

Structures at Risk

The structures at risk represents the number of structures within the 1% AEP floodplain within an FME area. Larger number of structures at risk within an FME area should have a higher priority. A statistical review was conducted for this criterion to determine the thresholds of low, medium, and high priority. This data has a right-skewed distribution (or positively skewed distribution) in which most values are clustered around a smaller number of structures at risk while the larger values vary significantly. In addition, the standard deviation of the distribution is high, even when removing outliers. Different threshold values were looked at to determine the best distribution of priority of FMEs for this criterion. Many different scenarios were analyzed in this effort and visualization of three different threshold groups are provided in **Exhibits 14-16**. **Table 5** provides the different thresholds shown in **Exhibits 14-16**. Based on the statistical analysis, the average and median values appear to be representative threshold values for this dataset meaning that if the number of structures at risk is greater than the average value, then the FME would be ranked as a high priority or if the number is less than the median value, then the FME would be as a low priority for this criterion.

Table 6. Summary of Threshold Alternatives for Structures at Risk

Criteria Alternative	Low Priority	Medium Priority	High Priority
Structures at Risk Alternative 1	**Less than Median**	**Greater than Median**	**Greater than Average**
Structures at Risk Alternative 2	Less than Average	Greater than Average	Greater than Average + 1 Standard Deviation
Structures at Risk Alternative 3	Less than Median	Greater than Median	Greater than Median + 1 Standard Deviation

Nature-Based Solutions

A nature-based solution is a sustainable planning, design, and engineering practice that utilizes the natural features of the environment to build more resilient communities. It is important to attempt to incorporate a green infrastructure to minimize the damage to the natural environment. Those FMEs that include considerations for nature-based solutions are given a high priority for this criterion while all others are labeled as low priority since there is no middle priority identifier. **Exhibit 17** provides visualization of the spatial distribution of low and high priority for nature-based solutions. Limited information on the FMEs and nature-based solutions led to a limited number of FMEs that have a high priority for this criterion.

Social Vulnerability Index (SVI)

The SVI is ranking of recorded data from the U.S. census, analyzed at a census tract level based, "on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes." A dataset from the Texas Water Development Board (TWDB) was used to conduct a spatial analysis to determine the average SVI for an FME area from 0 to 1. Many different scenarios of threshold values were analyzed in this effort and visualization of three different threshold groups are provided in **Exhibits 18-20**. **Table 6** provides the different thresholds shown in **Exhibits 18-20**. Based on the analysis, FMEs with a ranking above 0.66 was given a high priority, rankings between 0.33 and 0.66 are medium priorities, and anything less than a 0.33 was a low priority. These thresholds were based on the sensitivity analysis to differentiate the FMEs and their SVI priority ranking.

Table 7. Summary of Threshold Alternatives for SVI

Criteria Alternative	Low Priority	Medium Priority	High Priority
SVI Alternative 1	**Less than 0.33**	**0.33 – 0.66**	**Greater than 0.66**
SVI Alternative 2	Less than 0.3	0.3 – 0.7	Greater than 0.7
SVI Alternative 3	Less than 0.4	0.4 – 0.6	Greater than 0.6

Mobility

Mobility refers to the length of inundated roadway during a 1% AEP storm event within an FME area. This criteria factors in public safety and the ability to reach critical facilities or escape areas of flooding without being impeded by flood waters overtopping roadways. Many different scenarios of threshold values were analyzed in this effort and visualization of three different threshold groups are provided in **Exhibits 21-23**. **Table 7** provides the different thresholds shown in **Exhibits 21-23**. Based on the statistical data for the miles of inundated road, the FMEs that have a value less than the median would be noted as a low priority. Medium priority applies to FMEs that have a value that is above the median but below the average. The high priority rating is reserved for those FMEs that are above the average.

Table 8. Summary of Threshold Alternatives for Mobility

Criteria Alternative	Low Priority	Medium Priority	High Priority
Mobility Alternative 1	**Less than Median**	**Greater than Median**	**Greater than Average**
Mobility Alternative 2	Less than Average	Greater than Average	Greater than Average + 1 Standard Deviation
Mobility Alternative 3	Less than Median	Greater than Median	Greater than Median + 1 Standard Deviation

Population at Risk

Population at risk refers to the population within the 1% AEP existing floodplain within an FME area. The statistical data was collected from the FMEs and ranked accordingly. Many different scenarios of threshold values were analyzed in this effort and visualization of three different threshold groups are provided in **Exhibits 24-26**. **Table 8** provides the different thresholds shown in **Exhibits 24-26**. The population at risk for an FME below the median is ranked as a low priority and those above the median and below the

average are labeled as medium priority. The high priority rating is reserved for those FMEs that are above the average.

Table 9. Summary of Threshold Alternatives for Population at Risk

Criteria Alternative	Low Priority	Medium Priority	High Priority
Population at Risk Alternative 1	**Less than Median**	**Greater than Median**	**Greater than Average**
Population at Risk Alternative 2	Less than Average	Greater than Average	Greater than Average + 1 Standard Deviation
Population at Risk Alternative 3	Less than Median	Greater than Median	Greater than Median + 1 Standard Deviation

Unique Sponsor

The Unique Sponsor criteria refers to the priority that the Sponsor would like to advocate for a promotion to FMP. If the sponsor does not indicate a priority FME within the list, then it is assumed that the project with the highest ranking based on the other criteria will be given the high priority. In the case that multiple FMEs for a sponsor have an equal prioritization score, the FME that has the highest population at risk will be considered the highest priority FME for the sponsor. The other projects that the sponsor has will be labeled as low priority. In addition, those sponsors that only have one project will be given a high priority ranking to possibly introduce equal opportunity for sponsors to elevate their FMEs to FMPs.

Sub-Watershed Priority

The sub watershed priority is a criterion that was introduced to aid the spatial variability of priority FMEs throughout the San Jacinto region. A spatial join was conducted with the HUC10 watersheds and the FME list. From this list, the FMEs that have the same HUC10 ID were compared to each other. The highest priority FMEs based on the preliminary ranking was determined to be that HUC10's highest priority FME. All other FMEs were labeled as low priorities. This process is repeated across all HUC10s located within the San Jacinto region.

Criteria Weighting

A sensitivity analysis was conducted to determine the criteria driving the prioritization of the FMEs. The analysis was conducted by changing assigned weights to criteria between 0 and 1 to determine the influence each criterion has on the overall result of the prioritization. A weight of zero would remove the criteria from consideration in the ranking score and a weight of 1 includes the full value of the criteria in the ranking score. **Table 9** provides a summary of the weighting sensitivity analysis. For the analysis, all other criteria are set at a value of 1 to isolate the influence each criterion has on the overall ranking. From the sensitivity analysis, it was noted that many of the higher ranking FMEs tend to stay within the higher ranks and are not dependent on the weighting. The weighting of the criteria appears to primarily influence the rank of the middle to lower ranking FMEs.

Table 10. Summary of Criteria Weight Sensitivity Analysis

Criteria	0.5 Weight Observation	0.0 Weight Observation
Level of Effort	Many FMEs have an altered ranking outside of the top 20 FMEs	Many FMEs have an altered ranking outside of the top 20 FMEs
Model/Data Availability	Many FMEs have an altered ranking outside of the top 20 FMEs	Many FMEs have an altered ranking outside of the top 12 FMEs
Known Flood Risk	Many of the lower ranked items have an altered ranking	Many FMEs have an altered ranking outside of the top 35 FMEs
Number of Entities Benefitted	Many results have an altered ranking, including higher ranked FMEs	Many of the lower ranked FMEs have an altered ranking
Critical Facilities at Risk	Many FMEs have an altered ranking outside of the top 20 FMEs	Many FMEs have an altered ranking outside of the top 18 FMEs
Structures at Risk	Many FMEs have an altered ranking outside of the top 20 FMEs	Many FMEs have an altered ranking outside of the top 19 FMEs
Nature-Based Solutions	Many of the rankings remain the same outside of the first 14 FME which have an altered ranking	Many of the rankings remain the same outside of the first 18 FME which have an altered ranking
Social Vulnerability Index (SVI)	Many FMEs have an altered ranking outside of the top 20 FMEs	Most FMEs have an altered ranking
Mobility	Many FMEs have an altered ranking outside of the top 20 FMEs	Many FMEs have an altered ranking outside of the top 20 FMEs
Population at Risk	Many FMEs have an altered ranking outside of the top 20 FME	Many FMEs have an altered ranking outside of the top 20 FMEs

Weights were assigned to each of the criteria based on the ranking of the selection criteria gathered from the survey results of the Technical Committee and RFPG (**Appendix 03 and 04**) as well as feedback from the RFPG during the October RFPG meeting. Criteria at the top of the survey results were assigned a weight of 1 while criteria further down on the list have a corresponding weight. These weights were multiplied with the priority ranking of the criteria and factored into the overall prioritization rank meaning that a criterion with a weight of 1 get the entirety of points determined by the criteria while a criterion with a weight of 0.5 gets half of the points determined by the criteria. Based on the feedback received from the RFPG during the October RFPG meeting, additional investigation of the results of the prioritized list was warranted to determine if any refinements could be made that would elevate some FMEs from smaller entities and provide a more diverse mix of FMEs higher in the prioritized list. The consultant team reviewed the FME prioritized list and criteria and determined that multiple criteria are similar and each capture different aspects of flood risk which influenced the overall ranking to be primarily reflective of flood risk. Based on this observation, the "Known Flood Risk", "Critical Facilities at Risk", "Structures at Risk", and "Population at Risk" had their respective weighting revised from one (1) to 0.25 to represent an overall category of flood risk. The "Unique Sponsor" and "Subwatershed Priority" criteria were also revised to a value of one (1) to help elevate different sponsors and geographic representation. **Table 10** provides a summary of the weights assigned to each of the criteria. The total weights sum up to just above six (6.2) giving a maximum FME prioritization score of thirty-one (31) if it receives the maximum score for each individual criteria and a minimum score of just above six (6.2).

Table 11. Summary of Criteria Weights

Criteria	Weight
Level of Effort	1.0
Model/Data Availability	0.7
Known Flood Risk	0.25
Number of Entities Benefitted	0.2
Critical Facilities at Risk	0.25
Structures at Risk	0.25
Nature-Based Solutions	0.5
Social Vulnerability Index (SVI)	0.5
Mobility	0.3
Population at Risk	0.25
Unique Sponsor	1.0
Subwatershed Priority	1.0

Conclusion

Torres & Associates and Freese and Nichols, Inc. have developed preliminary selection criteria and a prioritization framework for assisting the San Jacinto Regional Flood Planning Group (RFPG) with prioritizing the flood management evaluations (FME) for use during Task 12. The objective of Task 12 as described by the Texas Water Development Board (TWDB) is to perform identified FMEs to recommend additional potentially feasible flood mitigation projects (FMP). The prioritization of the FMEs will be used by the Technical Consultant to execute FMEs in order of prioritization until Task 12 funds are exhausted. Execution of a FME is contingent on any comments received to the draft plan and concurrence by the sponsor entity. If a sponsor is unresponsive or does not wish to pursue a particular FME then a reasonable effort can be made to identify another sponsor for the FME. If no other sponsor is found, then next FME in order will be pursued. Based on the analysis described within this memorandum, a draft prioritization framework was developed for the FMEs within the San Jacinto region with criteria based on available data used to develop a score for each FME that is in line with the goals of the San Jacinto RFPG.

The need for a prioritization framework was determined based on the constraints inherent to Task 12 including budget, schedule, a significant number of recommended FMEs (374 FMEs), and a wide array of sponsors. Based on these constraints, certain FMEs were filtered from the prioritization evaluation including FMEs with a level of effort exceeding $150,000 to maximize the number of FMEs evaluated, FMEs labeled as “Not Recommended” by the RFPG, FMEs that will not likely produce an FMP, and FMEs identified by public comment as duplicates or ongoing efforts. The filtering process reduced the number of FMEs from 374 to 191 FMEs included in the prioritization effort. **Exhibit 02** provides a visual of the FMEs that were excluded from the prioritization analysis.

The prioritization framework is comprised of different criteria based on available data to differentiate the FMEs. Each criterion was chosen as important factors to achieve the RFPGs overall goals for the Task 12 effort. The criteria used include the following: level-of-effort, model/data availability, known flood risk, number of entities benefitted, critical facilities at risk, structures at risk, nature-based solutions, social vulnerability index (SVI), mobility, population at risk, unique sponsor, and sub-watershed priority. For each criteria listed above, different thresholds were used to determine if an FME was a low, medium, or high priority for a certain criterion to differentiate the FMEs and prioritize FMEs with a higher need. A statistical

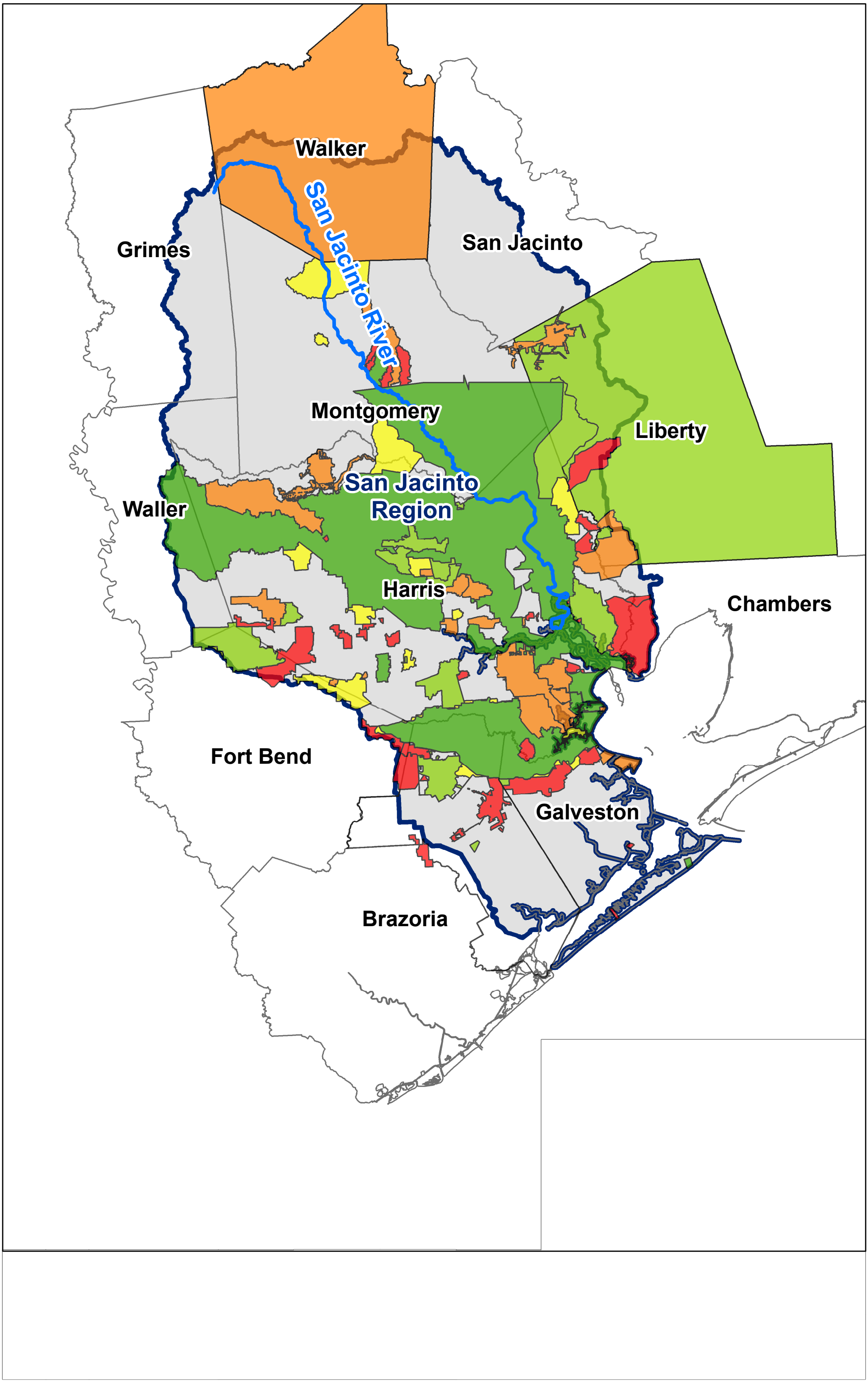
analysis was conducted for several of the criteria to determine effective thresholds to set for low, medium, and high priority. Documentation of the statistical analysis is provided in **Appendix 05**.

Weights were assigned to each of the criteria based on the ranking of the selection criteria gathered from the survey results of the Technical Committee and RFPG (**Appendix 03 and 04**). Criteria at the top of the survey results were assigned a weight of 1 while criteria further down on the list have a corresponding weight. These weights were multiplied with the priority ranking of the criteria and factored into the overall prioritization rank. Based on the feedback received from the RFPG during the October RFPG meeting, additional investigation of the results of the prioritized list was warranted to determine if any refinements could be made that would elevate some FMEs from smaller entities and provide a more diverse mix of FMEs higher in the prioritized list. The consultant team reviewed the FME prioritized list and criteria and determined that multiple criteria are similar and each capture different aspects of flood risk which influenced the overall ranking to be primarily reflective of flood risk. Based on this observation, the "Known Flood Risk", "Critical Facilities at Risk", "Structures at Risk", and "Population at Risk" had their respective weighting revised from one (1) to 0.25 to represent an overall category of flood risk. The "Unique Sponsor" and "Subwatershed Priority" criteria were also revised to a value of one (1) to help elevate different sponsors and geographic representation.

The results of the prioritization framework show the higher priority FMEs are mainly located in the middle to lower portion of the San Jacinto Region with a decent spread between sponsors however, many of the FMEs executed during the Task 12 effort may be for a limited number of sponsors as a function of the number of FMEs certain sponsors have that are only missing a BCA and the likelihood that there may be limited response to proceed with an FME from many sponsors. There are also FMEs included in the prioritized list that may be evaluated by the sponsor themselves. These FMEs are primarily benefit cost analyses (BCA). Based on coordination efforts, the City of Houston and City of Friendswood have indicated a potential for conducting the FMEs internally by the sponsor to elevate the FMEs to FMPs. Coordination is ongoing to ensure that there is no duplicated effort for Task 12. The completed draft prioritization framework is provided in **Appendix 01** with a spatial visual of the prioritized FMEs within the San Jacinto region provided in **Exhibit 01**. **Appendix 06** includes the FME One-Page fact sheets in ranked order for reference and **Appendix 07** includes the ranked FME list in excel form to provide an overall summary of the FMEs with the data used in the analysis and the FMEs removed based on different constraints.

List of Exhibits

List of Appendices


Walker
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San Jacinto
Montgomery
Liberty
San Jacinto
Region
Waller
Harris
Chambers
Fort Bend
Galveston
Brazoria

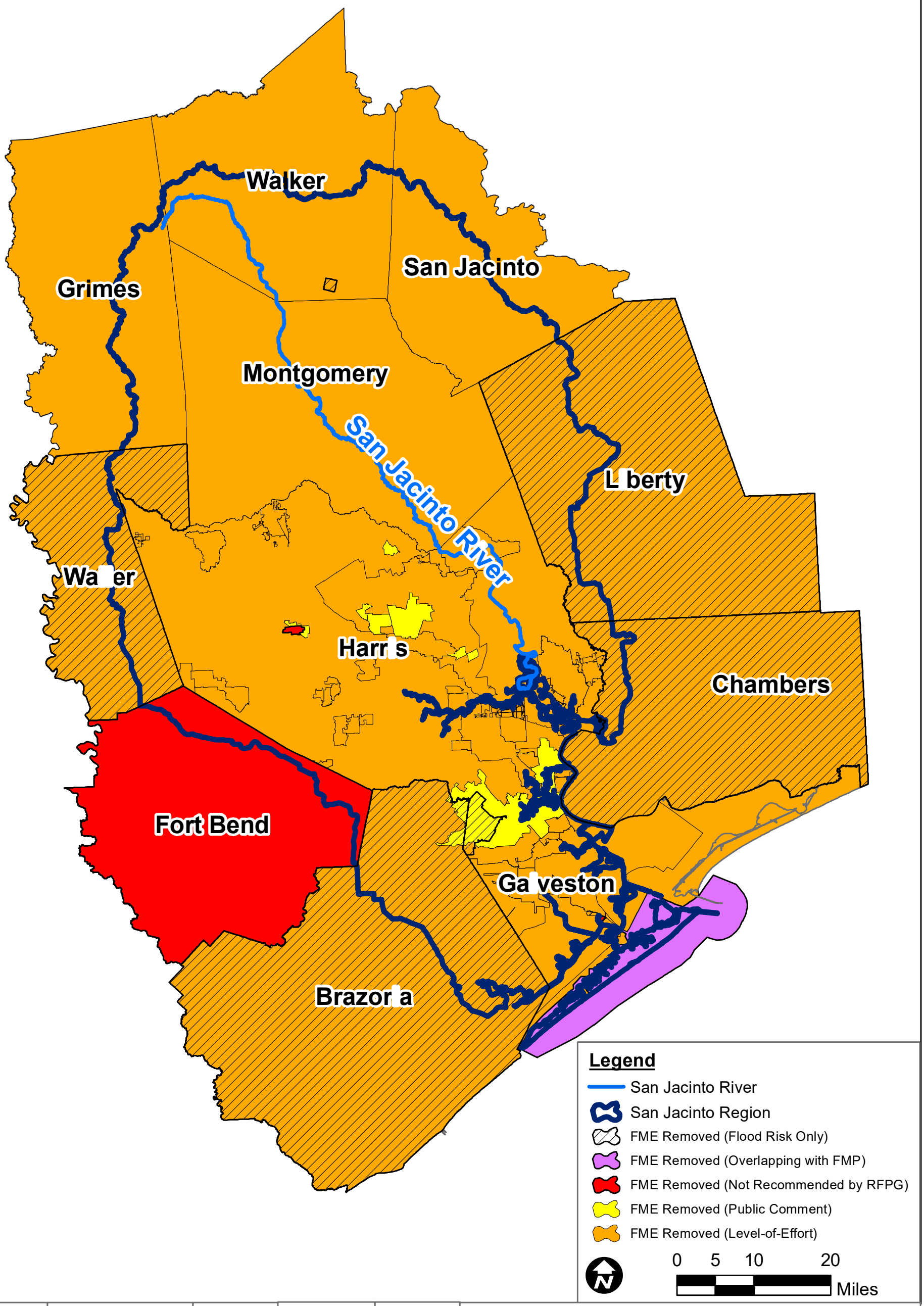


Exhibit 2

Date: Sep 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY,
SUITE 500
HOUSTON, TEXAS 77024

Prepared: CAA	Checked: ESA	Approved: JMT

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME) REMOVED FROM PRIORITIZATION

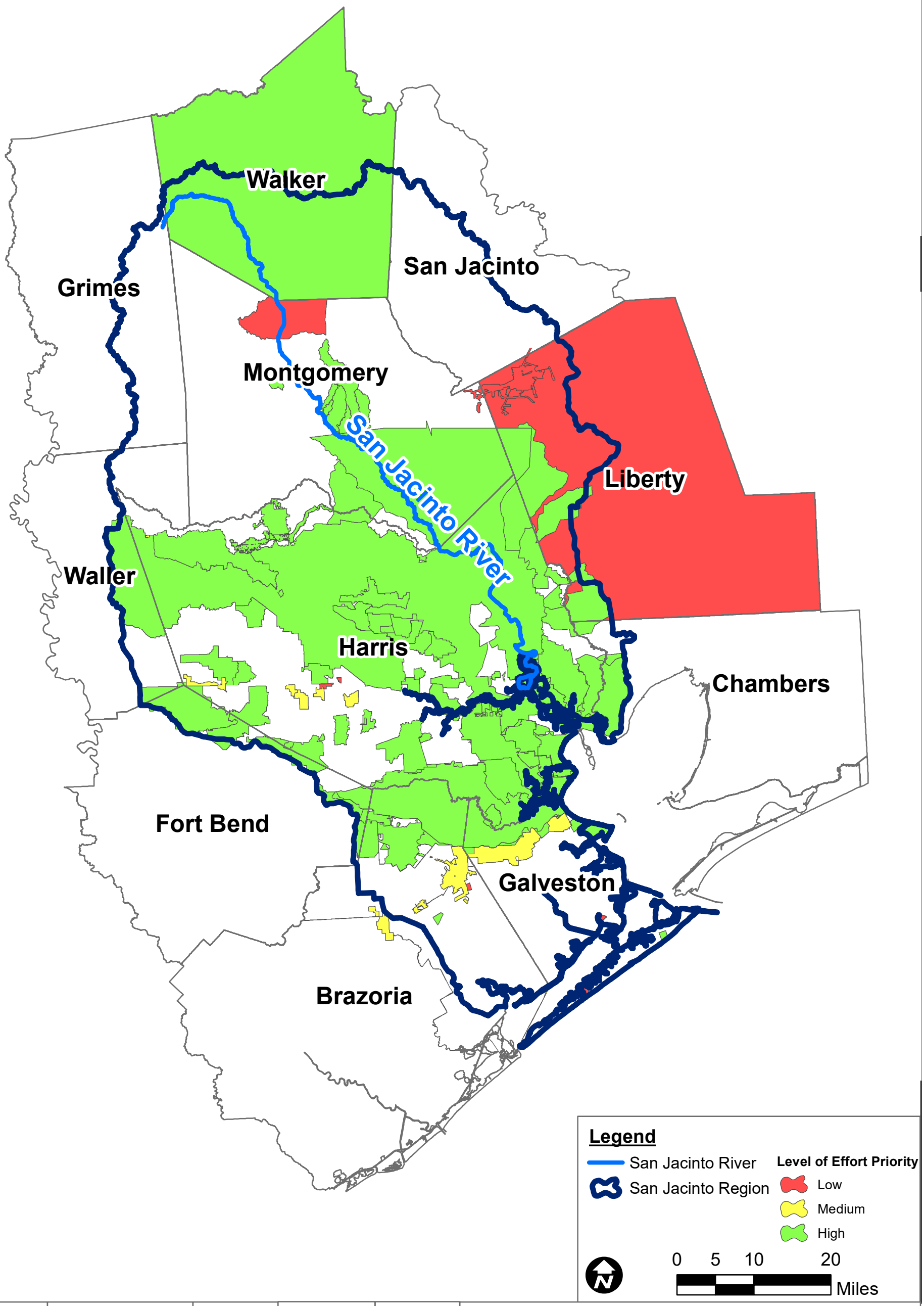
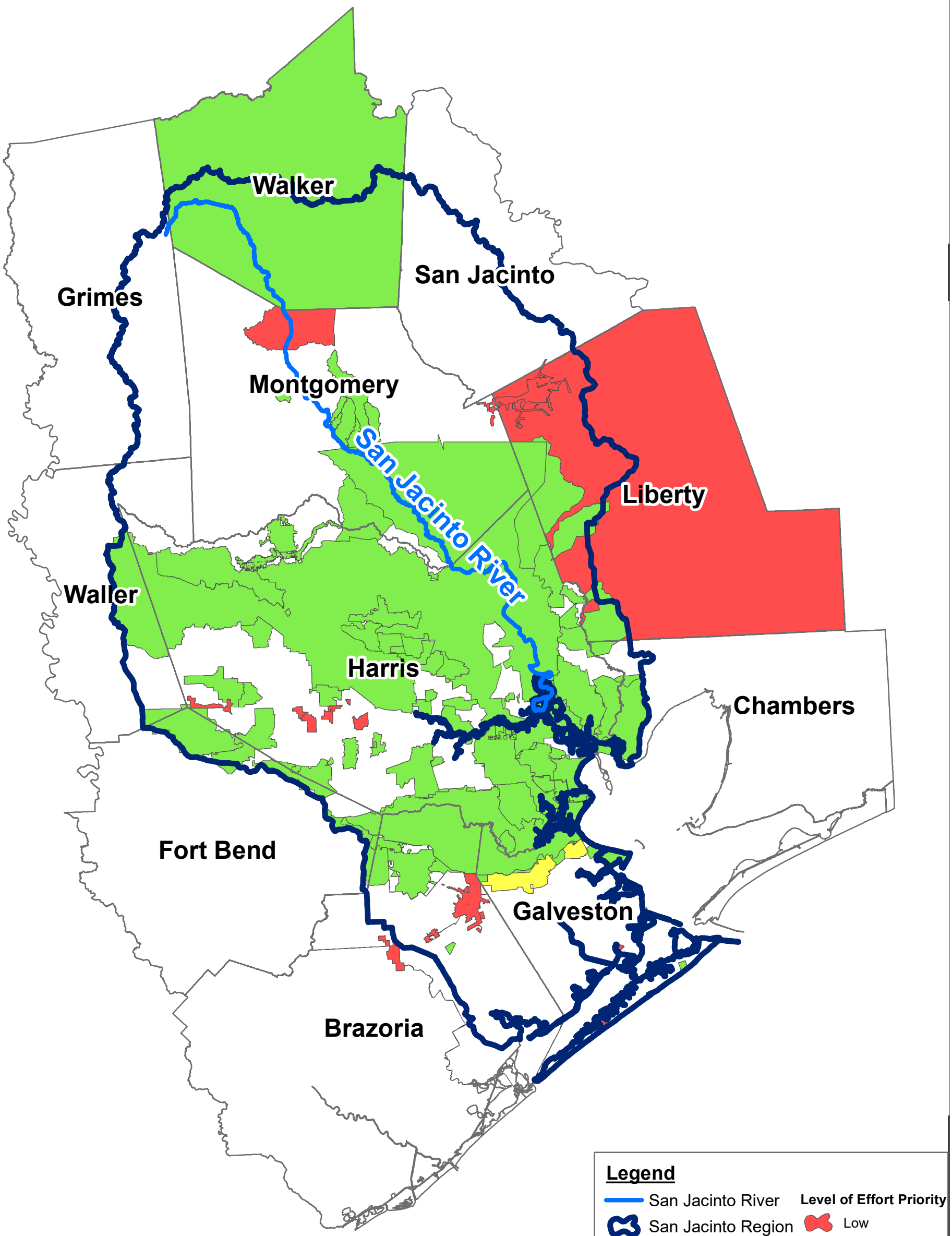


Exhibit 3	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) LEVEL OF EFFORT PRIORITY ALTERNATIVE 1**



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		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) LEVEL OF EFFORT PRIORITY ALTERNATIVE 2**

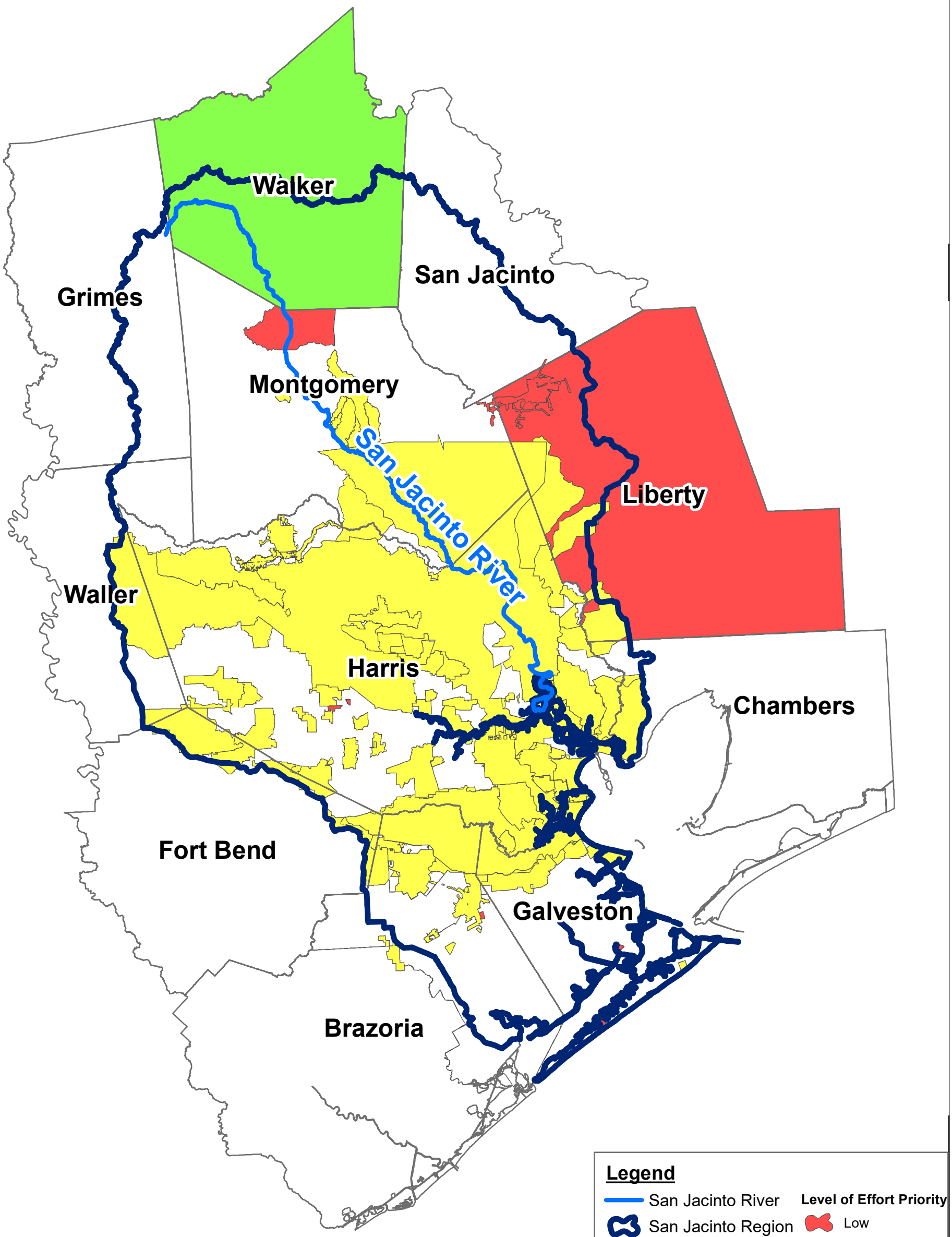
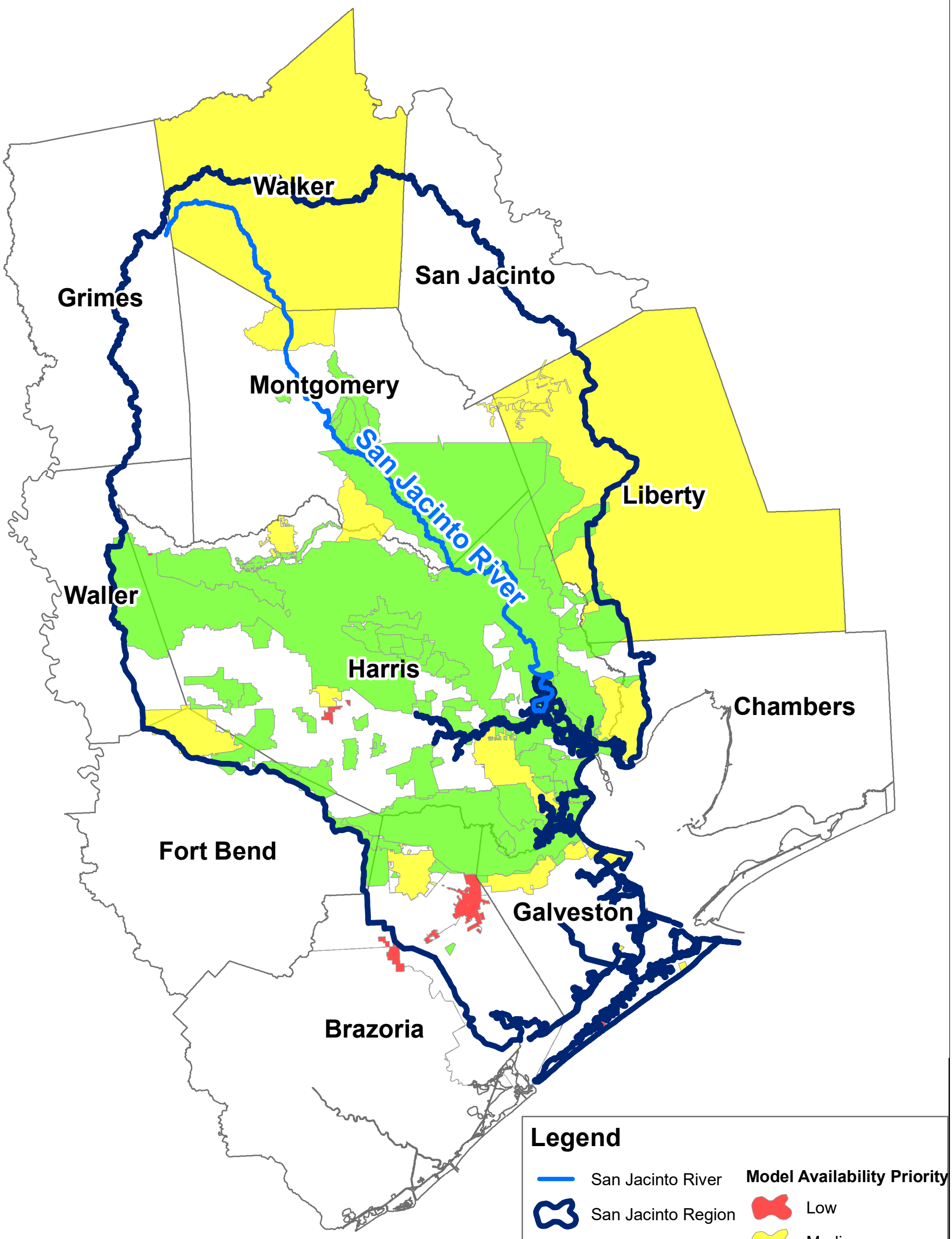


Exhibit 5	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) LEVEL OF EFFORT PRIORITY ALTERNATIVE 3**



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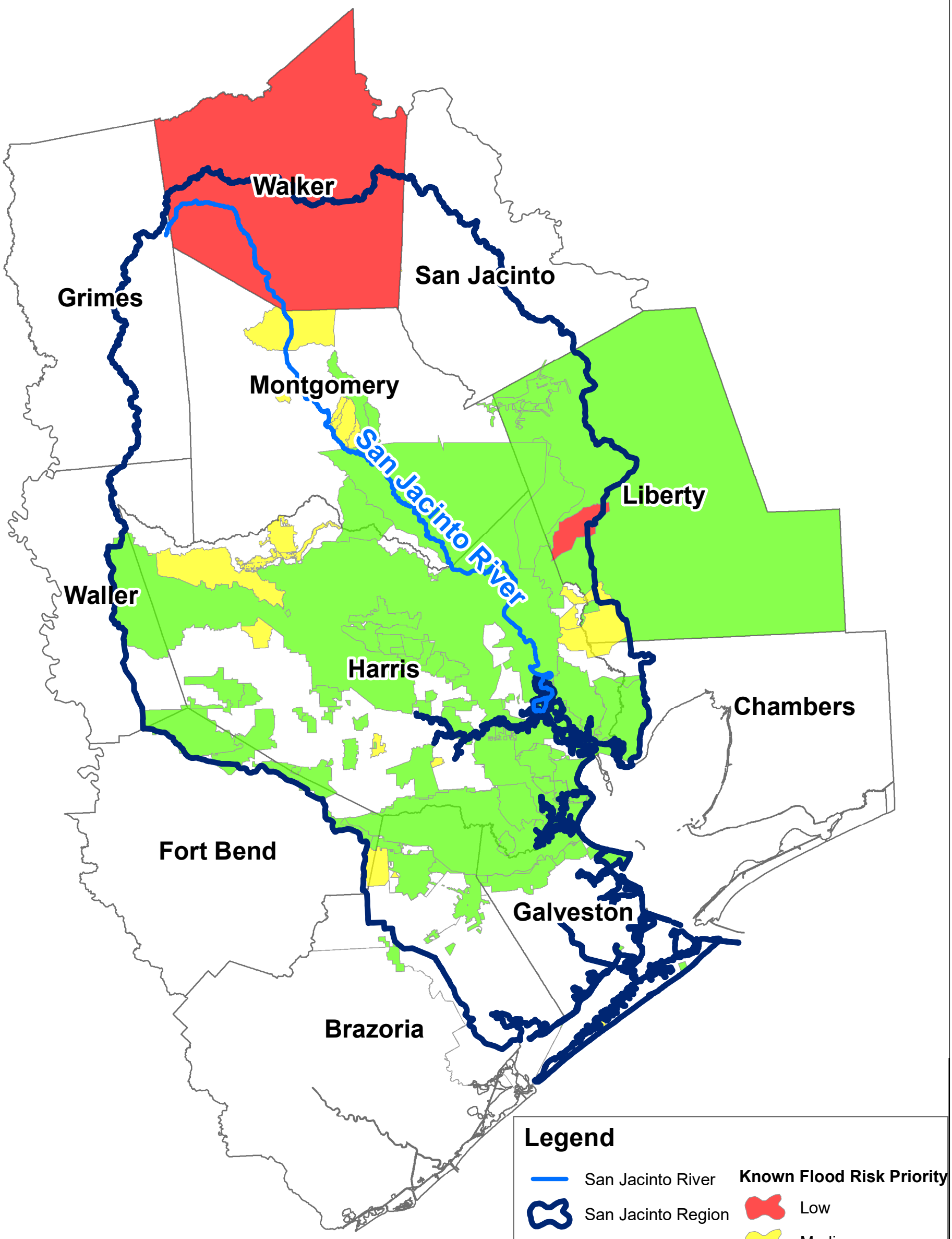


Exhibit 7

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

Prepared: CAA	Checked: ESA	Approved: JMT

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
KNOWN FLOOD RISK PRIORITY

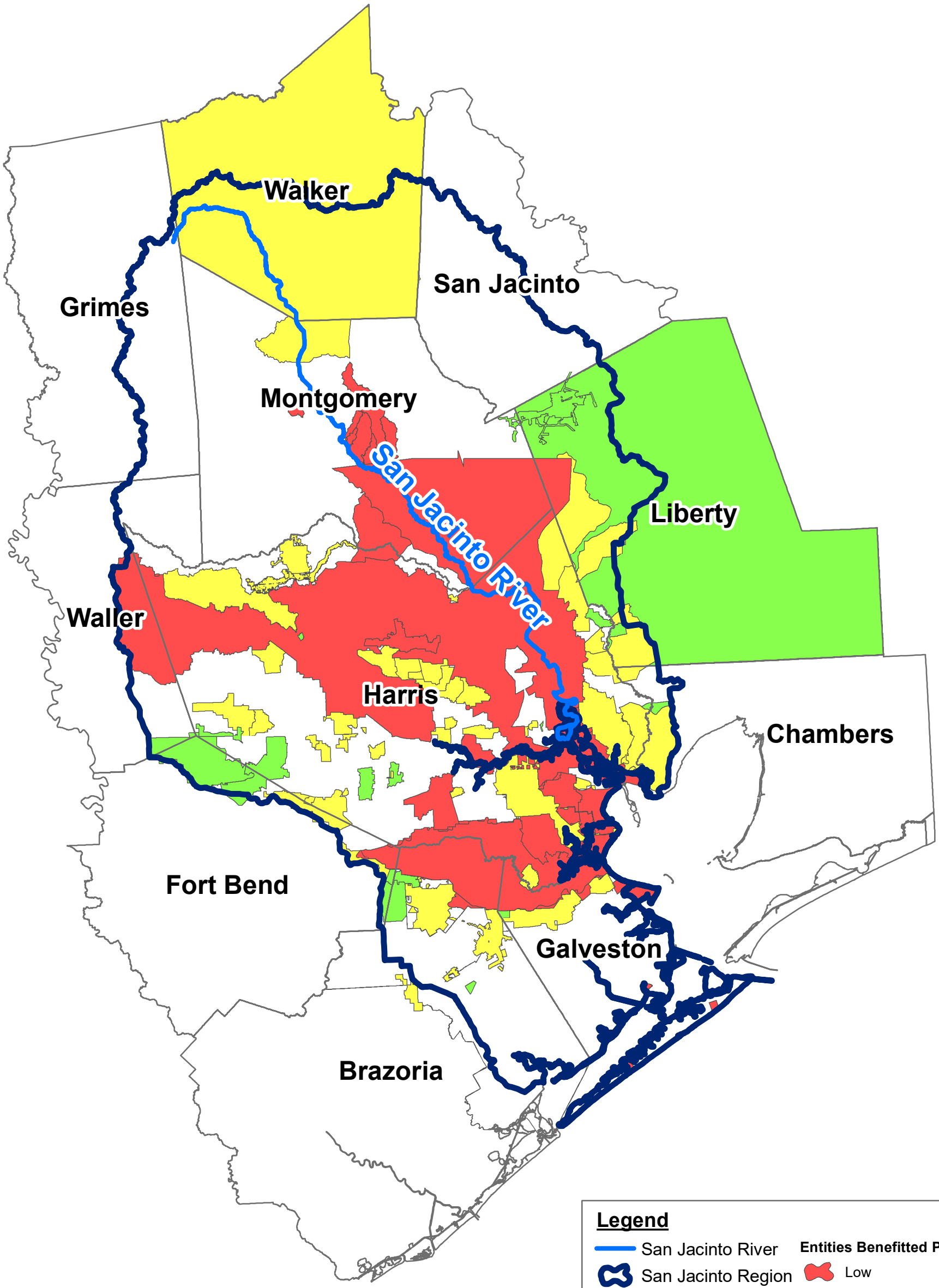


Exhibit 8

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
ENTITIES BENEFITTED PRIORITY
ALTERNATIVE 1

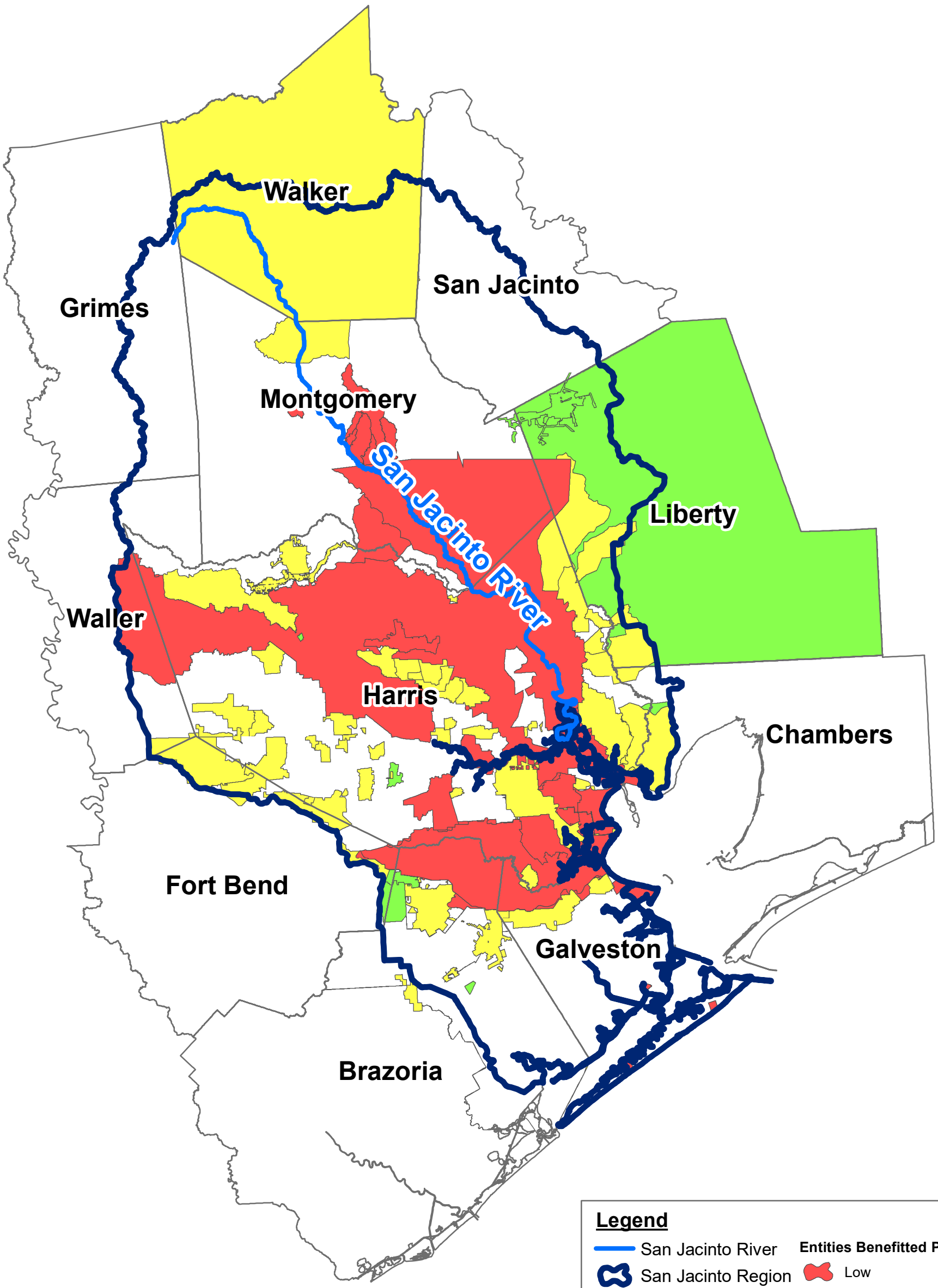


Exhibit 9

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
ENTITIES BENEFITTED PRIORITY
ALTERNATIVE 2

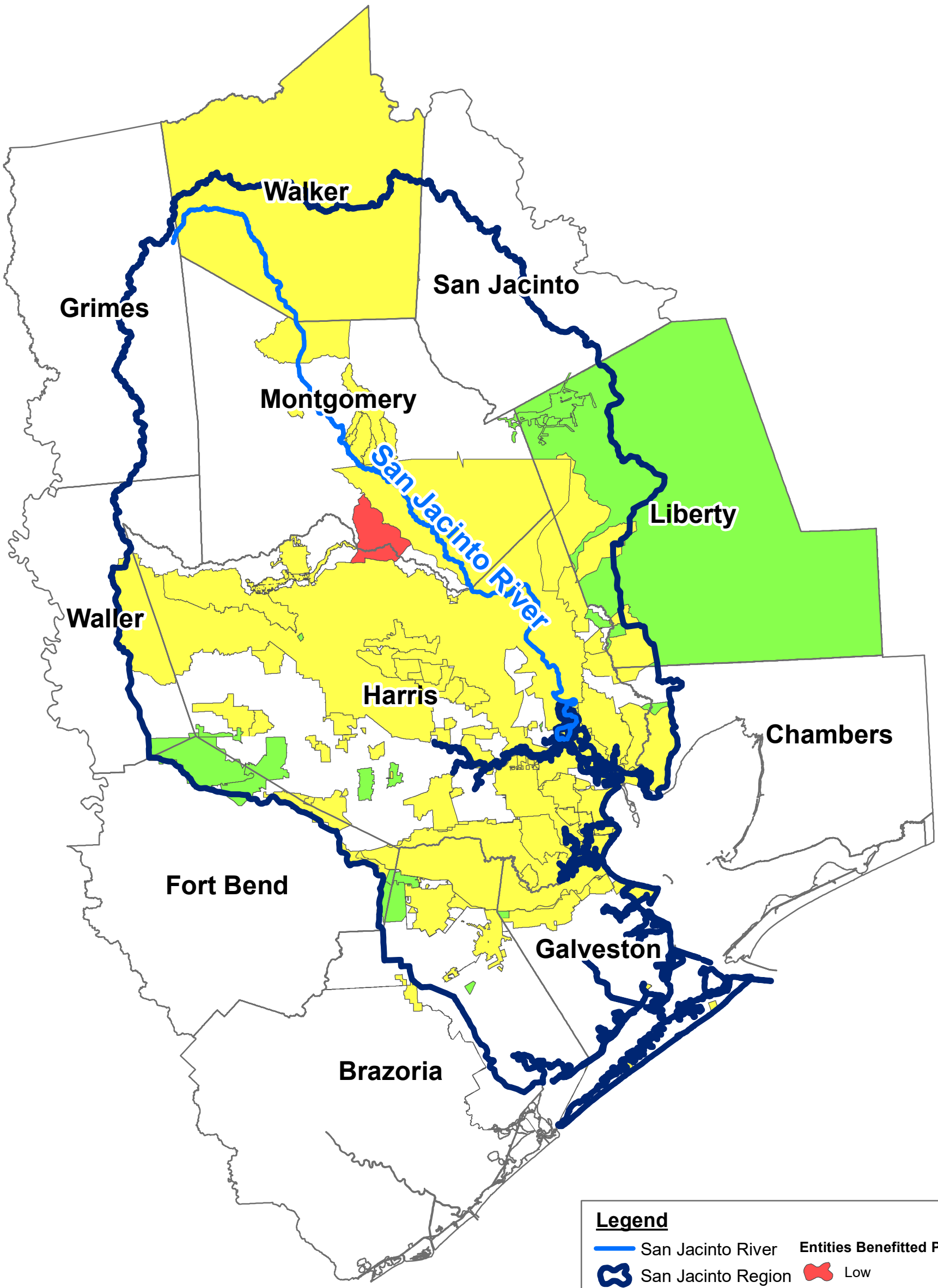


Exhibit 10

Date: Oct 2022
Scale: As Noted

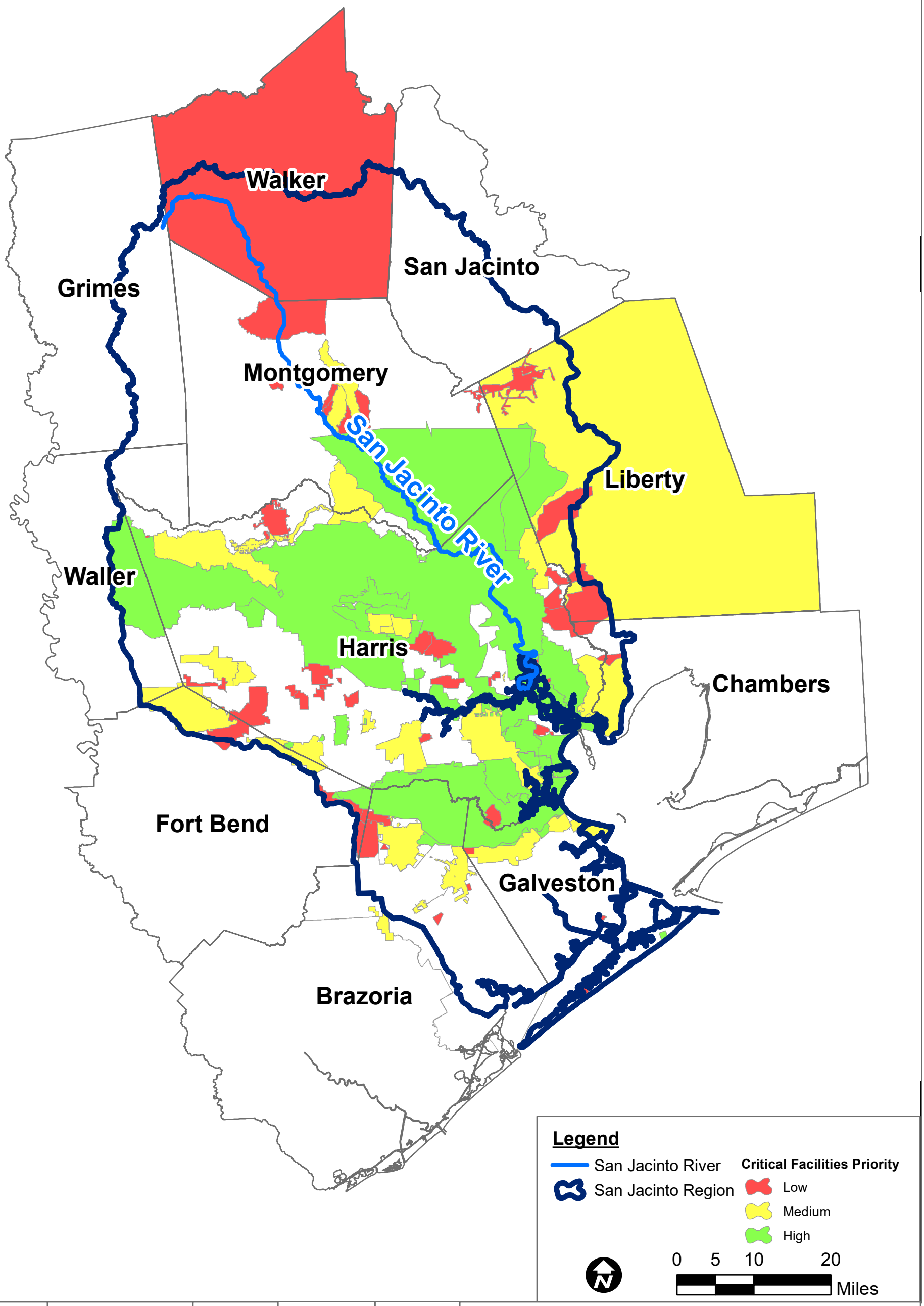
FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
ENTITIES BENEFITTED PRIORITY
ALTERNATIVE 3



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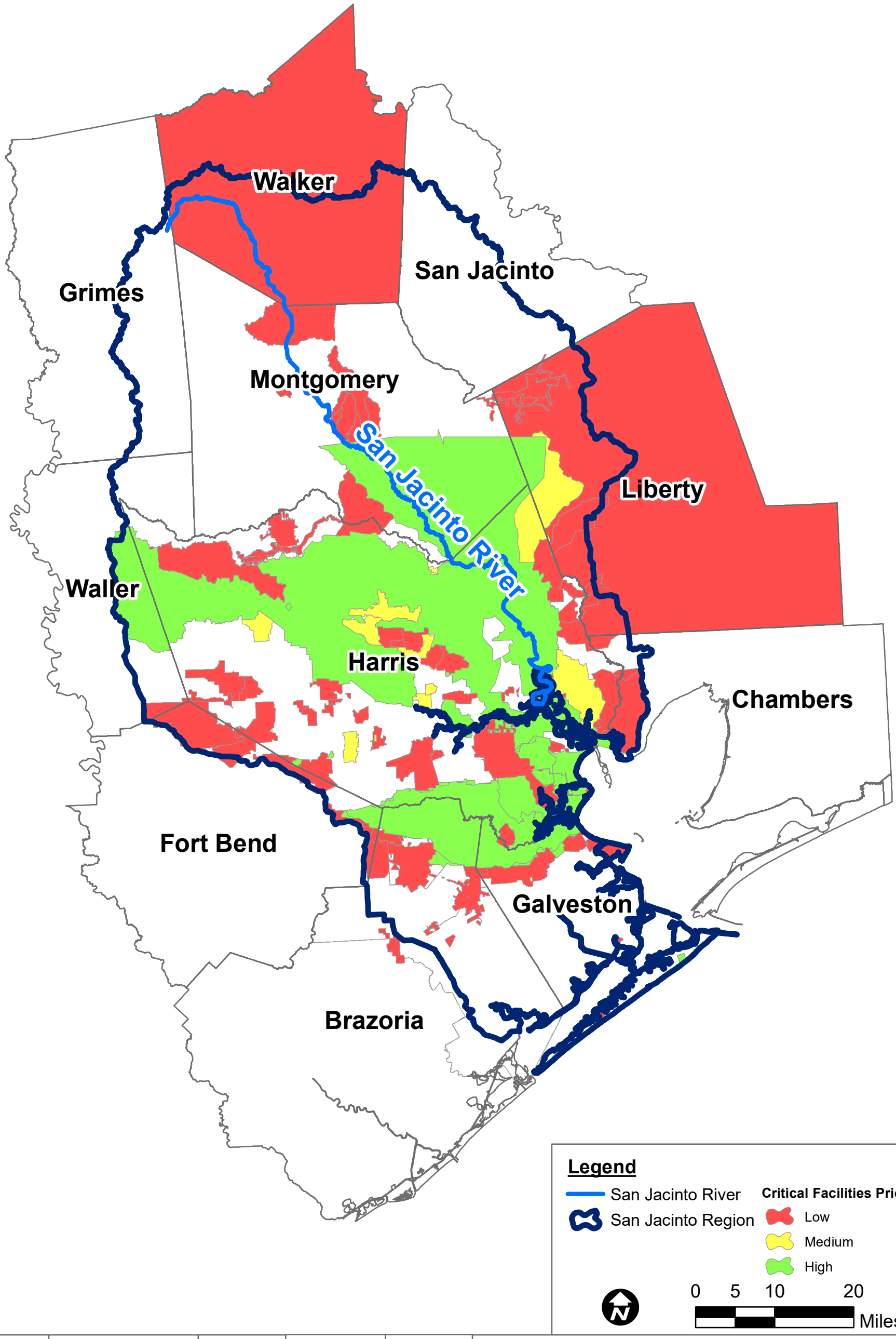
		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) CRITICAL FACILITIES BENEFITTED PRIORITY ALTERNATIVE 1**



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		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) CRITICAL FACILITIES BENEFITTED PRIORITY ALTERNATIVE 2**

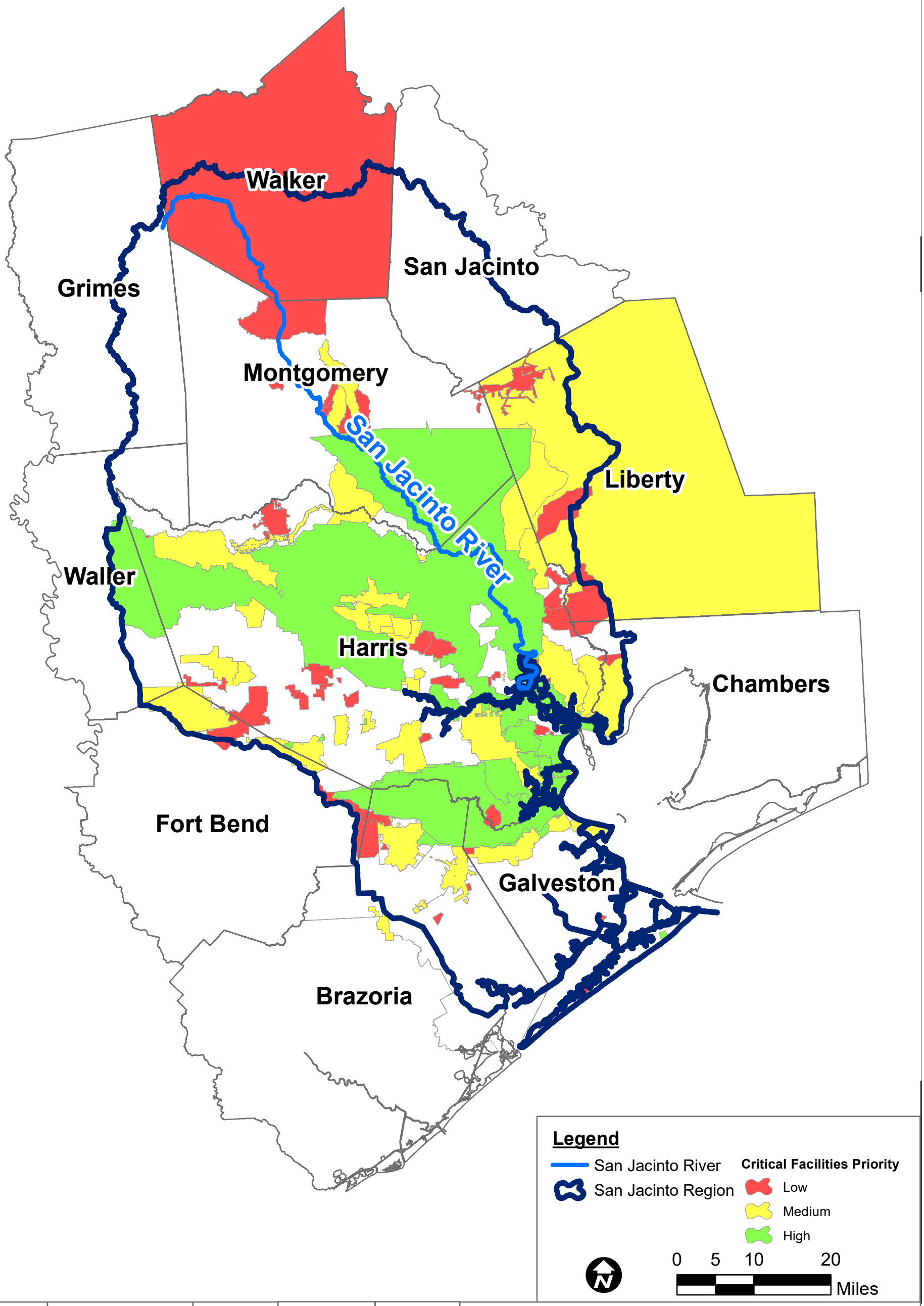


Exhibit 13	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC Engineers | Scientists | Professionals				**FLOOD MANAGEMENT EVALUATIONS (FME) CRITICAL FACILITIES BENEFITTED PRIORITY ALTERNATIVE 3**

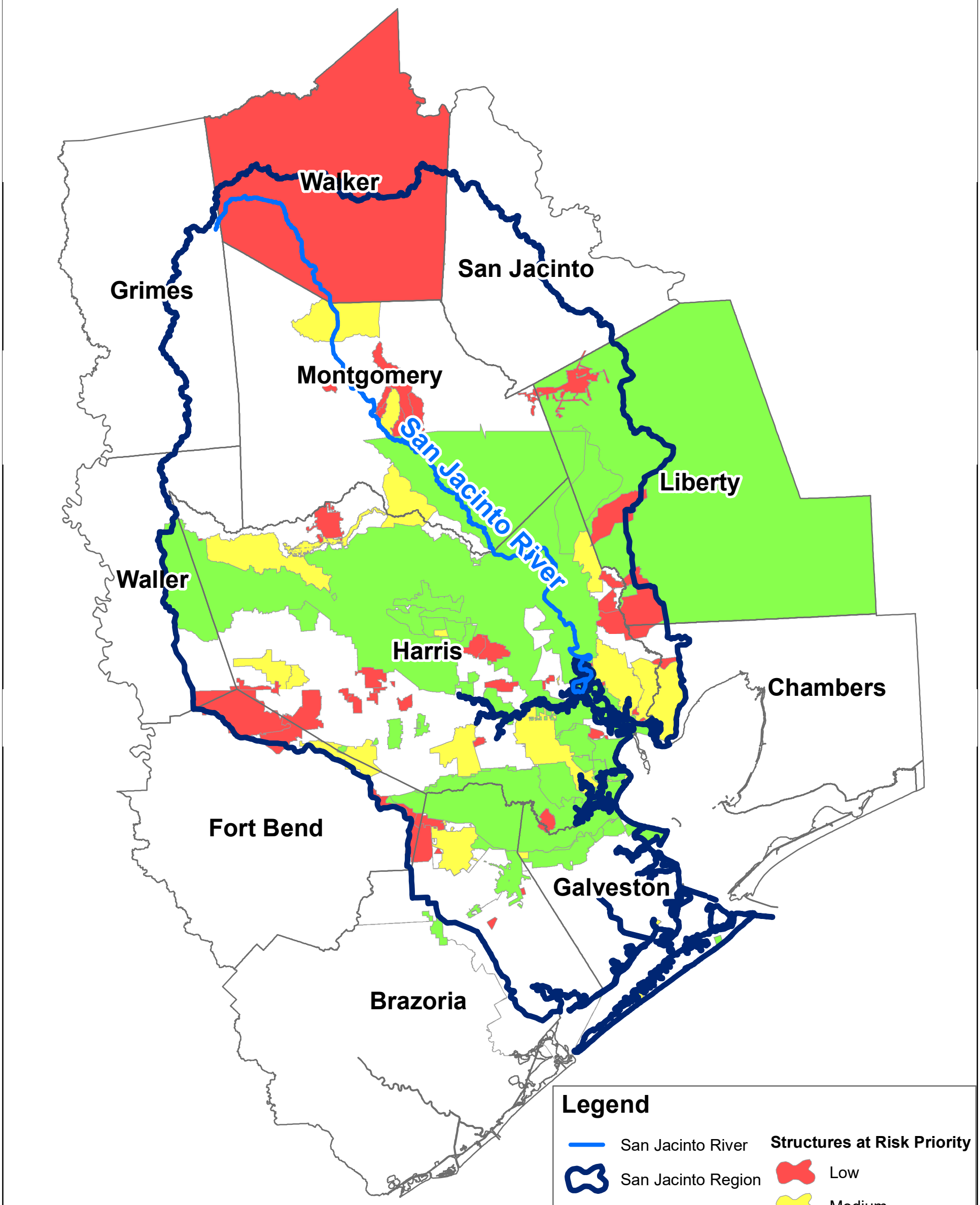


Exhibit 14

Date: Oct 2022
Scale: As Noted

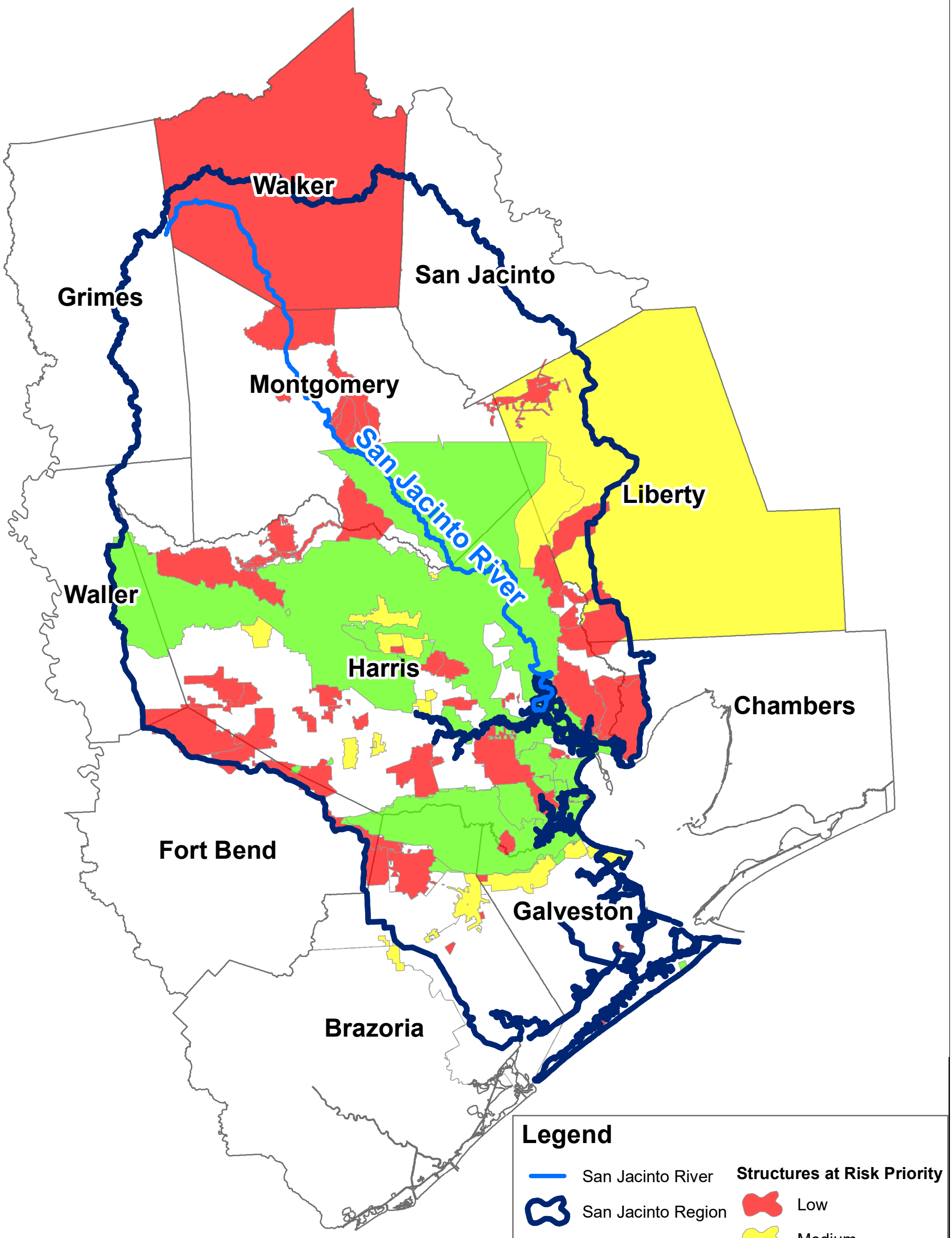
FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

Prepared: CAA	Checked: ESA	Approved: JMT

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
STRUCTURES AT RISK PRIORITY
ALTERNATIVE 1



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Date: Oct 2022
Scale: As Noted

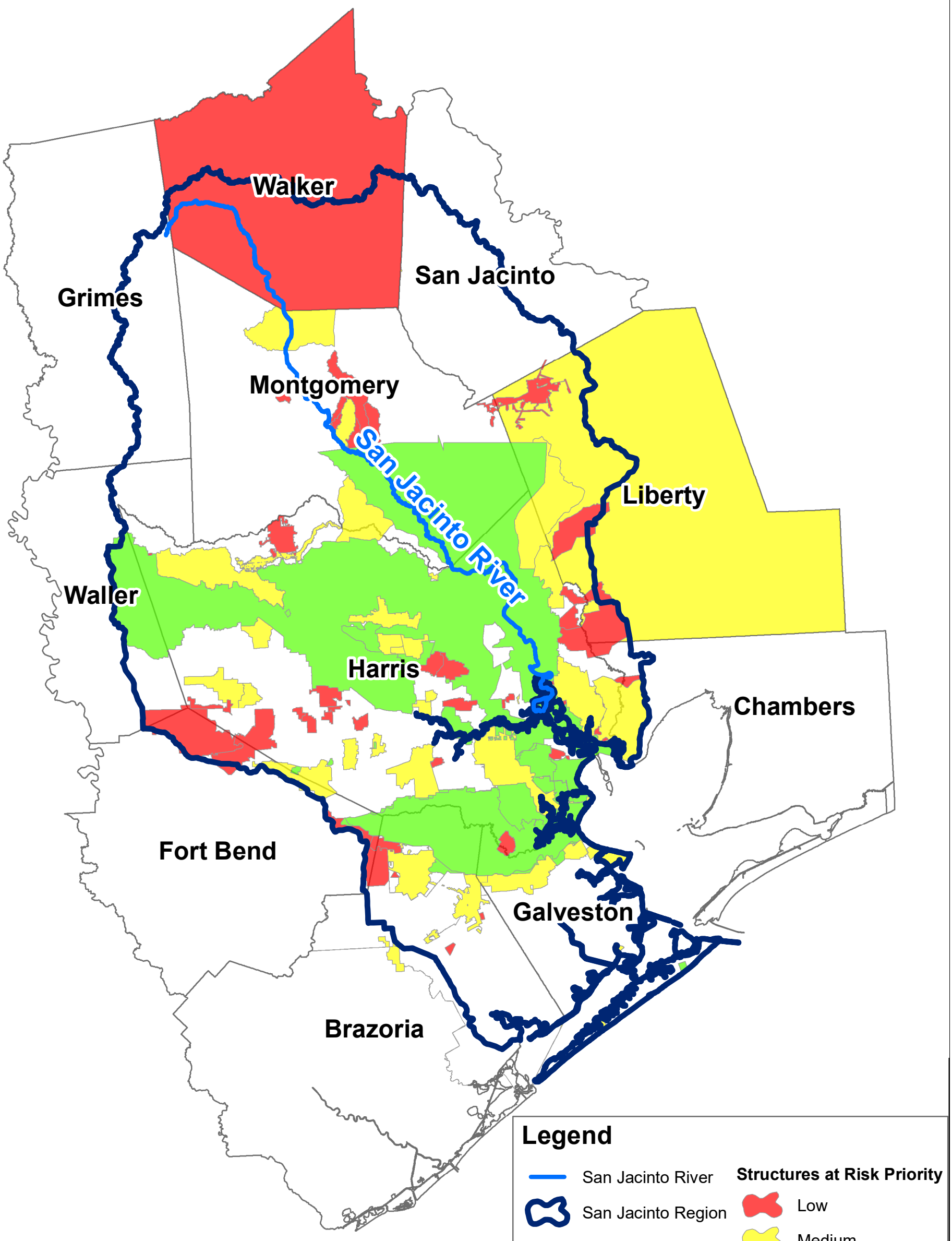
FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

Prepared: CAA	Checked: ESA	Approved: JMT

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
STRUCTURES AT RISK PRIORITY
ALTERNATIVE 2



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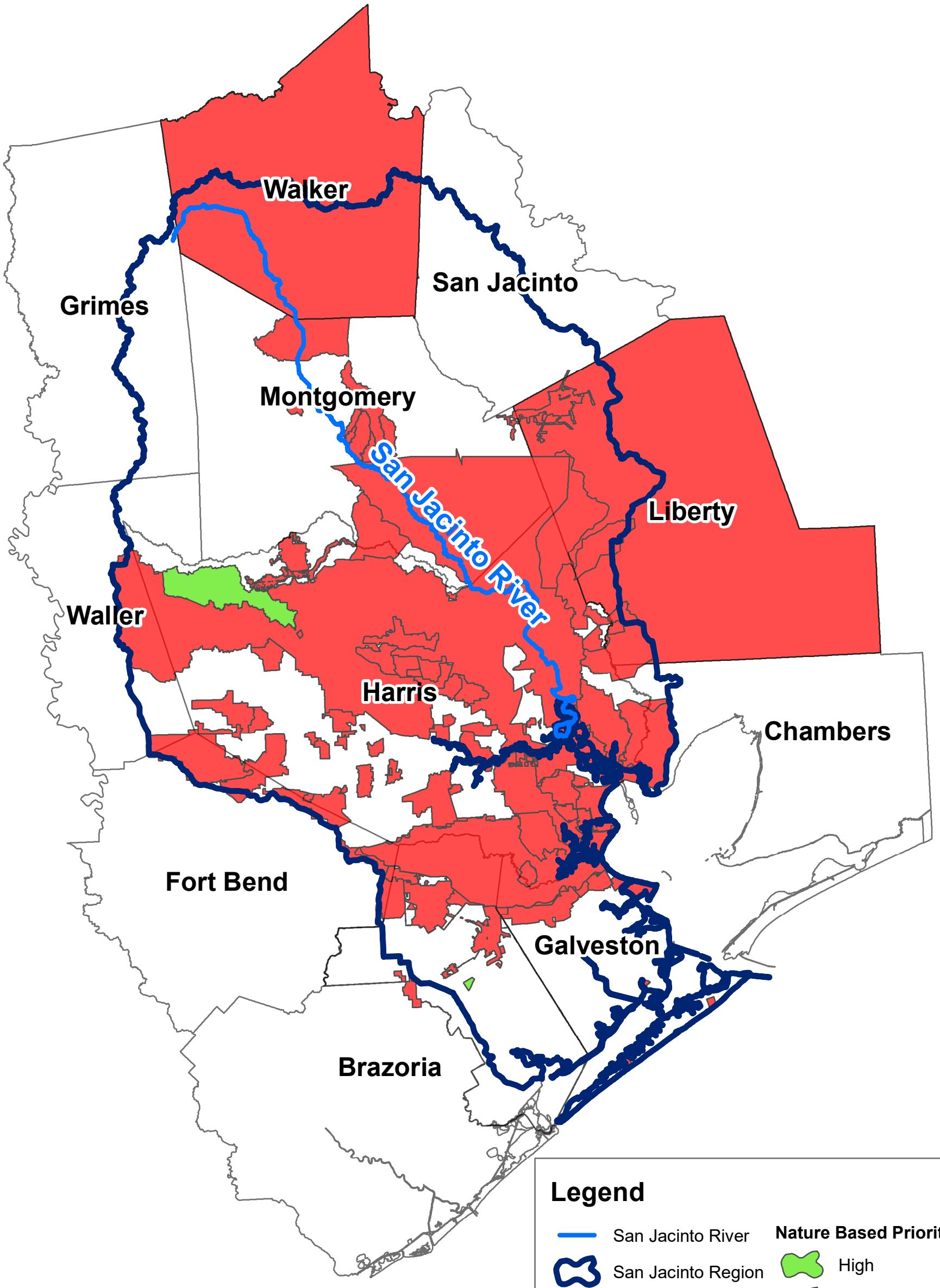
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) STRUCTURES AT RISK PRIORITY ALTERNATIVE 3**



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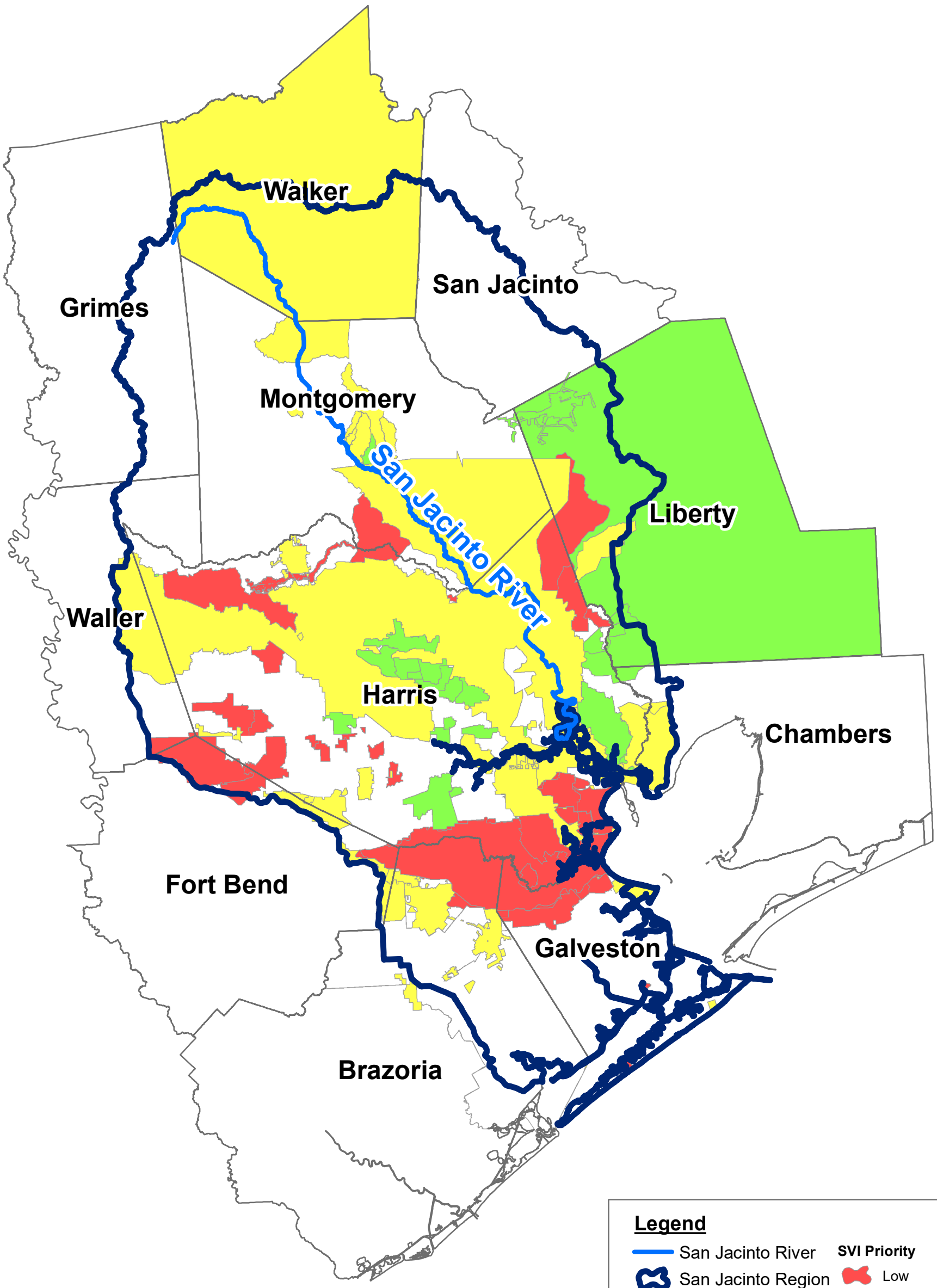


Exhibit 18	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) SVI PRIORITY ALTERNATIVE 1**

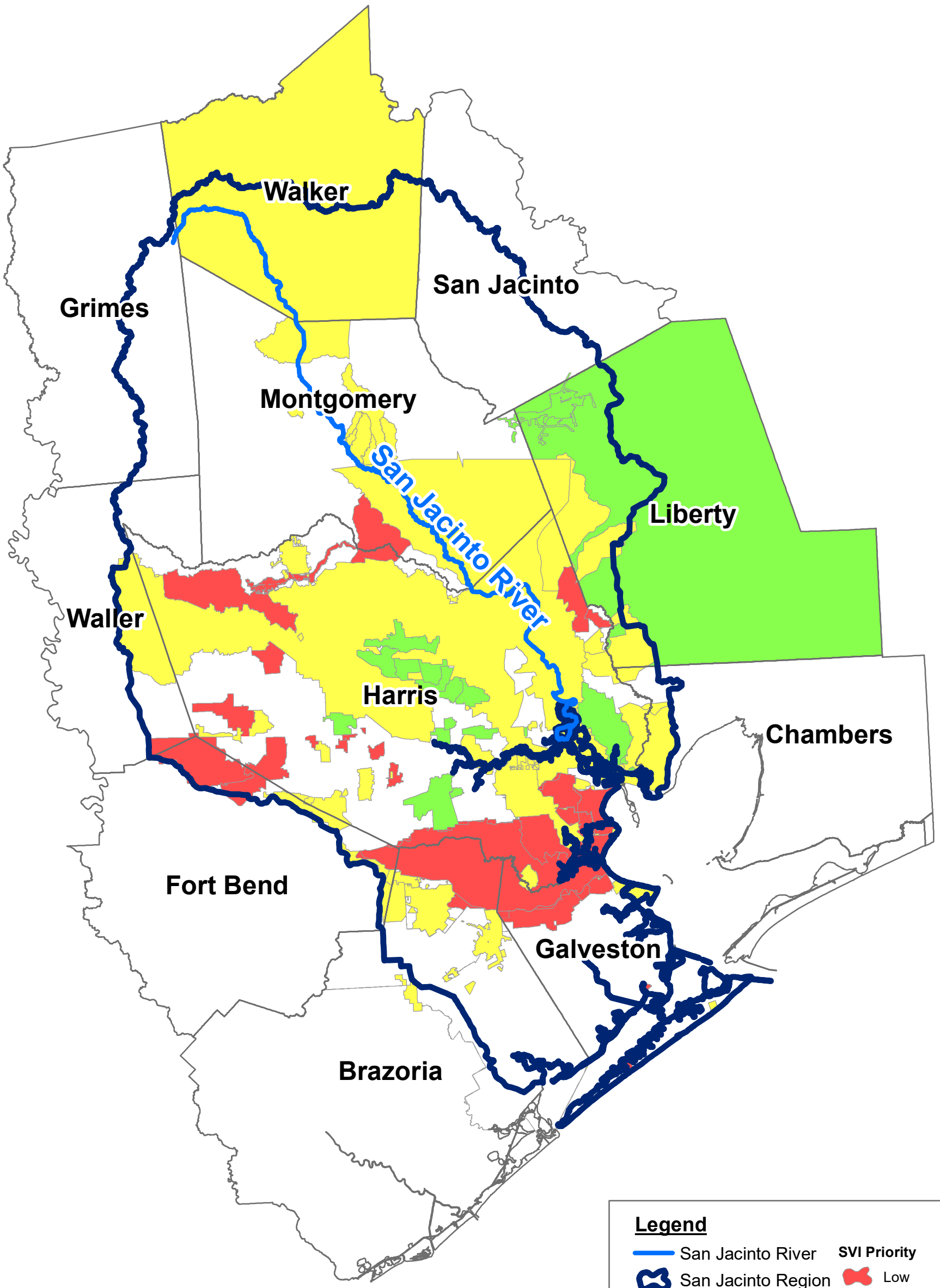


Exhibit 19	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) SVI PRIORITY ALTERNATIVE 2**

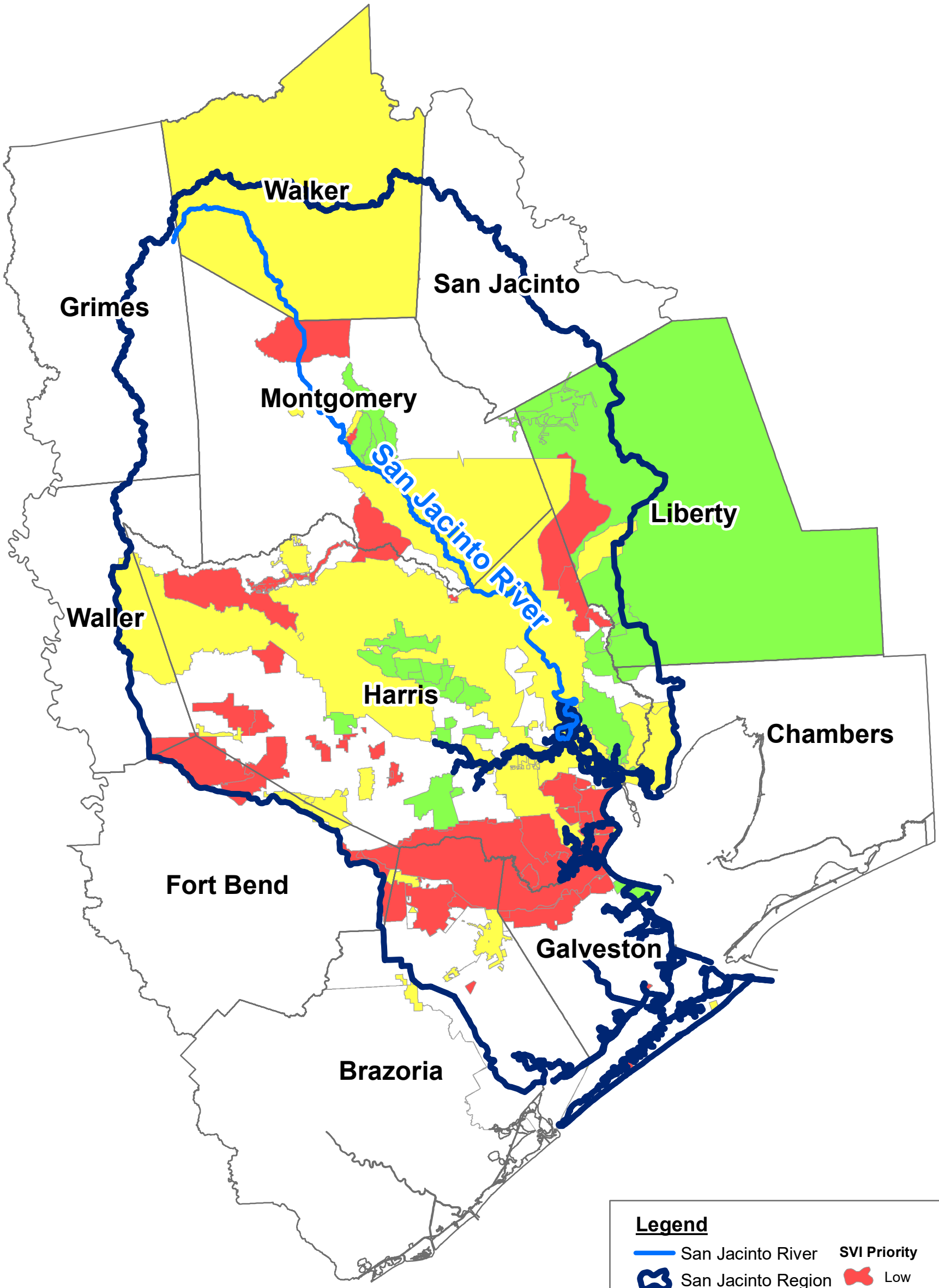


Exhibit 20	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) SVI PRIORITY ALTERNATIVE 3**

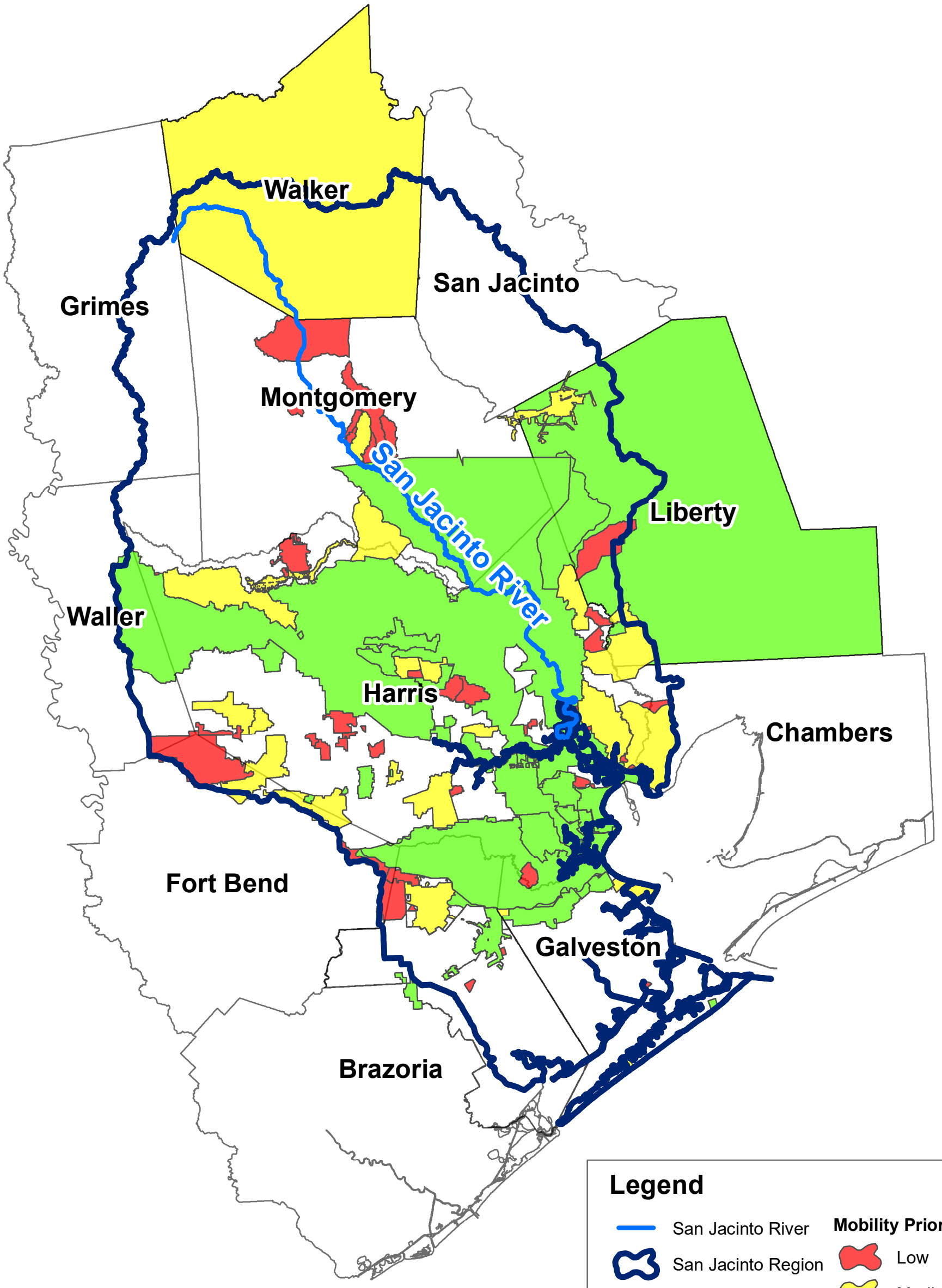


Exhibit 21

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
MOBILITY PRIORITY
ALTERNATIVE 1

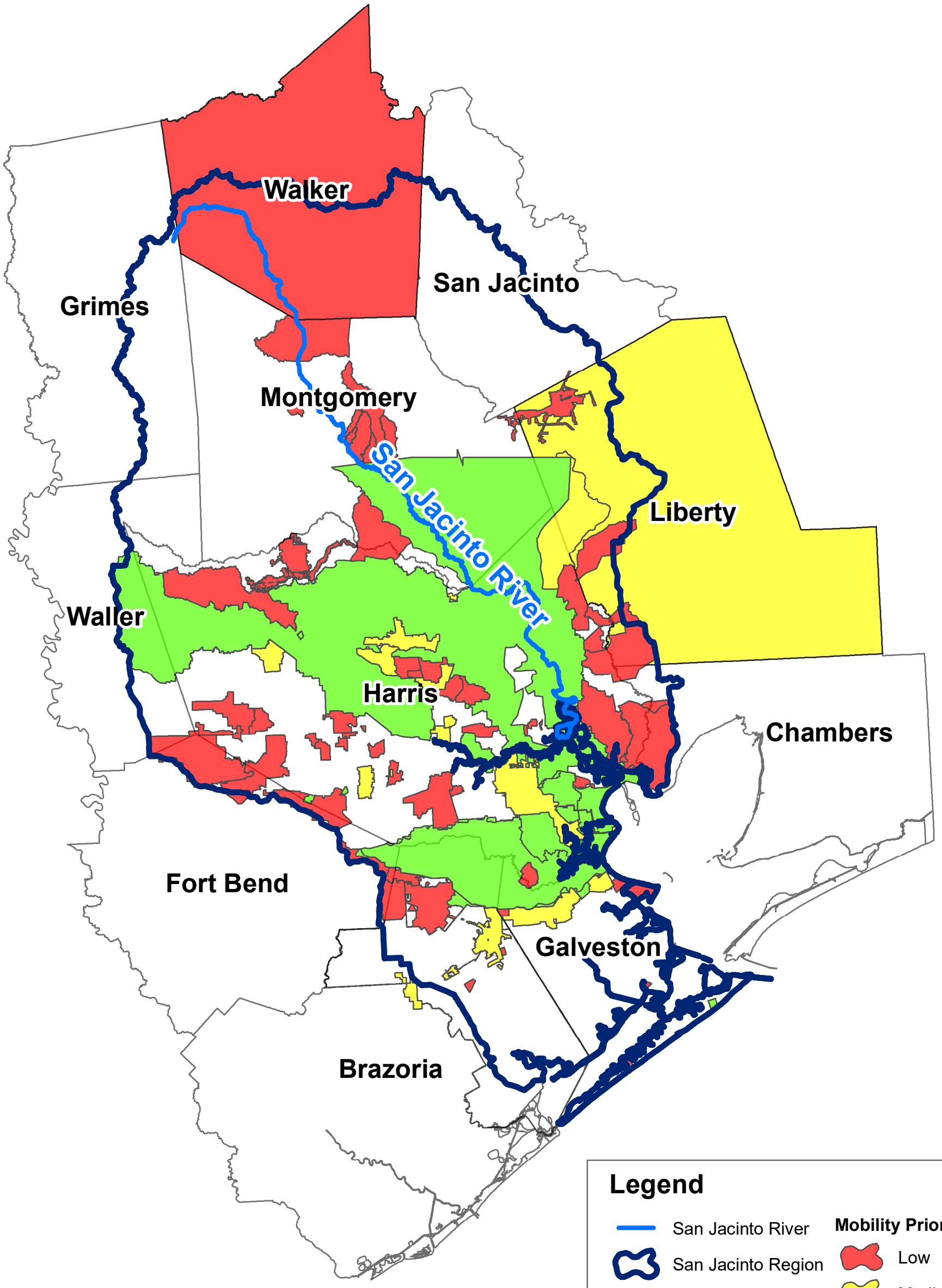


Exhibit 22

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
MOBILITY PRIORITY
ALTERNATIVE 2

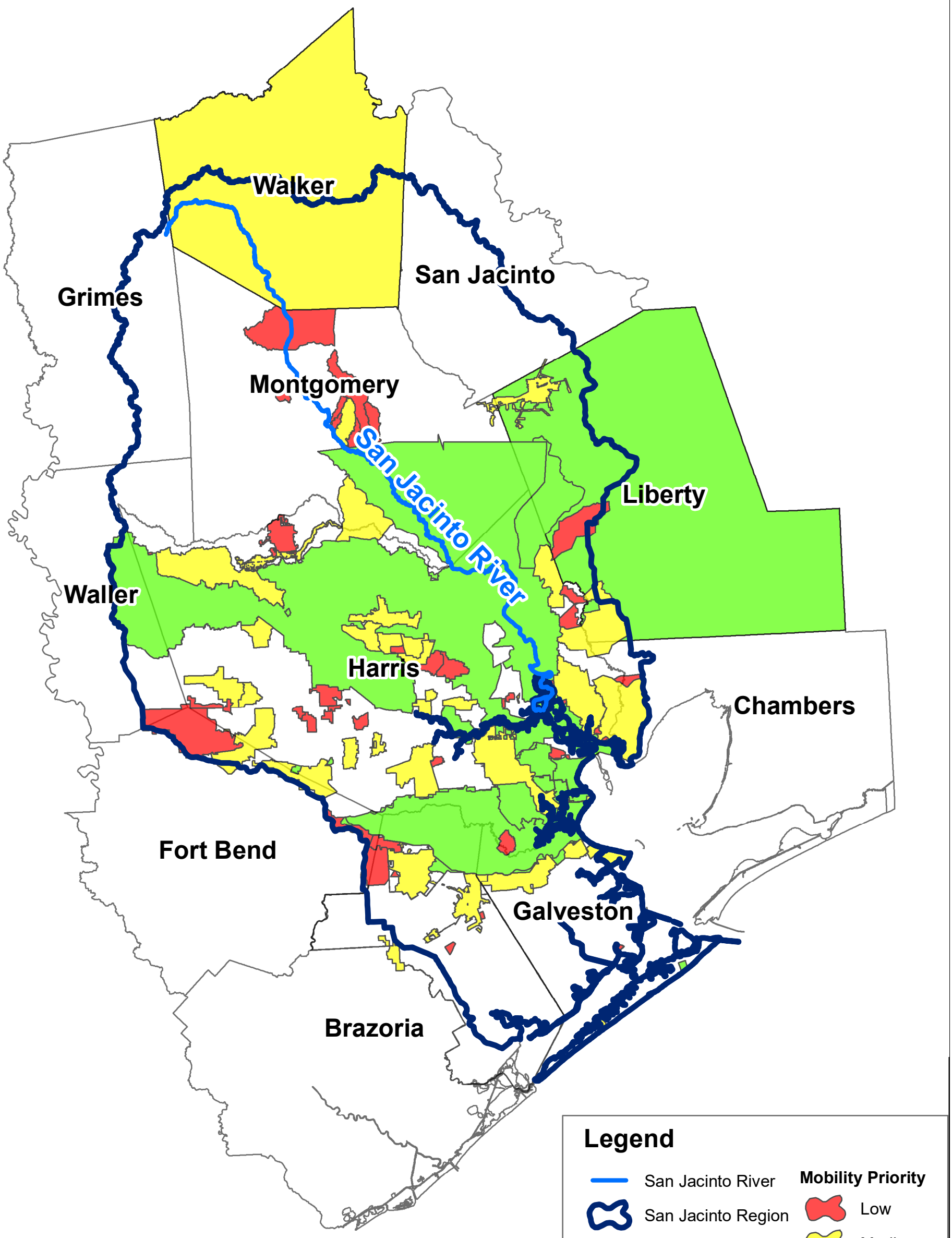


Exhibit 22

Date: Oct 2022
Scale: As Noted

FREESE AND NICHOLS
10497 TOWN AND COUNTRY WAY, SUITE 500
HOUSTON, TEXAS 77024

TORRES & ASSOCIATES, LLC
ENGINEERS | SCIENTISTS | PROFESSIONALS

Prepared:	Checked:	Approved:
CAA	ESA	JMT

SAN JACINTO REGIONAL FLOOD PLAN

FLOOD MANAGEMENT EVALUATIONS (FME)
MOBILITY PRIORITY
ALTERNATIVE 3

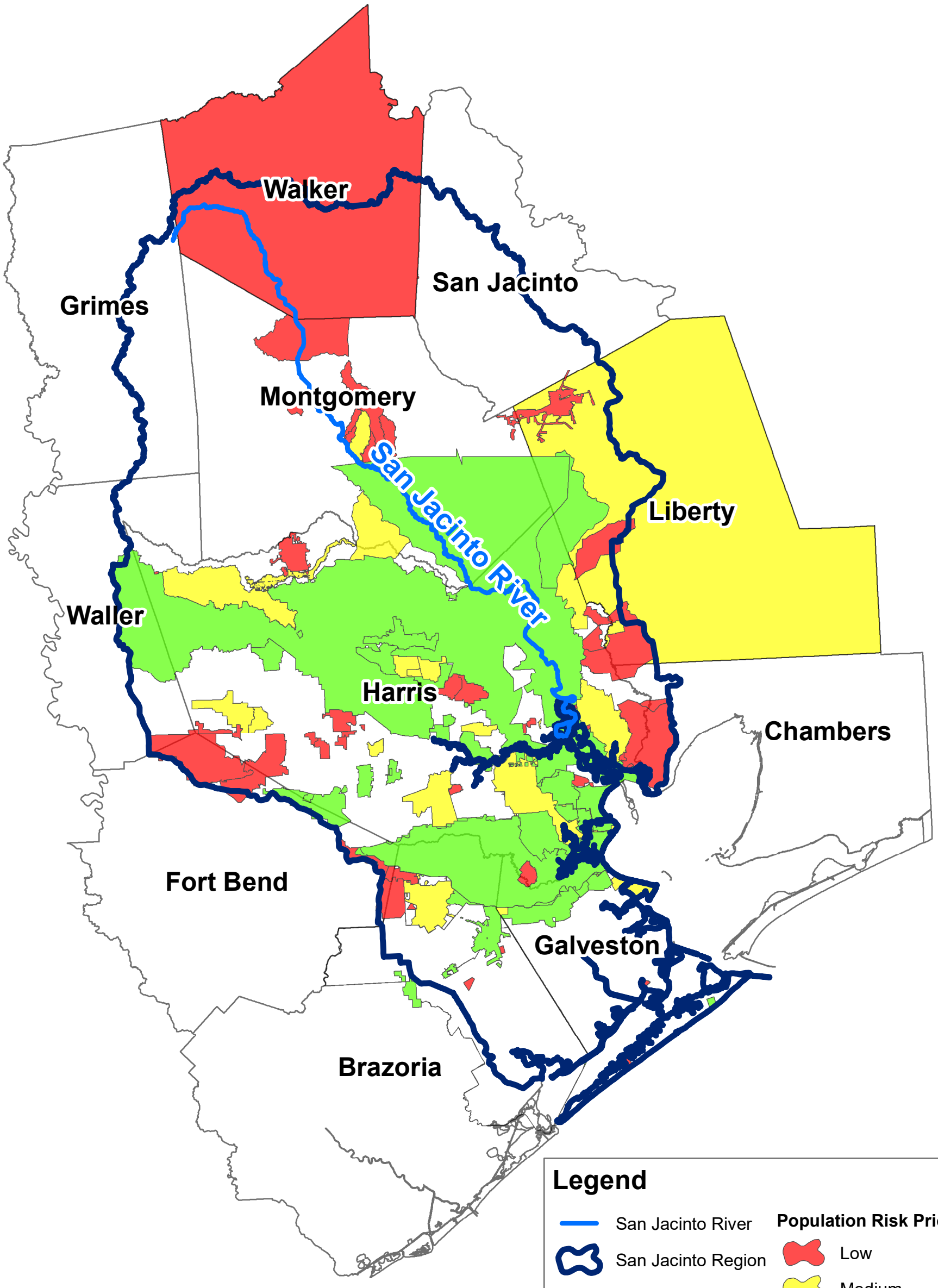


Exhibit 24	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) POPULATION AT RISK PRIORITY ALTERNATIVE 1**

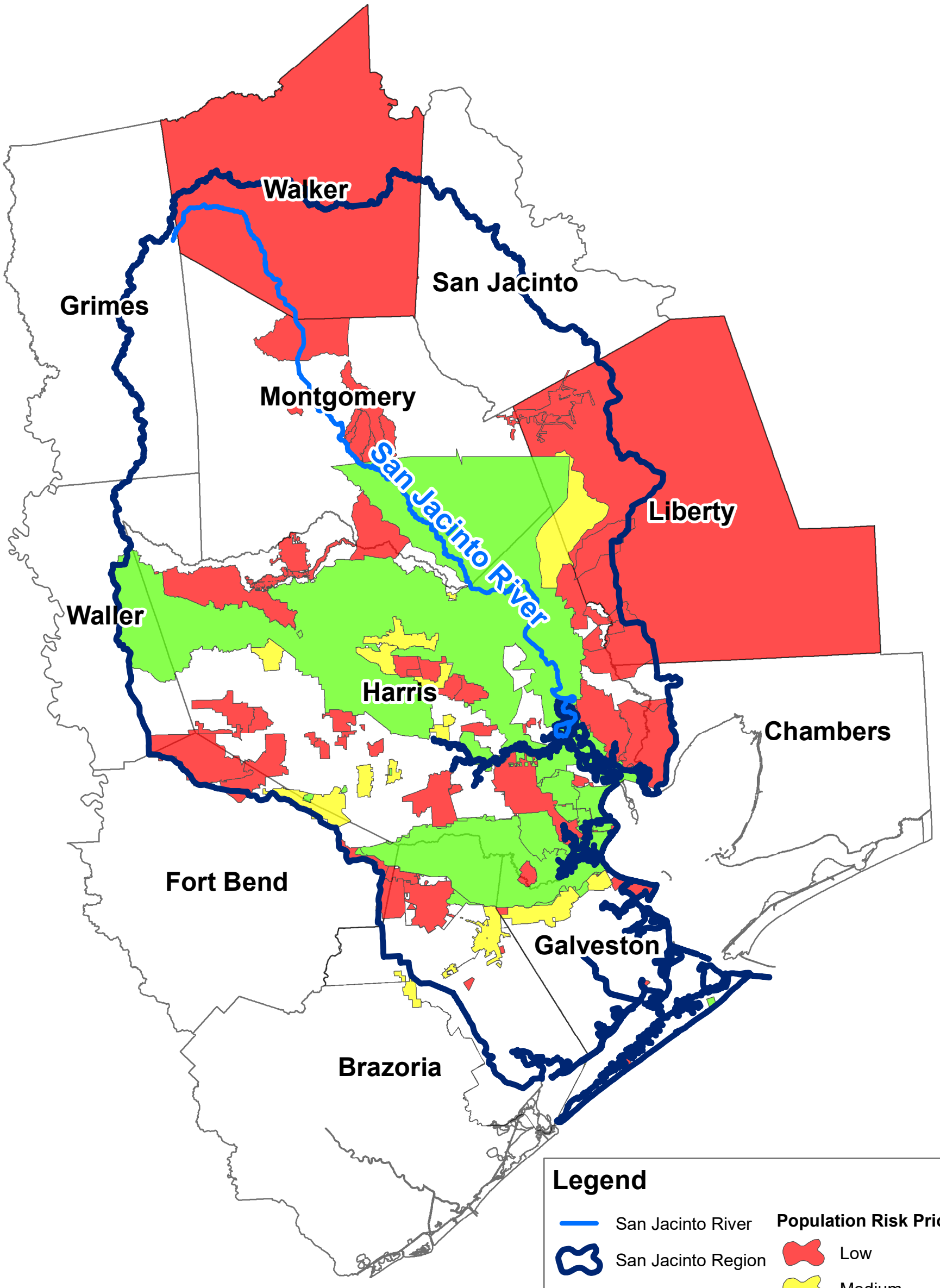


Exhibit 25	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) POPULATION AT RISK PRIORITY ALTERNATIVE 2**

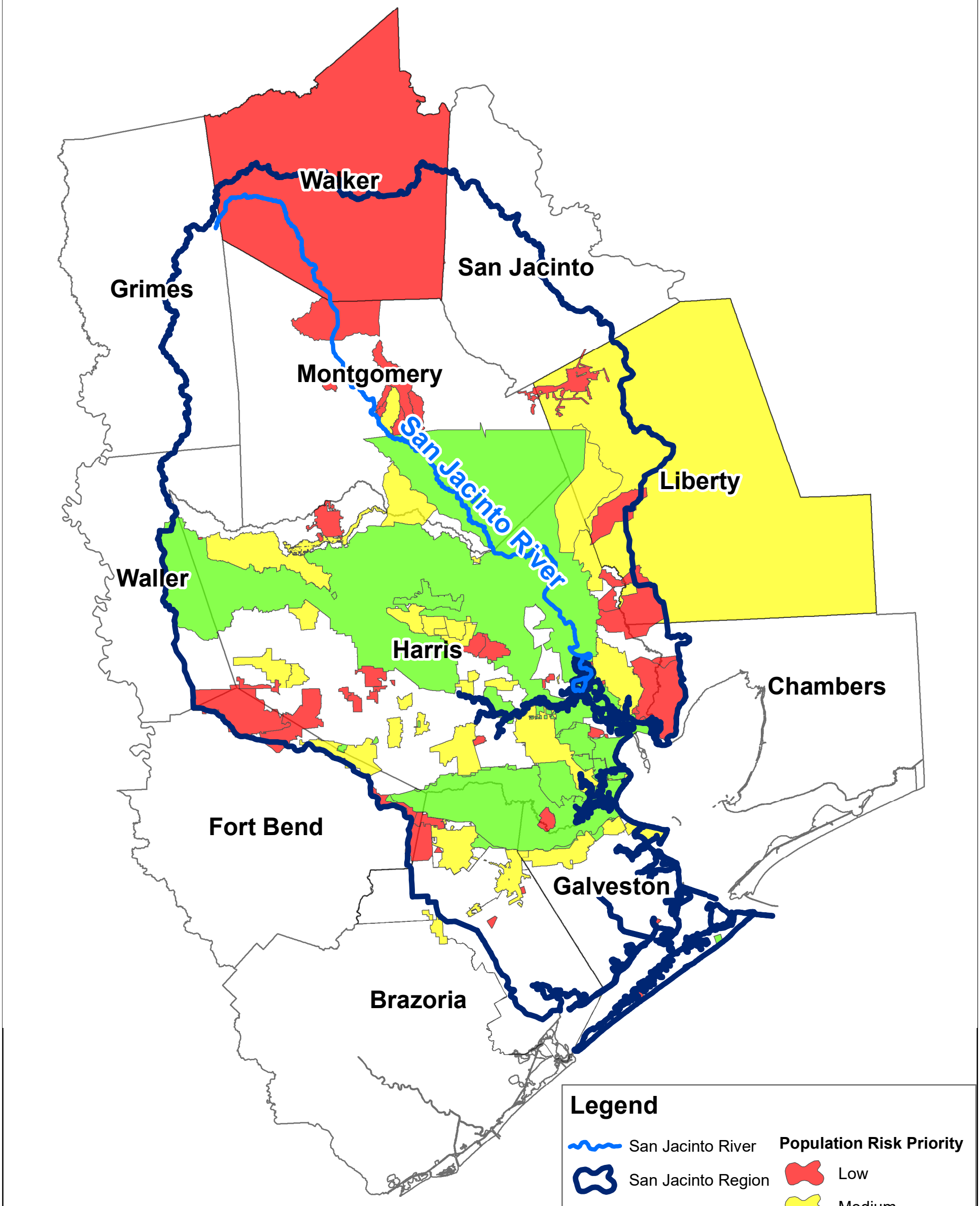


Exhibit 26	Date: Oct 2022 Scale: As Noted	FREESE AND NICHOLS 10497 TOWN AND COUNTRY WAY, SUITE 500 HOUSTON, TEXAS 77024	Prepared: CAA	Checked: ESA	Approved: JMT	SAN JACINTO REGIONAL FLOOD PLAN
		TORRES & ASSOCIATES, LLC ENGINEERS | SCIENTISTS | PROFESSIONALS				**FLOOD MANAGEMENT EVALUATIONS (FME) POPULATION AT RISK PRIORITY ALTERNATIVE 3**

APPENDIX 1

Revised DRAFT Prioritization Ranking of FMEs

Recommended Criteria	Priority Ranking		
	Low Priority (1)	Medium Priority (3)	High Priority (5)
Level of Effort	Effort may be outside of budget constraints ($150k to > $100k)	Reasonable Effort based on budget/schedule ($100k to > $30k)	Low Effort and can likely be completed quickly and efficiently (≤ $30k)
Model/Data Availability	No model/project data available	Some project data readily available	Necessary models and project data readily available
Known Flood Risk	Low Known Flood Risk	Medium Known Flood Risk	High Known Flood Risk
Number of Entities Benefitted	1-2	3	Greater than 3
Critical Facilities at risk	Less than Median	Above Median	Above Average
Structures at risk	Less than Median	Above Median	Above Average
Population at risk	Less than Median	Above Median	Above Average
Unique Sponsor	Another FME has higher priority for Sponsor	NA	Highest priority FME of Unique Sponsor
Nature Based Solutions	No Nature Based Solution considered in the evaluation	NA	Nature Based Solution(s) considered in the evaluation
Priority within Subwatershed (HUC10)	Another FME has higher priority for Subwatershed based on other criteria	NA	Highest priority FME of Subwatershed based on other criteria
Social Vulnerability Index (SVI)	Low (Less than 0.33)	Medium (0.33-0.66)	High (Greater than 0.66)
Mobility/Length of Inundated Roadway	Less than Median	Above Median	Above Average

NOTE: If sponsor concurrence is not received, FME may not be considered.

APPENDIX 2

Preliminary DRAFT Prioritization Ranking of FMEs

(For Reference Only)

Recommended Criteria	Priority Ranking		
	Low Priority (1)	Medium Priority (3)	High Priority (5)
Level of Effort	Significant Effort outside of budget constraints (>$150k)	Moderate Effort and may be slightly outside of budget constraints ($150k-$50k)	Reasonable Effort based on budget/schedule (<$50k)
Model/Data Availability	No model/project data available	Some project data readily available	Necessary models and project data readily available
Known Flood Risk	Low Known Flood Risk	Medium Known Flood Risk	High Known Flood Risk
Number of Entities Benefitted	NA	1-3	>3
Critical Facilities at risk	Less than Average	Above Average	Greater than Average + One Standard Deviation
Structures at risk	Less than Average	Above Average	Greater than Average + One Standard Deviation
Population at risk	Less than Average	Above Average	Greater than Average + One Standard Deviation
Unique Sponsor	Another FME has higher priority for Sponsor based on other criteria	NA	Highest priority FME of Unique Sponsor based on other criteria

NOTE: If sponsor concurrence is not received, FME may not be considered.

Appendix 03 – San Jacinto RFPG Technical Committee
Task 12 Survey Results (9/2/2022)

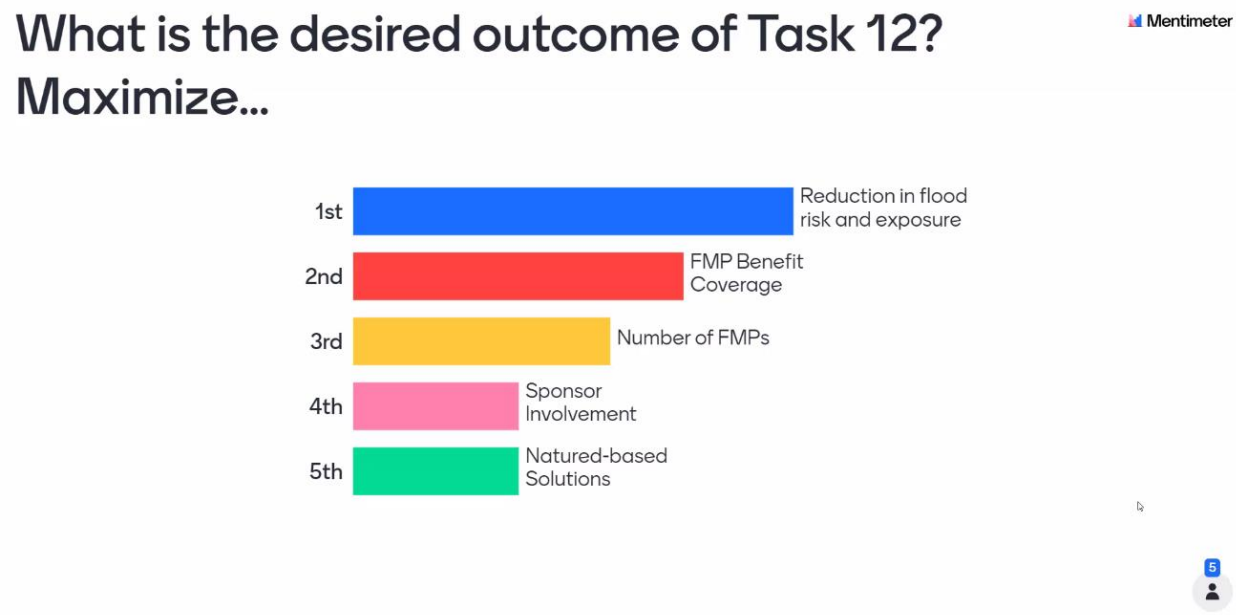


Figure 1: Survey Question #1 – What is the desired outcome of Task 12? Maximize…

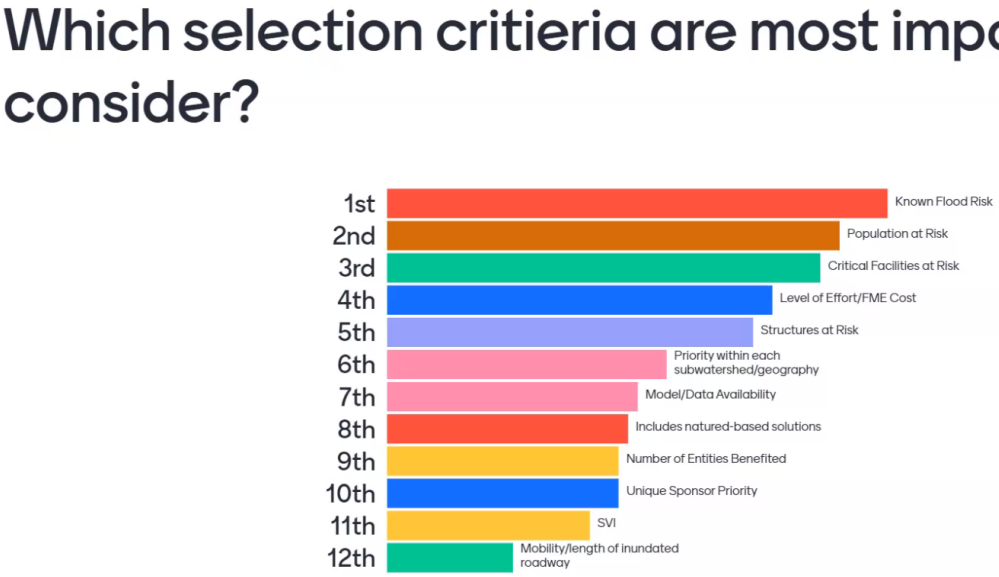


Figure 2: Survey Question #2 – Which selection criteria are most important to consider?

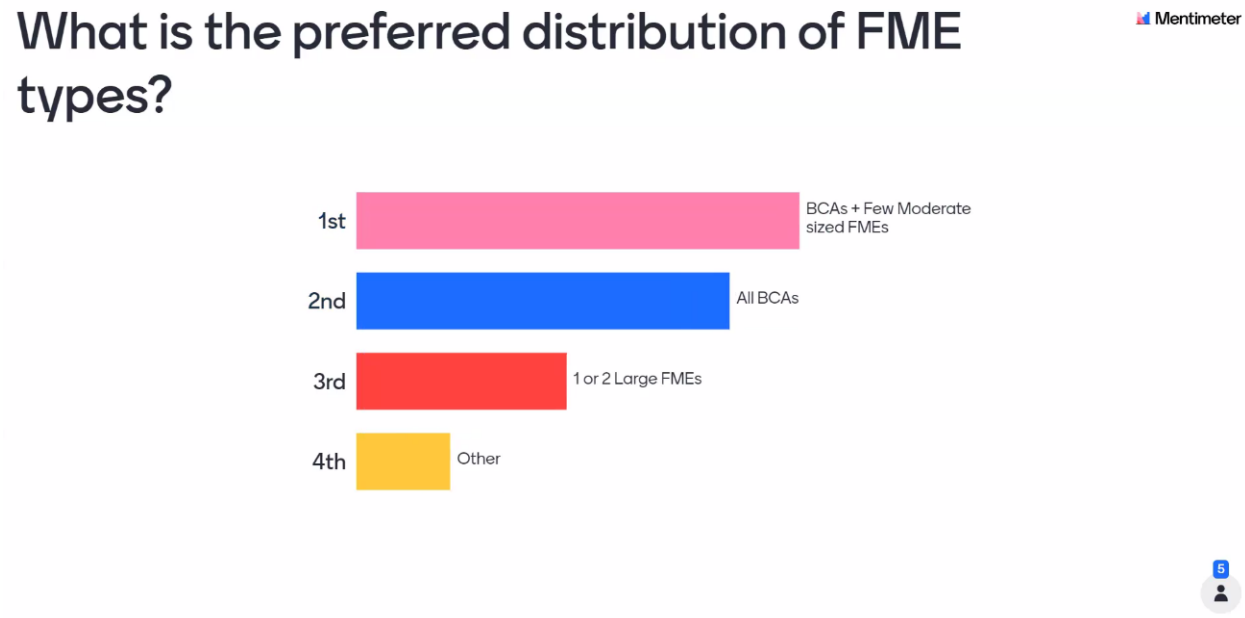


Figure 3: Survey Question #3 – What is the preferred distribution of FME types?

Appendix 04 – San Jacinto RFPG
Task 12 Survey Results (9/8/2022)

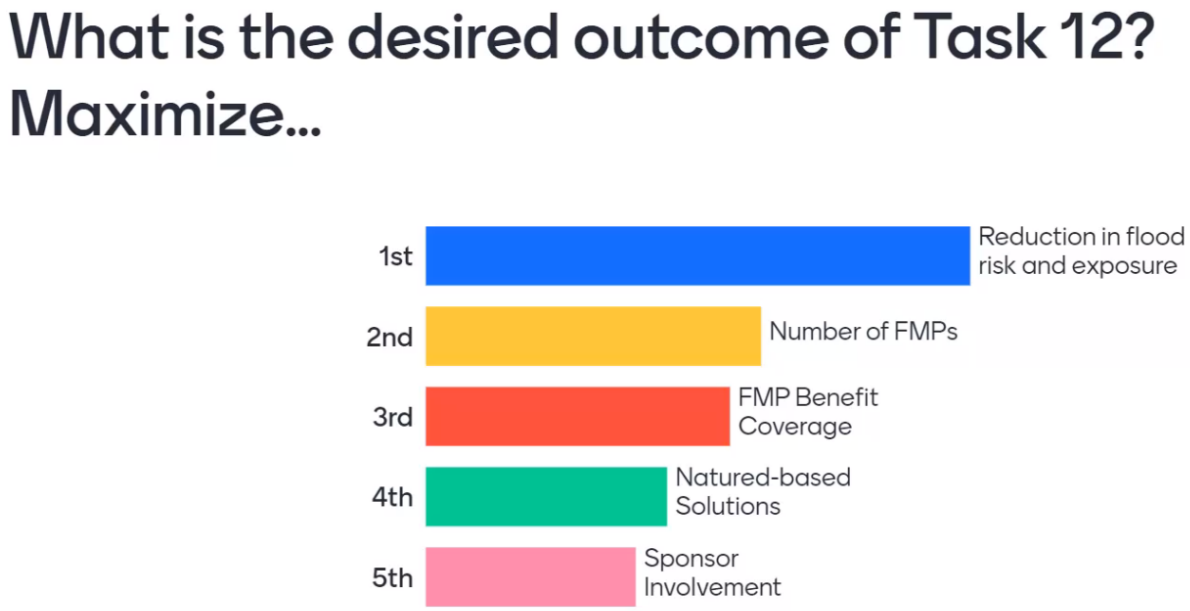


Figure 1: Survey Question #1 – What is the desired outcome of Task 12? Maximize…

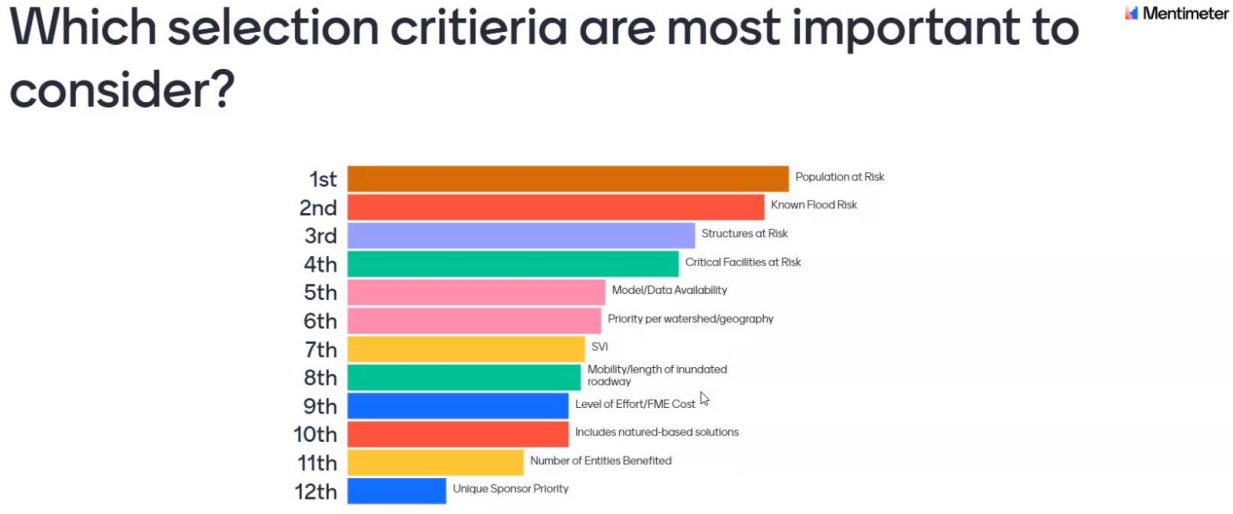


Figure 2: Survey Question #2 – Which selection criteria are most important to consider?

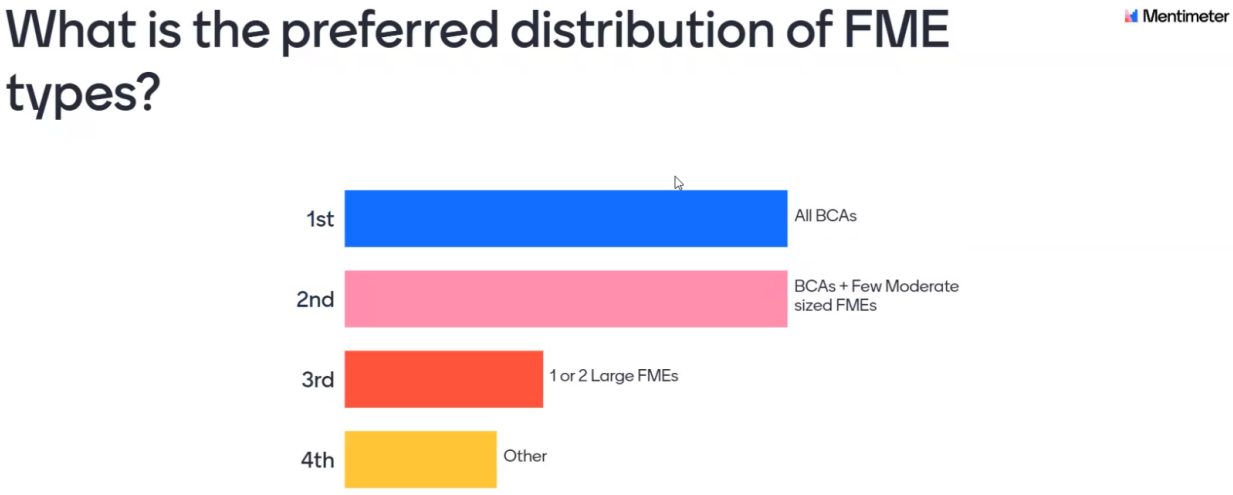


Figure 3: Survey Question #3 – What is the preferred distribution of FME types?

Appendix 05 – Results of Statistics for Prioritization Criteria

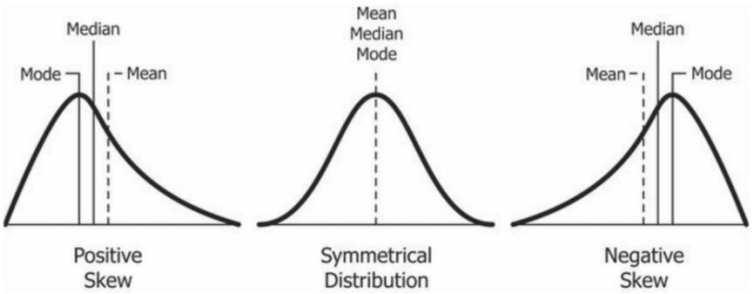
The statistical analysis was performed for all criteria to determine the boundaries of prioritization for the San Jacinto Regional Flood Planning Group (RFPG). The criteria included in the statistical analysis include the following: Level-of-Effort, Number of Entities Benefitted, Critical Facilities at Risk, Structures at Risk, Social Vulnerability Index (SVI), Mobility/Length of Inundated Roadway, and Population at Risk. In ***Appendix 05***, the statistical terms which are used for the analysis is explained and the result of statistical analysis is shown for each criterion.

Glossary of Statistical Terms

Mean	The sum of a list of numbers, divided by the total number of elements in the list.
Median	"Middle value" of a list. The smallest number such that at least half the numbers in the list are no greater than it. If the list has an odd number of entries, the median is the middle entry in the list after sorting the list into increasing order. If the list has an even number of entries, the median is the smaller of the two middle numbers after sorting. The median can be estimated from a histogram by finding the smallest number such that the area under the histogram to the left of that number is 50%.
Mode	For lists, the mode is a most frequent value. A list can have more than one mode. For histograms, a mode is a relative maximum.
Standard Deviation	A measure of the amount of variation or dispersion of a set of values. A low standard deviation indicates that the values tend to be close to the mean of the set, while a high standard deviation indicates that the values are spread out over a wider range.
Skewness	A measure of the asymmetry of the probability distribution of a real-valued random variable about its mean. The skewness value can be positive, zero, negative, or undefined.
Skewed Distribution	A distribution that is not symmetrical.

Positively skewed distribution (or right-skewed distribution) A type of distribution in which most values are clustered around the left tail of the distribution while the right tail of the distribution is longer. (Mean > Median > Mode)

Negatively skewed distribution (or left-skewed distribution) A type of distribution in which more values are concentrated on the right side of the distribution graph while the left tail of the distribution graph is longer. (Mode > Median > Mean)



Results of Statistical Analysis

The summary of statistical analysis results for each criterion are shown in ***Table 1*** and ***Table 2***. There are three commonly used metrics for the measures of central tendency: Mean, Median, and Mode. These values were calculated for each criterion as well as the standard deviation as a measure of spread (variability). Also, the skewness was checked as a measure of the asymmetry of the distribution. ***Table 1*** provides the results of the whole dataset, while ***Table 2*** shows the results when the most extreme outliers are removed from the dataset.

Table 1. Summary of Statistical Analysis for Each Criteria

Criteria	Mean	Median	Mode	STD	Skewness
Level-of-Effort	50,131	30,000	30,000	36,939	-
Number of Entities Benefitted	2.95	3.00	3.00	1.04	-
Critical Facilities at Risk	19	4	0	79	Positive
Structures at Risk	1,773	511	0	5,318	Positive
Social Vulnerability Index (SVI)	0.46	0.45	0.64	0.24	-
Mobility/Length of Inundated Roadway	33.5	9.9	9.9	99	Positive
Population at Risk	8,726	2,324	0	30,182	Positive

Appendix 06

FME One-Page Fact Sheets in order of Revised

DRAFT Prioritization List

Appendix 07

Revised DRAFT Prioritization

List of FMEs

Included as an Excel File

(Appendix07-RevisedDRAFTPrioritizationFMEList.xlsx)

Prioritized FME List

Rank	FME ID	Name	Description	Sponsor	Score
1	061000404	Halls Bayou - Planning, Right-Of-Way, Design and Construction of Halls Bayou Flood Risk Management	Develop BCA to become a FMP. Projects as part of the Halls Ahead Bond Implementation Program, could reduce the risk of flooding for more than 700 structures in an Atlas 14 1% rainfall event.	Harris County Flood Control District	28.6
2	061000438	Greens Bayou, Jackson Bayou, White Oak Bayou, Cypress Creek and San Jacinto River Areas Subdivision Drainage Mitigation Project	This proposed solution recommends establishing positive drainage and clear flow lines, which are expected to reduce the water surface elevation in the subdivision to mitigate the structural flood risk for all 1,445 beneficiaries.	Harris County	27.2
3	061000465	Catalina	Study to develop a BCR and other data needed to elevate project to a FMP. FIF application information unavailable.	City of Houston	26.2
4	061000453	Rivershire West - Grand Lake Creek Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	24.6
5	061000311	37th Street, Galveston, Drainage Project	Further study and FMP development of existing storm sewer system replacement and upgrades using the city's updated drainage criteria that now require a 25-year storm drainage capacity.	City of Galveston	24.2
6	061000187	Brays Bayou Restore Channel Conveyance Capacity Along D115-00-00	Further study of channel improvements from partnership project to restore channel conveyance including Atlas 14 rainfalls	Harris County Flood Control District	24
6	061000334	Goose Creek Flood Risk Reduction Phase 1	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. 1.65 Miles of Goose Creek channel modifications (Downstream of IH 10) with proposed detention basin "J"	Harris County Flood Control District	24
8	061000037	City of Alvin Flood Gauges	Study to identify areas where best to purchase additional flood gauges to be placed at bayous and key high water areas within City of Alvin.	City of Alvin	23.7
9	061000344	White Oak Bayou - Design and Construction of Woodland Trails Stormwater Detention Basin	Study to develop a BCA to become FMP. This stormwater detention basin compliments the federal project on White Oak Bayou which will reduce the risk of flooding for 1,800 structures in an Atlas 14 1% rainfall event.	Harris County Flood Control District	23.6
9	061000115	Stormwater Drainage Improvement- Nottingham ditch	Further study of proposed slope paving (concrete lining) improvements. Still in planning, consultant hired. Design complete and pending construction funding.	City of League City	23.6
11	061000437	Evaluation of Dredging of Channels that Exit Into Lake Houston	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. FIF application information unavailable.	Harris County	22.6
11	061000148	Liberty County Culvert Replacement Project	Increase culvert size in identified flood hazard problem areas within Liberty County.	Liberty County	22.6
13	061000468	Houston Sunnyside Area Flood Mitigation	Further study to develop into a FMP. Includes new storm sewer trunk systems on major thoroughfares & new or improved neighborhood storm sewer systems. Will also require construction of detention basins to mitigate the proposed improvements.	City of Houston	22.1
14	061000339	Willow Creek Watershed Plan - M120 Detention/Preservation Site	Study to develop BCA to become a FMP. Pursue purchase of property for regional detention, floodplain preservation, & habitat preservation.	Harris County Flood Control District	22
15	061000318	Fort Bend County Willow Fork Channel Improvements	Further study and BCA development. Combo of 11 different channel improvements were identified along Willow Fork and its tributaries as part of the Fort Bend County Master Drainage Plan that, when combined, will provide a 100-year level of service.	Fort Bend County Drainage District	21.9
16	061000440	Brazoria County Camp Mohawk County Park Development	Develop Benefit Cost Analysis in support of the purchase of approximately 160 acres of flood prone area adjacent to and surrounding Camp Mohawk County Park to be used as open space.	Brazoria County	21.8
17	061000370	City of Pasadena - Hurricane Harvey Drainage Mitigation Project 1	Further study to develop & elevate project into a FMP. Previously submitted by the Flood Infrastructure Fund (FIF) but was not approved at the time. Projects included in this application will be updated to include BCA and Atlas 14 rainfall consideration.	City of Pasadena	21.7
18	061000315	Addicks Reservoir - Right-Of-Way Acquisition, Design and Construction of Channel Conveyance Improvements, Bypass Channel, and Detention for South Mayde Creek	Study to develop a BCA needed for this project to become a FMP. This project is part of the South Mayde Creek Plan to reduce flood risk 70+ homes & reduce the rainfall event by 340+ acres in pre-Atlas 1% rainfall event.	Harris County Flood Control District	21
18	061000424	City of Friendswood - Clear Creek Inline & Offline Detention - Bay Area Blvd. Phase I	This project requires a BCA, and includes terraces, detention, and a trail network, will reduce water surface elevations on Clear Creek within the City of Friendswood and will make the Blackhawk Wastewater Treatment Facility more resilient.	City of Friendswood	21
20	061000415	City of Manvel Rogers Rd. Drainage Improvements	Further study Alleluia Trail Rogers Rd & All Roads off Rogers drainage improvements, including storm sewer rehabilitation and ditch deepening.	City of Manvel	20.7
21	061000403	Halls Bayou - Design and Construction of a Stormwater Detention Basin in Brock Park	Develop BCA to become a FMP. Provides additional stormwater detention in support of flood damage reduction as part of the Halls Ahead Bond Implementation Program. The project will be a partnership with the City of Houston.	Harris County Flood Control District	20.6
22	061000063	Mary's Creek Middle Segment	Further study including Benefit Cost Analysis of proposed channel modifications included in the City of Pearland master drainage plan.	City of Pearland	20.5
23	061000435	City of Southside Place - Auden Street Drainage Improvement Project	This project provides for design and construction of a new stormwater conveyance system for the City of Southside Place, that will have the capacity to covey a City standard storm event (2-year storm).	City of Southside Place	20.4

Prioritized FME List

Rank	FME ID	Name	Description	Sponsor	Score
24	061000365	Greens Bayou (P100-00-00) Mid-Reach Channel Conveyance Improvements From John F. Kennedy Blvd to Veterans Memorial Drive (Ultimate Project (Alternative 3))	Study to develop a BCR required for this project to become a FMP. 2,000 ac-ft proposed Hardy stormwater detention basin and channel conveyance improvements throughout the Green's Bayou Mid-Reach (From John F. Kennedy Blvd to Veterans Memorial Drive)	Harris County Flood Control District	20.2
25	061000335	Goose Creek Flood Risk Reduction Phase 2	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. 1.00 Mile of Goose Creek channel modifications (Upstream of IH 10) with proposed detention basin "I"	Harris County Flood Control District	20
25	061000336	Goose Creek Flood Risk Reduction Phase 3	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Local channel modifications and crossing structure improvements along O117 and O126	Harris County Flood Control District	20
25	061000396	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-21-00	Develop BCA to become a FMP. Part of Halls Ahead Bond Implementation Program, could reduce flood risk for 60+ structures & floodplain by 40+ acres.	Harris County Flood Control District	20
28	061000328	Brays Bayou - Keegans Bayou (D118-00-00) Flood Risk Reduction	Study to develop a BCR required for this project to become a FMP. A project could reduce the risk flooding for over 2,500 structures and could reduce the frequency and duration of flooding along about 100 miles of	Harris County Flood Control District	19.6
28	061000422	Danubina Drainage Improvements	Study to further this project and develop an FMP. This CDBG-MIT application involves the installation and construction of various storm sewer and detention infrastructure.	City of Baytown	19.6
30	061000355	Halls Bayou Drainage Project Bond C-01	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. FIF application information unavailable.	Harris County Flood Control District	19.5
30	061000399	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-25-00 &	Study to develop a BCR required for this project to become a FMP. Would reduce flood risk for 600+ structures. Facilitates future drainage projects by more outfall depth.	Harris County Flood Control District	19.5
30	061000400	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-27-00	Develop BCA to become a FMP. Part of Halls Ahead Bond Implementation Program, could reduce flood risk for 150+ structures, size of the floodplain by 90+ acres, frequency & duration of flooding along 3+ miles of roadway in an Atlas 14 1% event.	Harris County Flood Control District	19.5
33	061000327	Blalock Road Drainage Improvement Project	Study to further the proposed project that includes increasing the capacity of the drainage system with a 9'x9' RCB to replace dual 36-inch RCP along the east side of the road and an open ditch with driveway culverts on the west side of the road.	City of Piney Point Village	19
34	061000426	Sawdust Road Bridge Elevation Project	Further study of study, design, elevation, & replacement of the Sawdust Road Bridge to mitigate the risks associated with riverine flooding for the citizens residing in the Grogan's Point and Timberlakes - Timberridge Subdivisions.	Montgomery County	18.7
35	061000353	TC Jester Detention Basin	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Construction of a 25 acre stormwater detention basin. Estimated construction cost is $10,047,910. this application is requesting $10,000,000.00 of these funds.	Harris County Flood Control District	18.6
35	061000356	Westador Stormwater Detention Basin	Study to develop a BCR required for this project to become a FMP. The Westador Detention Basin is a proposed detention mitigation project within the Cypress Creek Watershed and located south of Cypress Creek and east and west of K141-00-00.	Harris County Flood Control District	18.6
35	061000360	G103-38-00 (Kingwood Diversion Ditch)	Study to develop a BCR required for this to become a FMP. Improvements to the Kingwood Diversion Ditch include channel modifications, flow diversion from Bens Branch, bridge replacements, as well as a new outfall to the West Fork San Jacinto River.	Harris County Flood Control District	18.6
35	061000361	G103-80-03.1B (Taylor Gully)	Study to develop a BCR required for this project to become a FMP. Improvements to Taylor Gully include two miles of channel conveyance improvements to the upper limits of Taylor Gully and a concrete low flow structure.	Harris County Flood Control District	18.6
35	061000130	Hostetter and Gourd Creek Bridges Elevation Evaluation	Further study to elevate and install culverts on Hostetter and Gourd Creek roadways to prevent flooding and/or flood damage on roadway.	Walker County	18.6
40	061000186	Brays Bayou - Poor Farm Ditch	Study to develop a BCR and elevate project to a FMP. Further study of channel improvements from partnership project to restore channel conveyanve including Atlas 14 rainfalls	Harris County Flood Control District	18.5
40	061000329	I100-WP06 for Vince Bayou Watershed Planning Project	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Right-of-way acquisition, design, and construction of a stormwater detention basin and schannel widening near Strawberry Road and Young Street	Harris County	18.5
40	061000330	I100-WP10 for Vince Bayou Watershed Planning Project	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Right-of-way acquisition, Design, and Consruction of Two Stormwater Detention Basins near Westside Dr. and Westside. Ct.	Harris County	18.5
40	061000331	I100-WP07 for Vince Bayou Watershed Planning Project	Study to develop a BCR needed for this project to become a FMP. Pasadena (CIP) Street Lowering (Various). Right-of-way acuisition, Design, and Consruction of Stormwaters Detention Basin and construction of Culverts near Pasadena Blvd.	Harris County	18.5
40	061000332	I100-WP11 for Vince Bayou Watershed Planning Project	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Right-of-way acquisition, Design, and Consruction of Stormwater Detention Basins near Spencer Hwy. and Tulip Street	Harris County	18.5

Prioritized FME List

Rank	FME ID	Name	Description	Sponsor	Score
40	061000434	Houston Kashmere Gardens Area Flood Mitigation	Further study to develop this project into a FMP. The project includes improvements to storm sewer, roadside ditch systems, culverts, sewer inlets, and the construction of detention basins.	City of Houston	18.5
40	061000031	Shoreacres Drainage Assessment	Further analysis necessary to determine downstream impacts and whether any additional volume in A104-11-00 would be available during a coincident event on Taylor Bayou.	City of Shoreacres	18.5
40	061000461	Rush Creek Lake - Lake Conroe Estates Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	18.5
48	061000324	Barker Reservoir Flood Risk Reduction and Park Project	Study to further the proposed project. FIF application information unavailable.	Willow Fork Drainage District	18.4
49	061000421	Clear Creek - Hughes Stormwater Detention (SWD) Basin	Develop BCA to become a FMP. Project identified in Clear Creek Federal Project study for flood management but did not yield high enough cost benefit ratio for Federal funding. Therefore, Harris and Galveston County have decided to fund this effort.	Harris County Flood Control District	18.2
50	061000357	Cypress Creek Implementation Plan - Various Detention Sites	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. The Implementation Plan identifies that approximately 14,000 acre-feet of stormwater detention volume across 23 different sites reducing flooding risk.	Harris County Flood Control District	18.1
50	061000407	Luce Bayou (Z100-00-00-P026) Bypass Channel	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Construction of channel bypass to provide Luce main stem upstream and local overland flooding relief	Harris County Flood Control District	18.1
50	061000412	Luce Bayou (Z100-00-00-P026) Channelization	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Construction of channel improvements along Luce main stem	Harris County Flood Control District	18.1
50	061000413	Luce Bayou (Z100-00-00-P026) Upstream Detention	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Construction of regional detention upstream of Luce Bayou, including acquiring open land north of Harris County	Harris County Flood Control District	18.1
50	061000121	Widen Drainage Systems and Culverts in City of Kemah	Further study to widen drainage systems and increase culvert size to accommodate increased water flows. Coordinate efforts with water district	City of Kemah	18.1
55	061000358	Little Cypress Creek - Management, Right-of-Way Acquisition, Design and Construction of the Little Cypress Creek Frontier Program	Study to develop a BCR required for this to become a FMP. The Little Cypress Creek Frontier program will reduce the risk of flooding and include detention, sediment control, vegetation management and other flood risk management projects.	Harris County Flood Control District	18
55	061000405	Hunting Bayou Wallisville Outfall (H103-00-00) - Gellhorn Drive	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Diversion channel expansion for Gellhorn Drive flood reductions.	Harris County Flood Control District	18
55	061000406	Hunting Bayou Wallisville Outfall (H103-00-00) - Denver Harbor	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Denver Harbor drainage system improvements.	Harris County Flood Control District	18
55	061000153	Downtown Cleveland Drainage Line Installation	Further study of proposed larger drainage lines in downtown Cleveland to reduce flooding.	City of Cleveland	18
59	061000326	I100-WP01 Vince Bayou Watershed Planning Project Recommendation	Study to develop a BCR required for this project to become a FMP. Alt-6 Detention basin and channel widening near Strawberry road on left bank of Vince Bayou.	Harris County Flood Control District	17.9
59	061000354	Halls Bayou Drainage Project Bond C-26 & C-27	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. FIF application information unavailable.	Harris County Flood Control District	17.9
59	061000397	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-23-00 and	Study to develop a BCR required for this project to become a FMP. Would reduce flood risk for 300+ structures, size of floodplain by 200+ acres. Facilitates future drainage projects by more outfall depth.	Harris County Flood Control District	17.9
62	061000371	City of Pasadena - Hurricane Harvey Drainage Mitigation Project 2	Further study to develop & elevate project into a FMP. Previously submitted by the Flood Infrastructure Fund (FIF) but was not approved at the time. Projects included in this application will be updated to include BCA and Atlas 14 rainfall consideration.	City of Pasadena	17.7
62	061000372	City of Pasadena - Hurricane Harvey Drainage Mitigation Project 3	Further study to develop & elevate project into a FMP. Previously submitted by the Flood Infrastructure Fund (FIF) but was not approved at the time. Projects included in this application will be updated to include BCA and Atlas 14 rainfall consideration.	City of Pasadena	17.7
62	061000467	Middle Armand Bayou Protection Project	Further study to develop this project into a FMP. FIF application information unavailable.	City of Pasadena	17.7
65	061000156	Flood Gates Evaluation at Walker County Annex #2	Evaluation of proposed removable facility flood gates at Walker County Annex #2	Walker County	17.6
65	061000320	Warren Lake and Dam Retrofit	Further study of Retrofit dam to improve detention of flood & storm water runoff, new 137.3 ac wetlands complex added of storage capacity & conversion of fields to tallgrass prairies to add approximately 856 ac-ft of total storage during rainfall events.	Coastal Prarie Conservancy	17.6
67	061000389	White Oak - SPT and E116 (E116-00-00) Improvements : PA01 thru PA-05	Study to develop a Benefit Cost Analysis needed for these projects to become a FMP. The "E116-00-00 Flood Reduction Feasibilty Study" was completed in March 2022 and provides a decrease riverine and urban flood risk in the area.	Harris County Flood Control District	17.5
67	061000419	Houston Huntington Village Area Flood Mitigation	Further study to develop this project into a FMP. The project includes storm sewer improvements in the Huntington Village neighborhood to reduce structural flood loss.	City of Houston	17.5
67	061000433	Spring Shadows South	Study to develop a Benefit Cost Analysis needed to elevate project to a FMP. FIF application information unavailable.	City of Houston	17.5

Prioritized FME List

Rank	FME ID	Name	Description	Sponsor	Score
67	061000373	City of Tomball Drainage Improvements	Study to the the drainage project for the City of Tomball is comprised of building storm sewer systems and channel conveyance to enable flood waters to be removed from portions of the city bounded by Holderrieth Road, SH 249, UPRR, and FM 2920.	City of Tomball	17.5
71	061000005	Missouri City Estates Drainage Improvements	Further study of proposed flood risk reduction project that includes drainage improvements to Missouri City Estates.	City of Stafford	17.4
72	061000145	Jamaica Cove Rd. Survey	Engineering assessment needed to determine if elevating the road would reduce future flooding impacts.	City of Jamaica Beach	17.2
73	061000367	Cedar Bayou Flood Risk Reduction Study - Property Acquisition in segment from SH 146 to Galveston Bay	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Property Acquisition in segment from SH 146 to Galveston Bay along Cedar Bayou	Harris County Flood Control District	16.9
74	061000436	Unincorporated Areas of Bacliff and San Leon Roadside Ditches & Driveway Culverts Improvements	Further study of this unfunded CDBG-MIT project consists of various areas of roadside ditch and driveway culvert improvements in Bacliff and San Leon.	City of Galveston	16.8
75	061000455	Valley - Stewarts Creek Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	16.6
75	061000456	Hunnington - Stewarts Creek Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	16.6
75	061000457	Avenue M - Stewarts Creek Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	16.6
75	061000458	South 3rd - Stewarts Creek Watershed	Develop a benefits cost analysis in support of this project identied in the City of Conroe Master Drainage Plan.	City of Conroe	16.6
79	061000205	Greens Bayou - P142-00-00	Further study of Flood Risk Reduction need identified through the HCFCD 'Watershed Planning Tool' to determine channel modifications needed to restore/improve channel conveyance including Atlas 14 rainfall	Harris County Flood Control District	16.5
79	061000312	Addicks Reservoir - Right-Of-Way Acquisition, Design and Construction of a Stormwater Detention Basin on South Mayde Creek	Develop BCA to become a FMP. This project is part of the South Mayde Creek Plan that could reduce the risk of flooding for more than 70 homes and reduce the rainfall event by more than 340 acres in a pre-Atlas 1% rainfall event.	Harris County Flood Control District	16.5
79	061000313	Addicks Reservoir - Design and Construction of Dinner Creek Stormwater Detention Basin	Develop BCA to become a FMP. Project would provide additional stormwater detention in support of flood damage reduction and could reduce the risk of flooding for approximately 30 multi-family structures in Addicks Reservoir Watershed.	Harris County Flood Control District	16.5
79	061000441	Addicks Reservoir - Design and Construction of a Bridge Replacement for Greenhouse Road at South Mayde Creek	Develop BCA to become a FMP. This project is part of the South Mayde Creek Plan that could reduce the risk of flooding for more than 70 homes and reduce the rainfall event by more than 340 acres in a pre-Atlas 1% rainfall event.	Harris County Flood Control District	16.5
79	061000384	Houston Braeburn Glen Area Flood Mitigation	Further study of a proposed project that includes upsizing of the existing stormwater system with new pipes, inlets, and manholes. Lateral improvement will be completed on Mahoning Drive and Valley View Lane.	City of Houston	16.5
79	061000376	Cedar Bayou Flood Risk Reduction Study - Channel improvements from US 90 to FM 1942	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Cedar Bayou channel improvements from US 90 to FM 1942	Harris County Flood Control District	16.5
79	061000102	Raise Road Surfaces in City of Plum Grove	Further evaluation of road surface elevation.	City of Plum Grove	16.5
86	061000333	Carpenters Planing Study Cloverleaf Community Flood Risk Reduction Project (Phase 1 and 2)	Study to develop a BCR required for this project to become a FMP. Drainage system upgrade using combination of 9'x7' RCB spanning 3,000' and a 109 acre-feet detention facility providing drainage relief for this portion of the Cloverleaf Community.	Harris County Flood Control District	16.4
86	061000362	Goose Creek O119-00-00-P001 (Alt 2A1)	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Construction of channel modifications and in-line stormwater detention along O119 to facilitate Harris County drainage improvements in Highland Mobile Estates	Harris County Flood Control District	16.4
86	061000363	Goose Creek O119-00-00-P001 (Alt 2A3)	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Secondary option for the recommended alternative with less benefits and project cost	Harris County Flood Control District	16.4
86	061000394	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-08-00	Develop BCA to become a FMP. This project could reduce the risk of flooding for over 210 structures and could reduce the 1% rainfall event for over 170 acres as part of the Halls Ahead Bond Implementation Program.	Harris County Flood Control District	16.4
86	061000395	Halls Bayou - Right-Of-Way, Design, and Construction of Channel Conveyance Improvements on P118-09-00	Develop BCA to become a FMP. Part of Halls Ahead Bond Implementation Program, could reduce flood risk for 80+ structures, size of the floodplain by 30+ acres & frequency & duration of flooding of up to half a mile of roadway in an Atlas 14 1% event.	Harris County Flood Control District	16.4
86	061000417	Houston Fifth Area Flood Mitigation	Further study to develop this project into a FMP. This unfunded CDBG-MIT application involves installing various storm sewer infrastructure in the Fifth Ward within the City of Houston.	City of Houston	16.4
86	061000418	Houston Port Area Flood Mitigation	Further study to develop this project into a FMP. The project includes storm sewer improvements on nearly every street in the Pleasantville neighborhood to improve conveyance capacity and construction of a detention basin.	City of Houston	16.4
93	061000054	Cannon Ditch Segment 2	Further study including Benefit Cost Analysis of proposed channel modifications included in the City of Pearland master drainage plan.	City of Pearland	16.3
93	061000343	Galveston Bay Watershed Plan- PA01 (N+6) Channel & Crossing Improvements	Develop BCA to become FMP. Channel deepening from N Broadway St to N Utah St, convert open channel segment to closed conduit w/ 8'x5' concrete boxes b/w N Utah St & Main St, replace concrete pipe w/ dual 8'x5' concrete box culvert outfall to F212.	Harris County Flood Control District	16.3

Prioritized FME List

Rank	FME ID	Name	Description	Sponsor	Score
95	061000338	Willow Creek Watershed Plan- Immediate: Selective Clearing BNRR to Mouth	Study to develop a BCR required for this project to become a FMP. Selective clearing from BNRR to mouth to increase riverine storm water conveyance, maintain tree canopy & veg. diversity, minimize impact on riparian & uplands habitats.	Harris County Flood Control District	16
95	061000340	Willow Creek Watershed Plan- FM2920 Stormwater Detention Basin	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Proposed 826 acre-feet detention basin located near FM 2920 crossing of Willow Creek	Harris County Flood Control District	16
95	061000341	Willow Creek Watershed Plan- Kuykendahl Basin	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Proposed 727 acre-feet detention basin located near Kuykendahl Road crossing of Willow Creek	Harris County Flood Control District	16
95	061000342	Willow Creek Watershed Plan- M121 Basin Stormwater Detention Basin	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Proposed 1010 acre-feet detention basin located near M121 tributary	Harris County Flood Control District	16
95	061000322	Jackson Bayou Watershed Planning Project- Immediate: First Street Crossing Mitigation	Develop BCA to become a FMP. Priority ranking #1, 0.5 mile upstream along Jackson Bayou identified to fulfill mitigation efforts. Culvert upsizing recommended at First Street. Improvements produced need or 32.4 acre-feet of detention.	Harris County Flood Control District	16
95	061000366	Greens Bayou - Planning, Right-of-Way Acquisition, Design and Construction of Channel Conveyance Improvements	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Potential federal funded project, the risk of flooding could be reduced for approximately 100 structures in a pre-Atlas 1% rainfall event.	Harris County Flood Control District	16
95	061000162	Elevation of Bridge Road in City of North Cleveland	Further study to elevate Bridge road	City of North Cleveland	16
102	061000364	Sims Bayou C116 Storm Sewer Improvement (C116-00-00-P001) From Mykawa Road to Telephone Road	Study to develop a BCR required for this project to become a FMP. To increase the system C116 capacity, Alternative 1 adds capacity to the C116 system trunkline through an additional parallel trunkline, from Dixie Drive to Sims Bayou.	Harris County Flood Control District	15.9
102	061000374	Cedar Bayou Flood Risk Reduction Study - Q128 Channel Improvements from US 90 to Q100 Confluence	Study to develop a Benefit Cost Analysis needed for this project to become a FMP. Cedar Bayou channel improvements from US 90 to Confluence with Q100	Harris County Flood Control District	15.9

Appendix 5-1:
Map 19 - Recommended FMEs

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.

Huntsville
Walker CO
West Fork San Jacinto River
Grimes CO
San Jacinto CO
Lake Baygall
East Fork San Jacinto River
Lewis Creek Reservoir
Lake Paula
Conroe
Montgomery CO
The Woodlands
Liberty CO
Spring
Lake Houston
Humble
Lake Houston
Cypress Farms Lake
Number 1
Hegar Lake
Waller CO
Harris CO
Sheldon Reservoir
Lake Houston
East Fork San Jacinto River
Highlands Reservoir
Chambers CO
Addicks Reservoir
Katy
Houston
Jacinto City
Lynchburg Reservoir
Baytown
Tucker Lake
Barker Reservoir
Pasadena
La Porte
Stafford
Sugar Land
Missouri City
Pearland
Fort Bend CO
Friendswood
League City
Galveston County Industrial Water Reservoir
Alvin
Galveston CO
Texas City
La Marque
Mustang Lake East
Galveston
Brazoria CO
Needville
Big Creek
Fort Bend 80 ft

19 30 75 156 190 150 59 146 45 105 242 321 69 99 249 290 8 90 610 225 6 96 3 288 87 168 275 36

0 3 6 12 Miles

Legend

- County Boundary
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update*
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update*
- Modern Mapping

Watershed Planning
- Mapping Requires Update*
- Modern Mapping

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

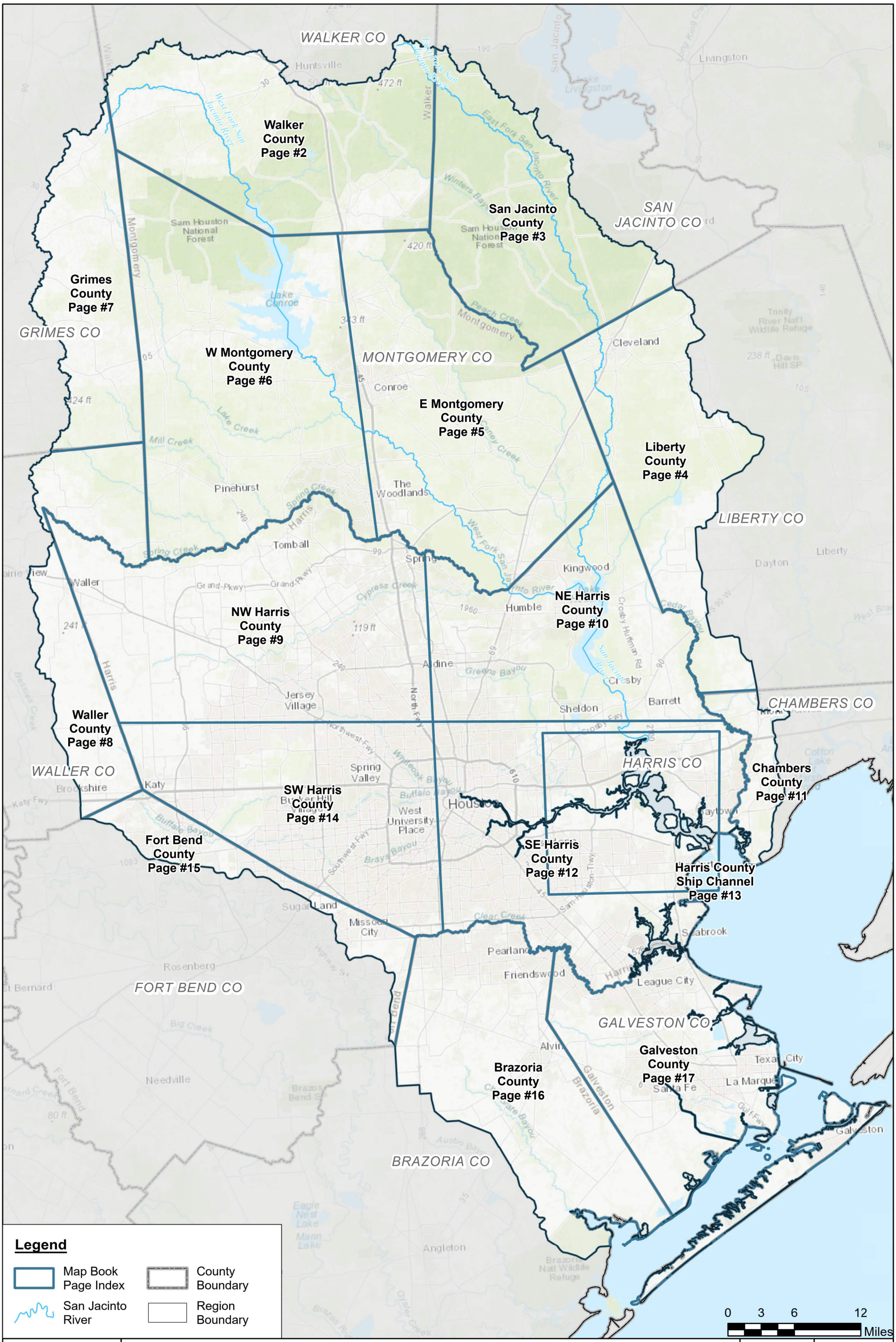
San Jacinto Regional Flood Plan

Recommended Flood Management Evaluations

N W E S

MAP 19
Overview

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert



SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

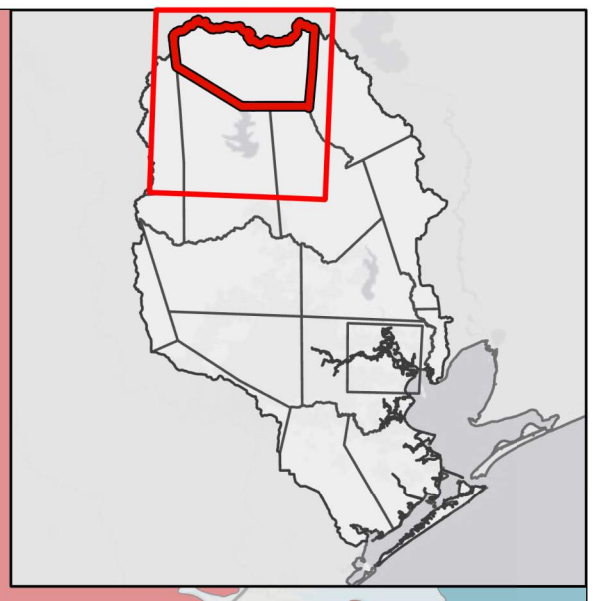
Recommended Flood Management Evaluations - Index

N W E S

MAP 19
FIGURE 1 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Midway
0021
Larrison Creek
MADISON
Caney Creek
19
190
Huntsville
75
30
West Fork San Jacinto River
150
Lake Paula
Lewis Creek Reservoir
45
105
Conroe

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1.25 2.5 5 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

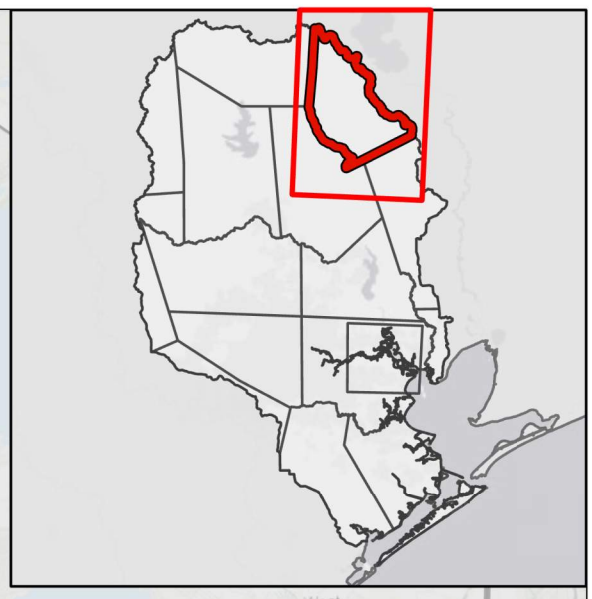
Recommended Flood Management Evaluations - Walker

N W E S

MAP 19
FIGURE 2 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Livingston
Omaha
POLK
West Livingston
Lake Livingston
East Fork San Jacinto River
Lake Baygall
Morg
Goodri

190
156
150
59
69
105
321

0 1 2 4 Miles

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

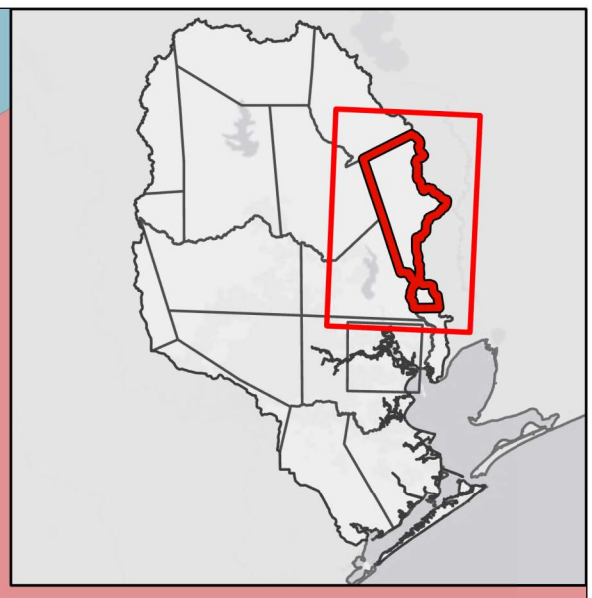
Recommended Flood Management Evaluations - San Jacinto

N W E S

MAP 19
FIGURE 3 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Lake Baygall
59
105
242
321
99
69
90
146
Humble
West Fork San Jacinto River
East Fork San Jacinto River
San Jacinto River
Lake Houston
Lake Houston
Lake Houston
Lake Houston
Lake Houston
Lake Houston

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1 2 4 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

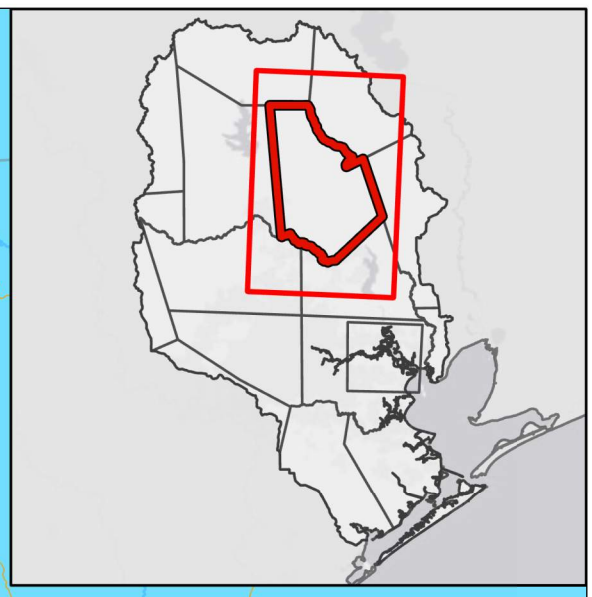
Recommended Flood Management Evaluations - Liberty

N W E S

MAP 19
FIGURE 4 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Lake Paula
Lewis Creek Reservoir
Lake Paula
Lake Baygall
75
59
321
105
Conroe
45
242
The Woodlands
99
Spring
69
Humble
West Fork San Jacinto River
East Fork San Jacinto River
Lake Houston
Lake Houston
Lake Houston
Lake Houston

0 1 2 4 Miles

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

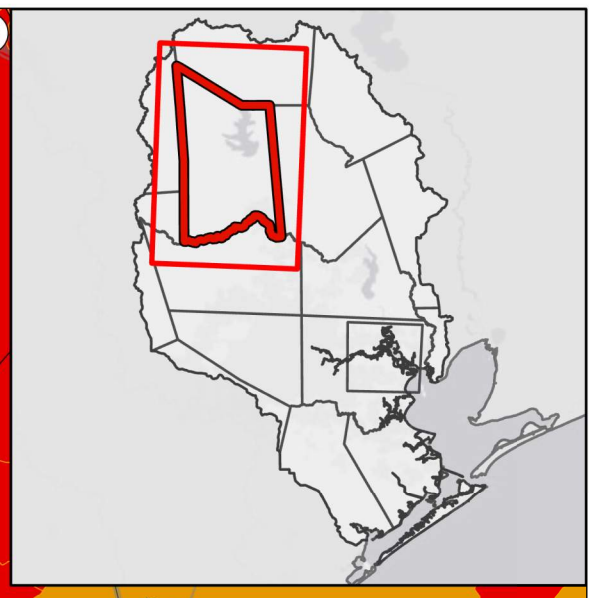
Recommended Flood Management Evaluations - E Montgomery

N W E S

MAP 19
FIGURE 5 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



West Fork San Jacinto River
Lake Paula
Lewis Creek Reservoir
Conroe
The Woodlands
19
30
150
75
45
105
242
249
99

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1 2 4 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Evaluations - W Montgomery

N W E S

MAP 19
FIGURE 6 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
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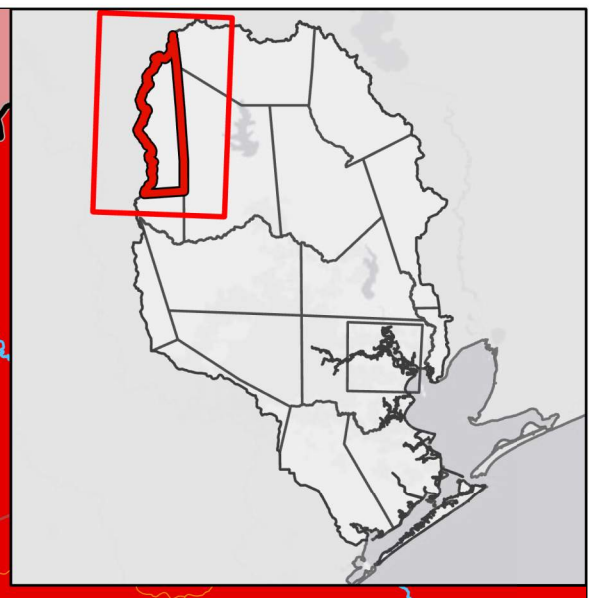


30

90

105

6

Lake Paula

0 1 2 4
Miles

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

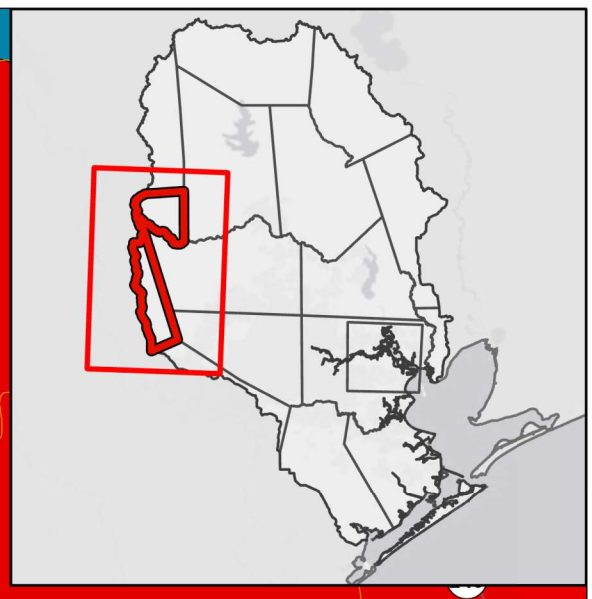
Recommended Flood Management Evaluations - Grimes

N
W E
S

MAP 19
FIGURE 7 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



6
290
0159
99
90
10
OIL FIELD
AUSTIN
Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Katy
Tucker Lake
Barker Reservoir
0 1 2 4 Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

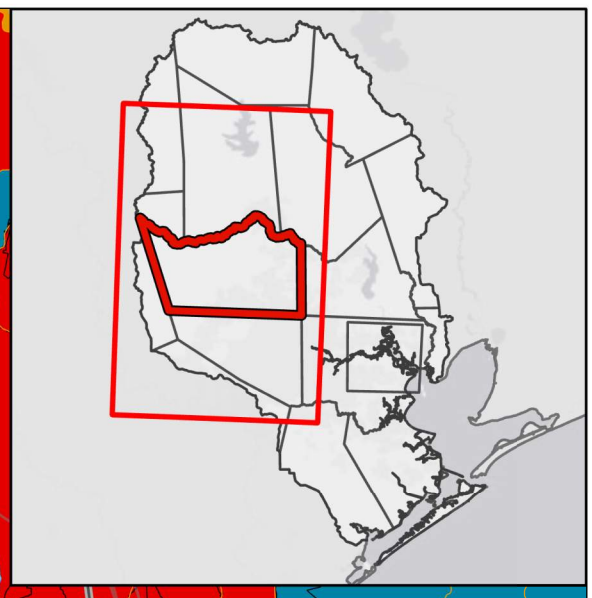
Recommended Flood Management Evaluations - Waller

N W E S

MAP 19
FIGURE 8 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Lewis Creek Reservoir
Lake Paula
105
242
The Woodlands
West Fork San Jacinto River
45
99
Spring
290
249
Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Katy
Houston
90
10
610
Tucker Lake
Barker Reservoir
Simonton
6
Stafford
69
Sugar Land
0 1.5 3 6
Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

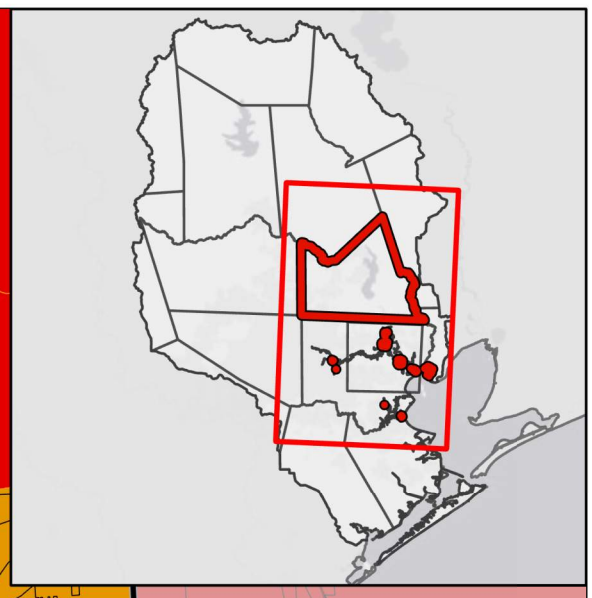
Recommended Flood Management Evaluations - NW Harris

N W E S

MAP 19
FIGURE 9 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



West Fork San Jacinto River
East Fork San Jacinto River
Lake Houston
Sheldon Reservoir
Highlands Reservoir
Lynchburg Reservoir
San Jacinto River
Spring
Humble
Houston
Jacinto City
Baytown
La Porte
Pasadena
Pearland
69
242
99
610
290
249
45
225
288
8
3
90
146
10

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1.25 2.5 5 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

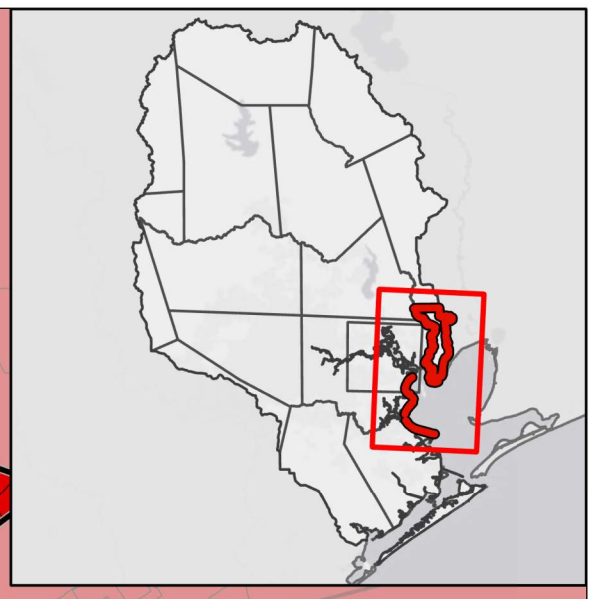
Recommended Flood Management Evaluations - NE Harris

N W E S

MAP 19
FIGURE 10 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



146
90
10
99
225
45
96

San Jacinto River
Highlands Reservoir
Lynchburg Reservoir
Baytown
La Porte

0 0.75 1.5 3 Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

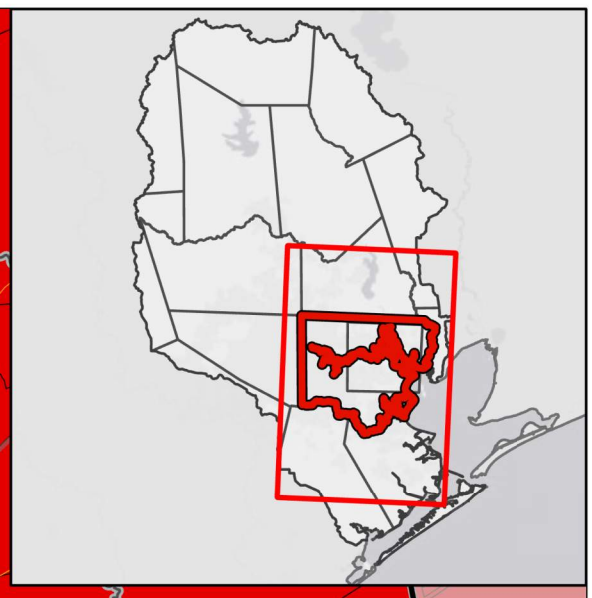
Recommended Flood Management Evaluations - Chambers

N W E S

MAP 19
FIGURE 11 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Lake Houston
Lake Houston
Lake Houston
Lake Houston
Lake Houston
Lake Houston
Humble
69
Lake Houston
249
Sheldon Reservoir
Highlands Reservoir
10
99
Lynchburg Reservoir
Houston
Jacinto City
Baytown
610
225
45
La Porte
Pasadena
8
Pearland
35
3
Friendswood
96
League City
Galveston County Industrial Water Reservoir
Texas City
6
Alvin
La Marque
0 1.25 2.5 5 Miles

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

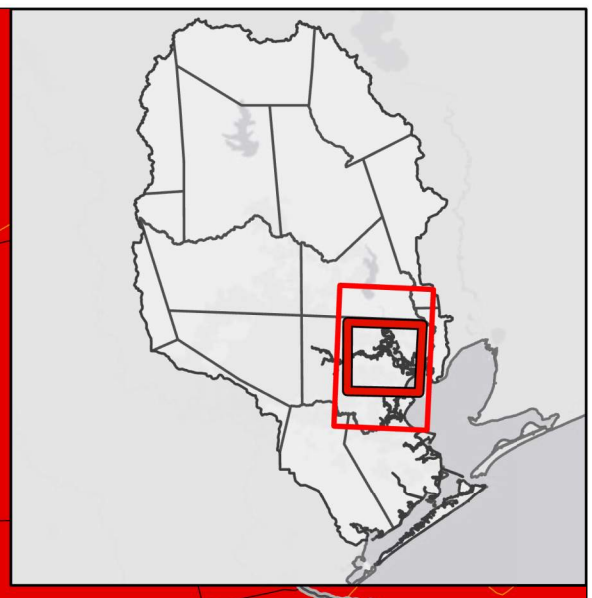
Recommended Flood Management Evaluations - SE Harris

N W E S

MAP 19
FIGURE 12 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Lake Houston

Lake Houston

San Jacinto River

Sheldon Reservoir

8

90

Highlands Reservoir

10

Lynchburg Reservoir

Jacinto City

Baytown

99

225

La Porte

Pasadena

146

45

3

0 0.75 1.5 3 Miles

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

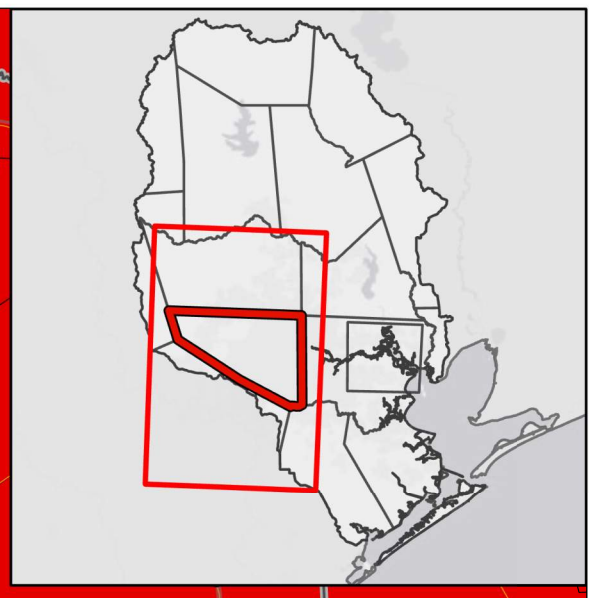
Recommended Flood Management Evaluations - Ship Channel

N W E S

MAP 19
FIGURE 13 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Tucker Lake
Barker Reservoir
Katy
Houston
Stafford
Sugar Land
Missouri City
Pecan Grove
Richmond
Rosenberg
Pleak
Smithers Lake
Thompsons
OIL CREEK OIL FIELD
THOMPSONS OIL FIELD
Fairchilds
249
99
290
610
90
10
6
69
8
59
36

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1.25 2.5 5 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

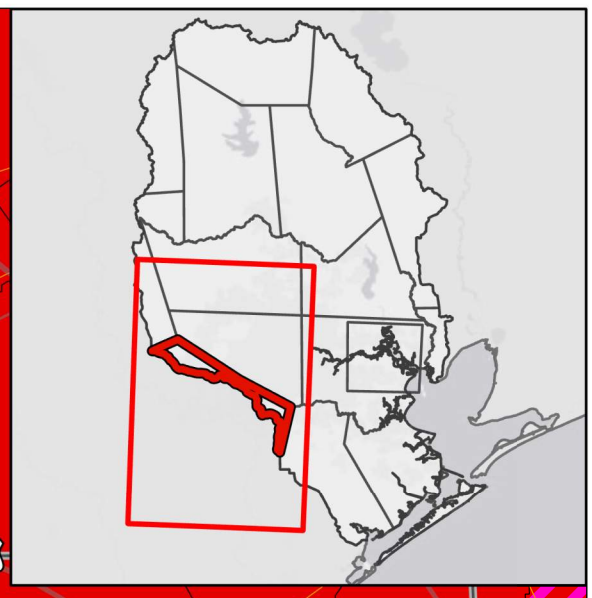
Recommended Flood Management Evaluations - SW Harris

N W E S

MAP 19
FIGURE 14 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Tucker Lake
Barker Reservoir
Katy
Houston
Simonton
Pecan Grove
Richmond
Stafford
Sugar Land
Missouri City
Rosenberg
Thompsons
Smithers Lake
Pleak
Fairchilds
Needville
Brazos Bend SP
Guy
Cedar C
ORCHARD DOME OIL AND GAS FIELD
OIL CREEK OIL FIELD
THOMPSONS OIL FIELD
San Bernard River
80 ft
endleton
ek
FORT
W

249
290
99
8
45
610
90
10
6
69
59
36
288

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1.25 2.5 5 Miles

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

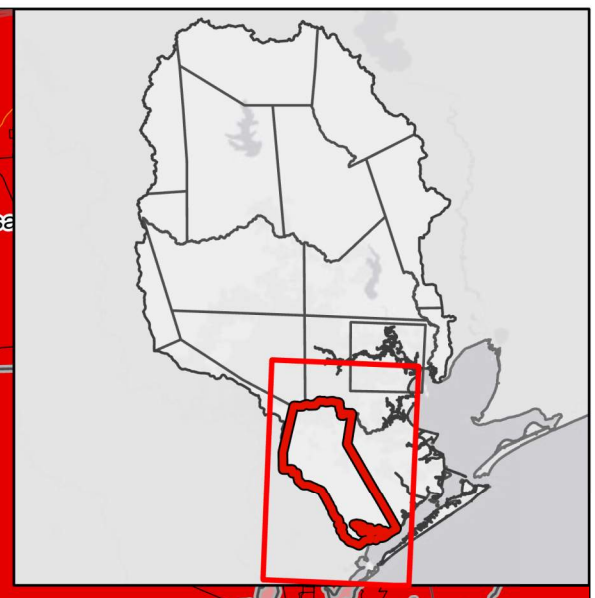
Recommended Flood Management Evaluations - Fort Bend

N W E S

MAP 19
FIGURE 15 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.



610
225
Pasa
8
45
Pearland
146
3
96
6
Friendswood
League City
Alvin
La Marque
288
35
Mustang Lake West
Mustang Lake East
Mustang Lake East
Monsanto Reservoir

Legend

- Map Book Page Index
- FME Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1 2 4 Miles

*Mapping requires updates when it is found to meet the following conditions

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Evaluations - Brazoria

N W E S

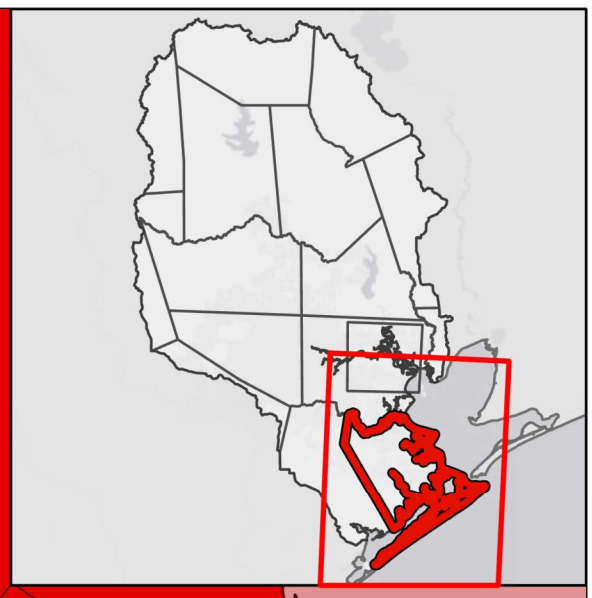
MAP 19
FIGURE 16 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FME are not visible.
More detail on all FME can be found in Appendix 4.1.

610
225
99
8
146
3
96
35
6
87
168
275
45

La Porte
Pasadena
Friendswood
League City
Galveston County Industrial Water Reservoir
Texas City
Alvin
La Marque
Galveston
Mustang Lake East
Mustang Lake West
Monsanto Reservoir



Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road
- FME Boundary

Flood Management Type and Mapping Condition

Project Planning
- Mapping Requires Update
- Modern Mapping

Other
- Modern Mapping

Preparedness
- Mapping Requires Update
- Modern Mapping

Watershed Planning
- Mapping Requires Update
- Modern Mapping

0 1.25 2.5 5 Miles

***Mapping requires updates when it is found to meet the following conditions**

- Mapping limited to main reach of channel system
- Effective FEMA mapping is more than 10 years old
- Area of recent development with only BLE mapping
- Lacks effective NFHL mapping

See Map 5 for more information on existing flood map gaps

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Evaluations - Galveston

N W E S

MAP 19
FIGURE 17 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Appendix 5-2:
Map 20 - Recommended FMPs

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.

Huntsville
Walker CO
West Fork San Jacinto River
Sam Houston National Forest
Grimes CO
Lewis Creek Reservoir
Lake Paula
San Jacinto CO
East Fork San Jacinto River
Lake Baygall
Shepherd
Livingston
Trinity River Nat'l Wildlife Refuge
Davis Hill SP
Conroe
Montgomery CO
The Woodlands
Spring
Lake Houston
Humble
Cypress Farms Lake Number 1 Hegar Lake
Waller CO
Harris CO
Addicks Reservoir
Katy
Tucker Lake
Barker Reservoir
Bunker Hill Village
Houston
Jacinto City
Sheldon Reservoir
Highlands Reservoir
Lynchburg Reservoir
Baytown
Chambers CO
Liberty CO
Pasadena
La Porte
Stafford
Sugar Land
Missouri City
Pearland
Friendswood
League City
Galveston County Industrial Water Reservoir
Alvin
Galveston CO
Texas City
La Marque
Galveston
Brazoria CO
Mustang Lake East
Monsanto Reservoir

Legend

- County Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 3 6 12 Miles

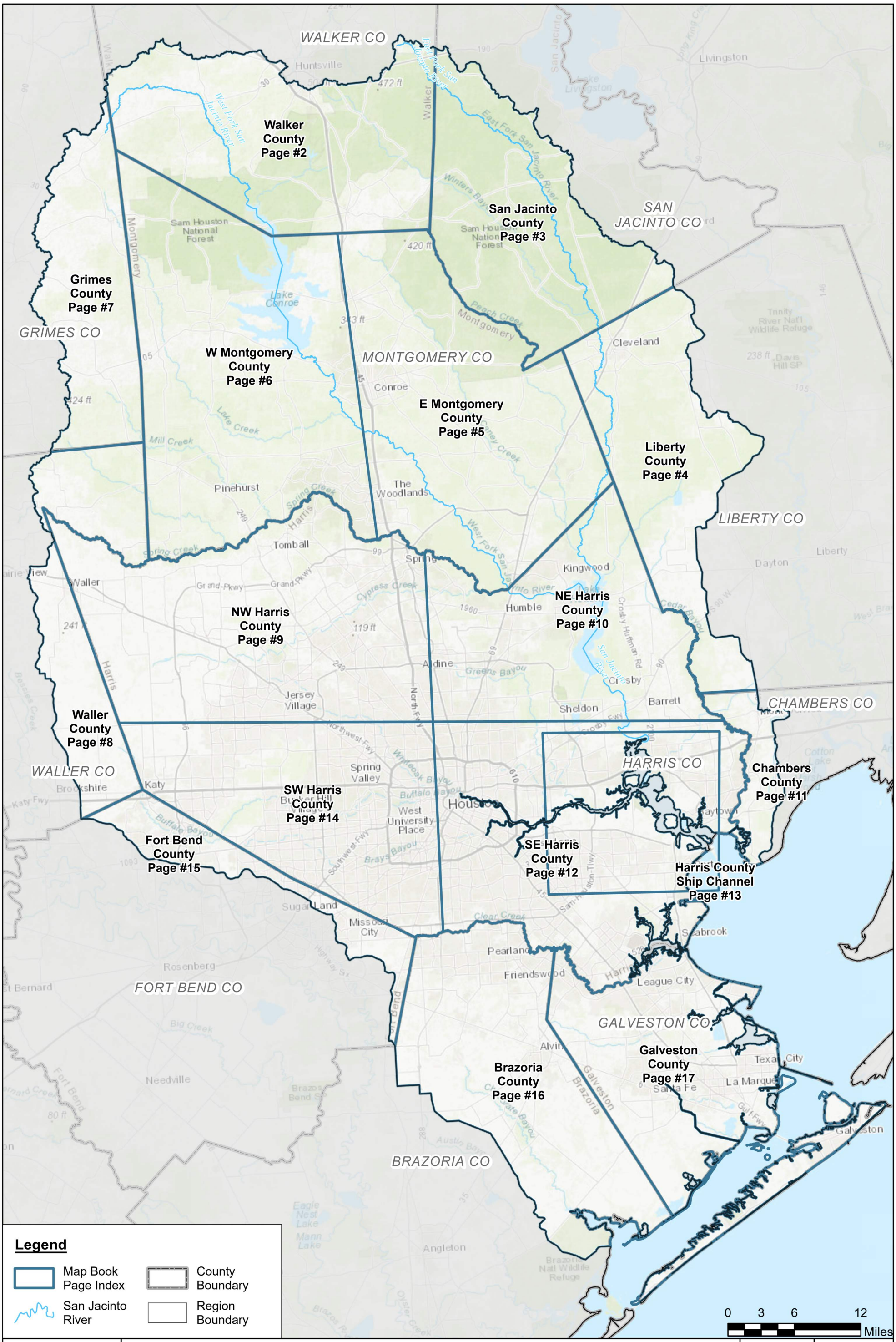
SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

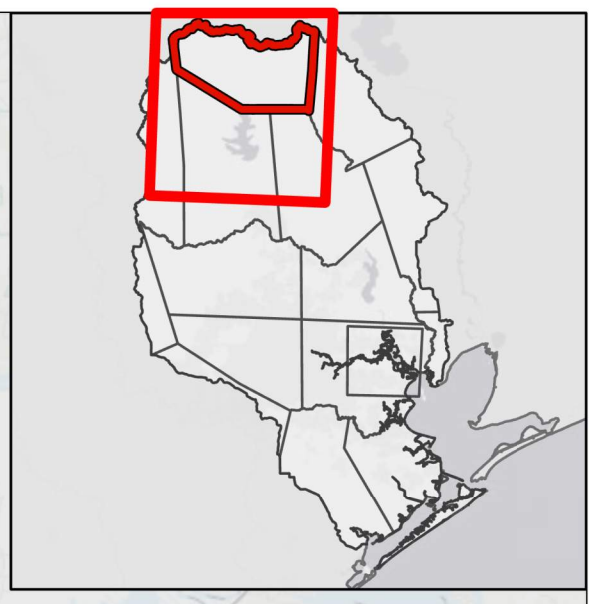
Recommended Flood Mitigation Projects

MAP 20
Overview

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert


WALKER CO
Walker County Page #2
San Jacinto County Page #3
SAN JACINTO CO
Grimes County Page #7
GRIMES CO
W Montgomery County Page #6
MONTGOMERY CO
E Montgomery County Page #5
Liberty County Page #4
LIBERTY CO
NW Harris County Page #9
NE Harris County Page #10
Waller County Page #8
WALLER CO
SW Harris County Page #14
HARRIS CO
Chambers County Page #11
CHAMBERS CO
Fort Bend County Page #15
SE Harris County Page #12
Harris County Ship Channel Page #13
FORT BEND CO
Brazoria County Page #16
Galveston County Page #17
GALVESTON CO
BRAZORIA CO
Huntsville
Livingston
Conroe
Cleveland
Pinehurst
The Woodlands
Tomball
Spring
Kingwood
Humble
Waller
Aldine
Crosby
Jersey Village
Sheldon
Barrett
Spring Valley
Katy
Brookshire
West University Place
Pearland
Friendswood
League City
Missouri City
Sugar Land
Rosenberg
Needville
Alvin
Texas City
La Marque
Galveston
Angleton
Dayton
Sam Houston National Forest
Lake Conroe
Trinity River Nat'l Wildlife Refuge
Davis Hill SP
Lake Livingston
West Fork San Jacinto River
East Fork San Jacinto River
Winters Bayou
Peach Creek
Lake Creek
Mill Creek
Spring Creek
Cypress Creek
Greens Bayou
Buffalo Bayou
Brays Bayou
Whiteoak Bayou
Clear Creek
Cedar Bayou
Crosby Huffman Rd
Harris
Montgomery
Walker
North Fwy
Northwest Fwy
Southwest Fwy
Katy Fwy
Grand Pkwy
Gulf Fwy
Sam Houston Tlwy
Galveston Brazoria
Legend
Map Book Page Index
County Boundary
San Jacinto River
Region Boundary
0 3 6 12
Miles
SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6
San Jacinto Regional Flood Plan
Recommended Flood Mitigation Projects - Index
N
W
E
S
MAP 20
FIGURE 1 of 17
Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Midway
0021
Larrison Creek
MADISON
Caney Creek
WALKER
South Bedias Creek
196
Riverside
224 ft
19
Caney Creek
State Highway 19
Huntsville
Huntsville
75
190
30
30
West Fork San Jacinto River
Huntsville SP
Sam Houston National Forest
150
45
Lake Paula
Lewis Creek Reservoir
Panorama Village
343 ft
Montgomery
105
E Loop 336
Conroe
Conroe
CONRO
0 1.25 2.5 5
Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

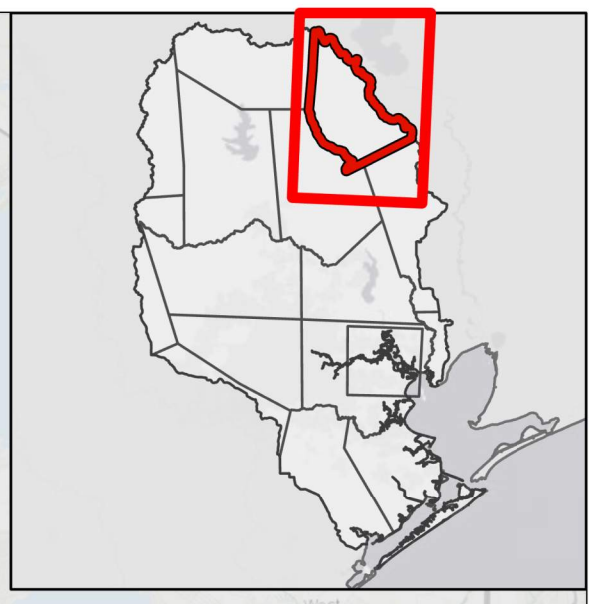
Recommended Flood Mitigation Projects - Walker

N W E S

MAP 20
FIGURE 2 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

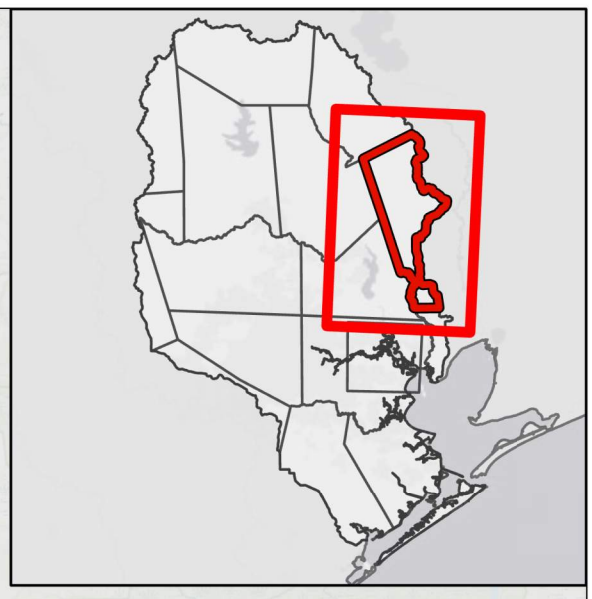
San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - San Jacinto

MAP 20
FIGURE 3 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Lake Baygall
Tarkington Bayou
TARKINGTON PRAIRIE
East Fork San Jacinto River
Luce Bayou
LIBERTY
HARRIS
Cedar Bayou
West Fork San Jacinto River
Lake Houston
Huffman
Humble
San Jacinto River
Lake Houston
Sheldon Reservoir
Highlands Reservoir
Davis Hill SP
Dayton Lakes
Kenefick
Dayton
Liberty
Eagle Point Golf Club
Old River-Winfree
SOUTH LIBERTY OIL FIE
ESPERSO

59 105 242 321 99 69 90 146 8 10

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

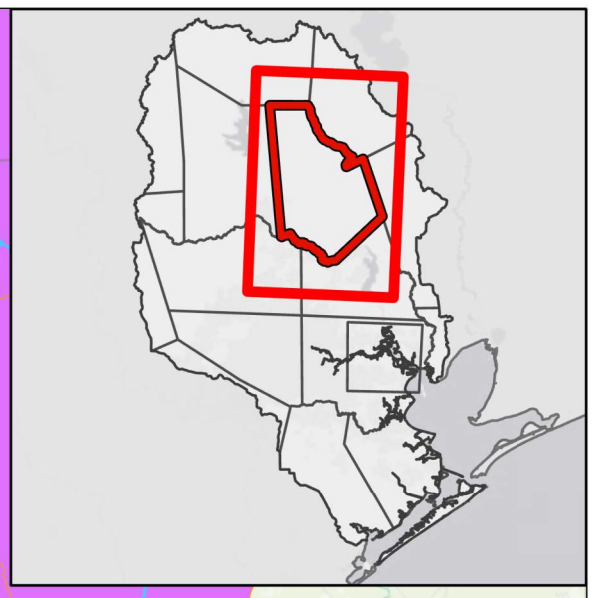
Recommended Flood Mitigation Projects - Liberty

N W E S

MAP 20
FIGURE 4 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

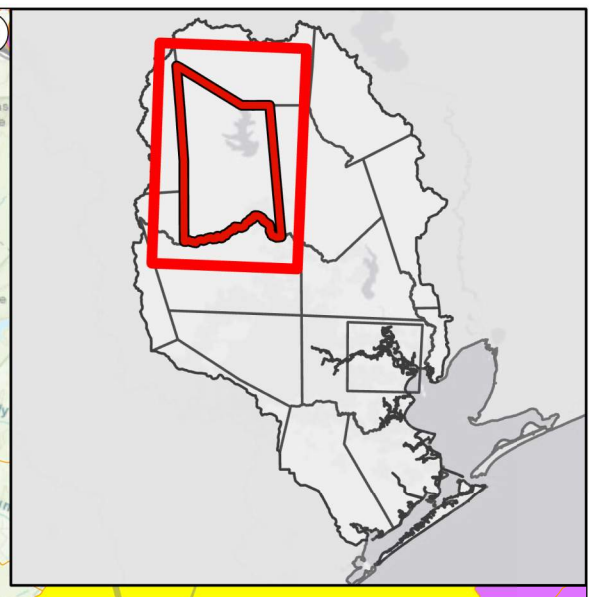
San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - E Montgomery

MAP 20
FIGURE 5 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - W Montgomery

MAP 20
FIGURE 6 of 17

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
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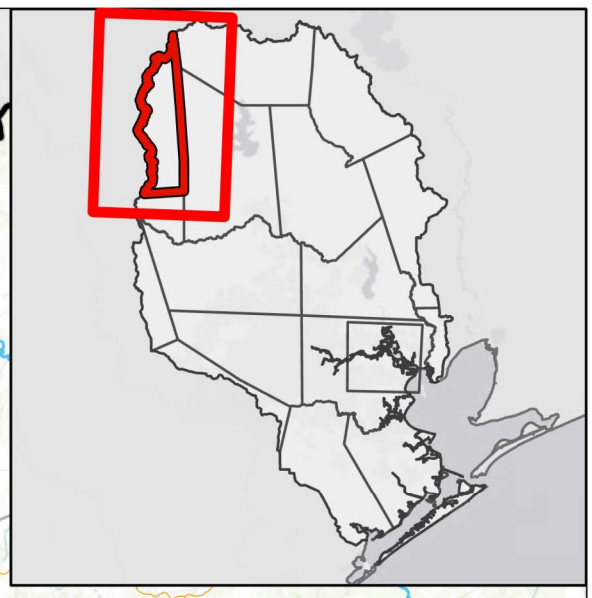


Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

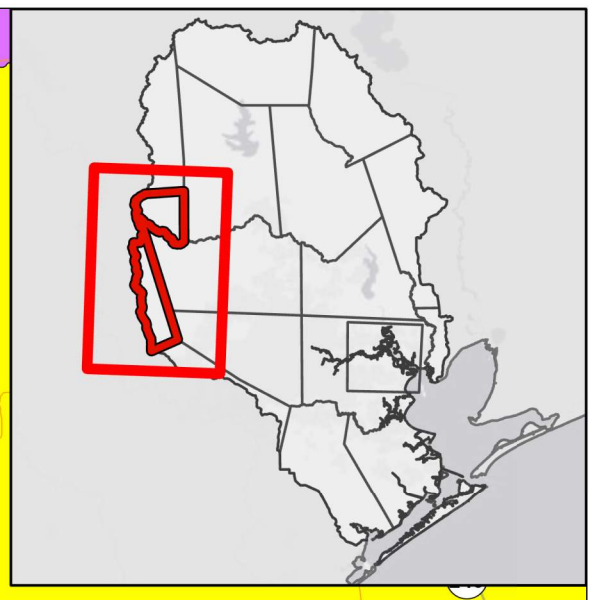
San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - Grimes

MAP 20
FIGURE 7 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Rocky Creek
Beason Creek
Cedar Creek
6
Hempstead
Ponds Creek
Prairie View
290
0159
Pine Island
Threemile Creek
Waller
Mound Creek
Snake Creek
241 ft
OIL FIELD
Clear Creek
AUSTIN
WALLER
HARRIS
WALLER
Cypress Farms
Lake Number 1
99
Hegar Lake
John Paul
Landing Park
Irons Creek
KATY OIL AND GAS F
Bessies Creek
Pattison
Katy
Park
Addicks
Reservoir
Katy
Katy
90
10
Brookshire
SAN FELIPE
OIL FIELD
Katy
Mills
Tucker Lake
Falcon
Point
HARRIS
FORT BEND
FULSHEAR OIL FIELD
Cinco
Barker
Reservoir
WALLER
Brookshire Creek
145 ft
Westpark Tlwy
Fulshear
0 1 2 4
Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

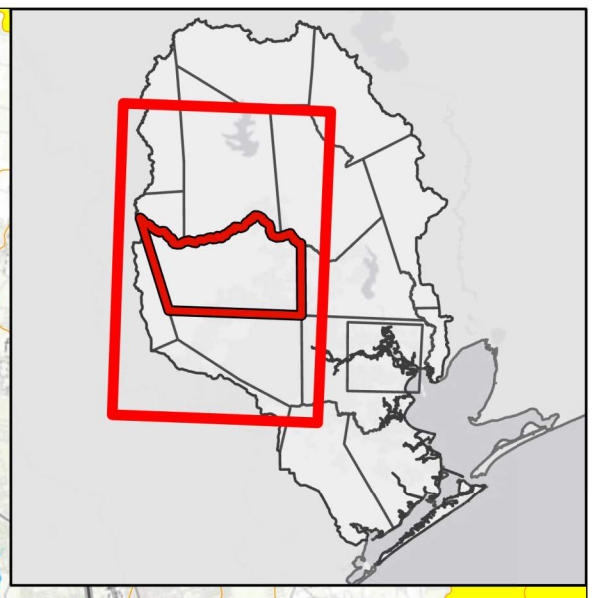
Recommended Flood Mitigation Projects - Waller

N
W E
S

MAP 20
FIGURE 8 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Lewis Creek Reservoir
Lake Paula
Montgomery
105
242
The Woodlands
Shenandoah
Woodlands
45
99
Spring
290
Prairie View
Waller
Pine Island
241 ft
249
Cypress Farms Lake Number 1
Hegar Lake
HARRIS
KATY OIL AND GAS FIELD
Addicks Reservoir
Pattison
Katy
90
10
610
Houston
Tucker Lake
FULSHEAR OIL FIELD
Barker Reservoir
Westpark Hwy
6
Stafford
69
Sugar Land
8
288
Missouri City
Pecan Grove
Richmond
Rosenberg
0 1.5 3 6
Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

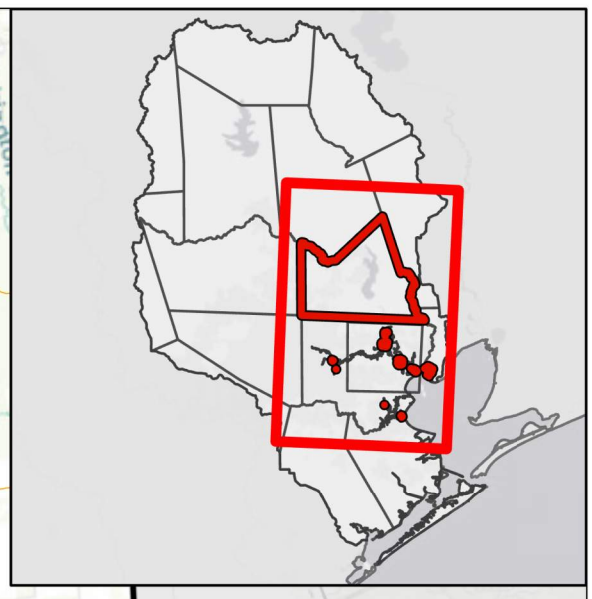
Recommended Flood Mitigation Projects - NW Harris

N W E S

MAP 20
FIGURE 9 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Spring
Humble
Houston
Jacinto City
Pearland
Friendswood
League City
Pasadena
La Porte
Baytown
Huffman
Dayton
Lake Houston
Sheldon Reservoir
Highlands Reservoir
Lynchburg Reservoir
West Fork San Jacinto River
East Fork San Jacinto River
San Jacinto River
HARRIS
LIBERTY
69
242
99
610
290
45
288
225
249
8
35
3
96
146
10
90

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

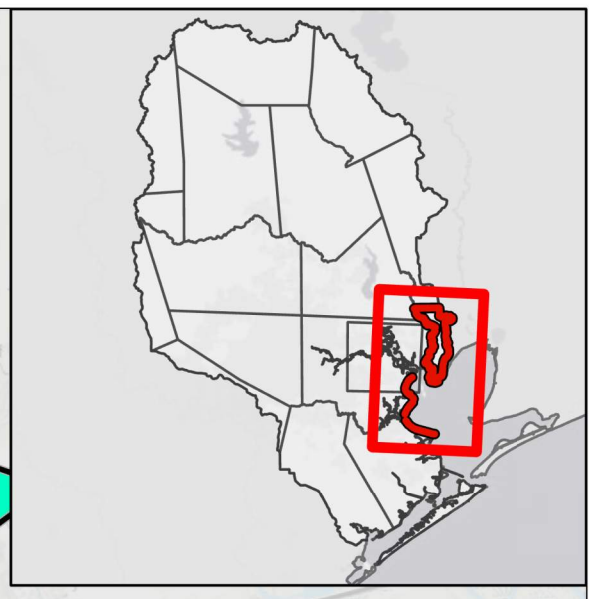
Recommended Flood Mitigation Projects - NE Harris

N W E S

MAP 20
FIGURE 10 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



146
90
10
99
225
96
Highlands Reservoir
Lynchburg Reservoir
San Jacinto River
Eagle Point Golf Club
Cove
Cotton Lake
Dutton Lake
Trinity Bay
Beach City
Baytown
La Porte

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 0.75 1.5 3 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

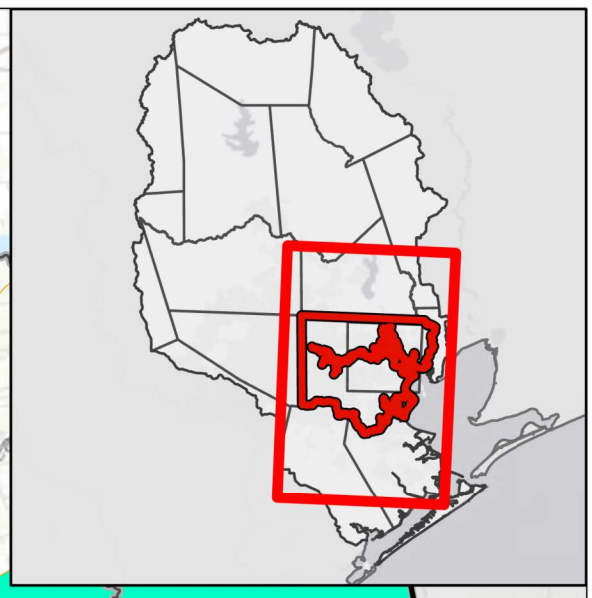
Recommended Flood Mitigation Projects - Chambers

N W E S

MAP 20
FIGURE 11 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Lake Houston
Lake Houston
Lake Houston
Lake Houston
East Fork San Jacinto River
Huffman
Humble
69
Sam Houston
Golf Club
San Jacinto River
Lake Houston
249
Sheldon Reservoir
Highlands Reservoir
10
99
Lynchburg Reservoir
Houston
Jacinto City
Baytown
610
225
45
La Porte
Pasadena
8
Pearland
35
3
Friendswood
96
League City
Galveston County Industrial Water Reservoir
Texas City
6
Alvin
La Marque
Mustang Lake West
Mustang Lake East
Mustang Lake East

0 1.25 2.5 5 Miles

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - SE Harris

N W E S

MAP 20
FIGURE 12 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.

Lake Houston

Lake Houston

Sheldon Reservoir

San Jacinto River

Highlands Reservoir

Lynchburg Reservoir

Jacinto City

Baytown

La Porte

Pasadena

8

90

10

99

225

146

3

96

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 0.75 1.5 3 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

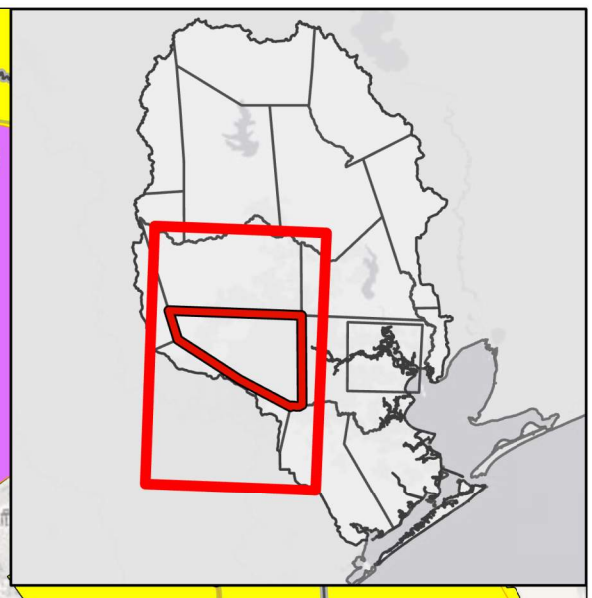
Recommended Flood Mitigation Projects - Ship Channel

N W E S

MAP 20
FIGURE 13 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Tucker Lake
Barker Reservoir
Katy
Houston
Stafford
Sugar Land
Missouri City
Pecan Grove
Richmond
Rosenberg
Thompsons
Pleak
Fairchilds
Smithers Lake
Brazos Bend SP
KATY OIL AND GAS FIELD
FULSHEAR OIL FIELD
OIL CREEK OIL FIELD
THOMPSONS OIL FIELD
HARRIS
Westpark Tlwy
Sam Houston Tlwy
Kitty Hollow Park

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

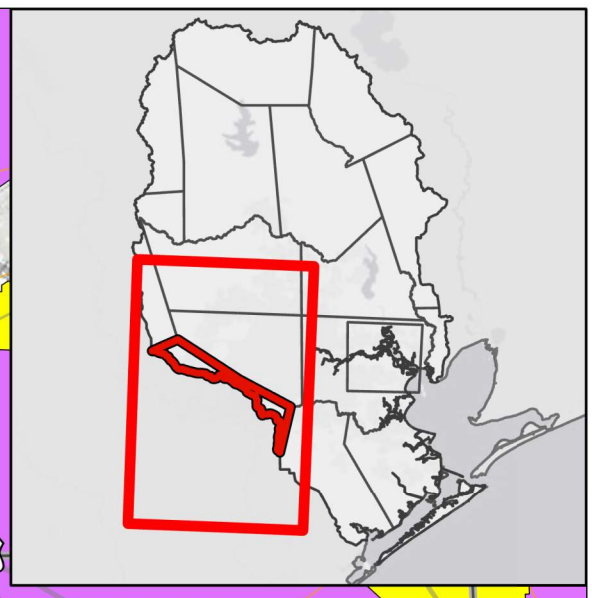
San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - SW Harris

MAP 20
FIGURE 14 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Tucker Lake
Barker Reservoir
Katy
Houston
Stafford
Sugar Land
Missouri City
Pecan Grove
Richmond
Rosenberg
Thompsons
Smithers Lake
Pleak
Fairchilds
Needville
Brazos Bend SP
Simonton
Guy
Cinco
Park
Westpark Hwy
Sam Houston Tollway
36th Division Memorial Hwy
Kitty Hollow Park
KATY OIL AND GAS FIELD
FULSHEAR OIL FIELD
RCHARD DOME OIL AND GAS FIELD
OIL CREEK OIL FIELD
THOMPSONS OIL FIELD
HARRIS
241 ft
249
290
99
8
45
610
90
10
6
69
59
36
288

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

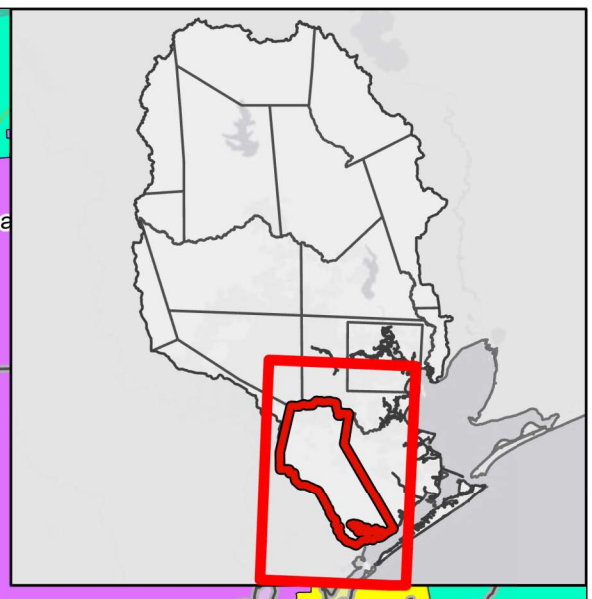
Recommended Flood Mitigation Projects - Fort Bend

N W E S

MAP 20
FIGURE 15 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.



Pearland
Friendswood
League City
Alvin
La Marque
Mustang Lake West
Mustang Lake East
Mustang Lake East
Monsanto Reservoir

610 225 8 45 146 3 96 6 288 35

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - Brazoria

N W E S

MAP 20
FIGURE 16 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMP are not visible.
More detail on all FMP can be found in Appendix 4.1.

610
225
99
8
146
3
96
35
6
168
275
45
87

La Porte
Pasadena
Friendswood
League City
Texas City
Alvin
La Marque
Galveston
Port Bolivar

Galveston County Industrial Water Reservoir
Mustang Lake East
Mustang Lake West
Monsanto Reservoir

Legend

- Map Book Page Index
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Mitigation Project Type

- Infrastructure
- Channel
- Preparedness
- Detention Pond
- Other
- Comprehensive
- Coastal

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Mitigation Projects - Galveston

N W E S

MAP 20
FIGURE 17 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Appendix 5-3:
Map 21 - Recommended FMSs

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.

Huntsville
Walker CO
San Jacinto CO
Grimes CO
Montgomery CO
Liberty CO
Waller CO
Harris CO
Chambers CO
Brazoria CO
Galveston CO
Conroe
The Woodlands
Spring
Humble
Katy
Houston
Jacinto City
Baytown
Pasadena
La Porte
Stafford
Sugar Land
Missouri City
Pearland
Friendswood
League City
Alvin
Texas City
La Marque
Galveston
Pinehurst
Lake Houston
Lake Baygall
Lewis Creek Reservoir
Lake Paula
Cypress Farms Lake Number 1
Hegar Lake
Addicks Reservoir
Tucker Lake
Barker Reservoir
Sheldon Reservoir
Highlands Reservoir
Lynchburg Reservoir
Galveston County Industrial Water Reservoir
Mustang Lake East
Monsanto Reservoir
West Fork San Jacinto River
East Fork San Jacinto River
Sam Houston National Forest
Winters Bayou
Peach Creek
Lake Creek
Mill Creek
Spring Creek
Carney Creek
Montgomery
420 ft
343 ft

Legend

- County Boundary
- San Jacinto River
- Reservoir
- HUC12
- City
- Major Road

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 3 6 12 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

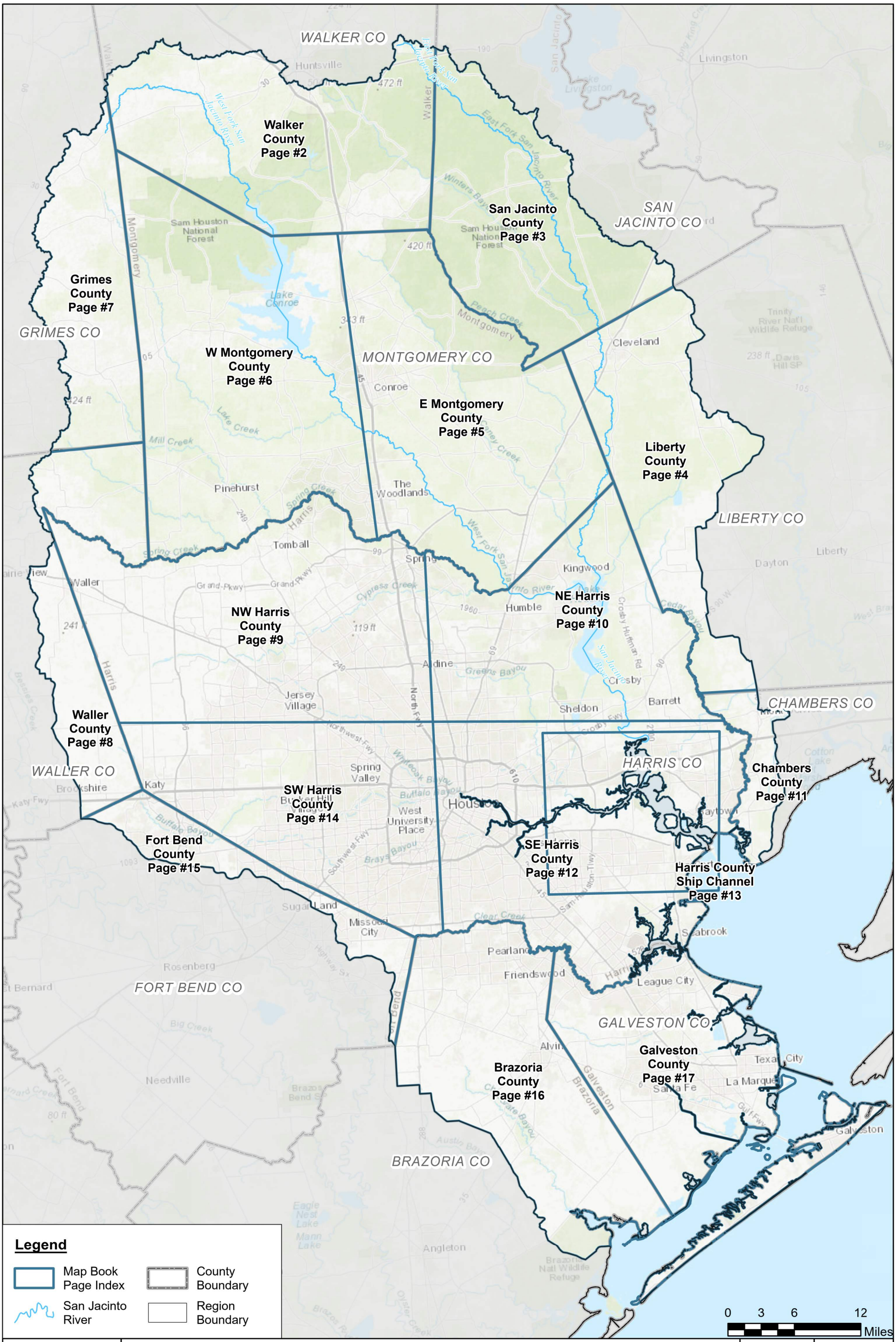
San Jacinto Regional Flood Plan

Recommended Flood Management Strategies

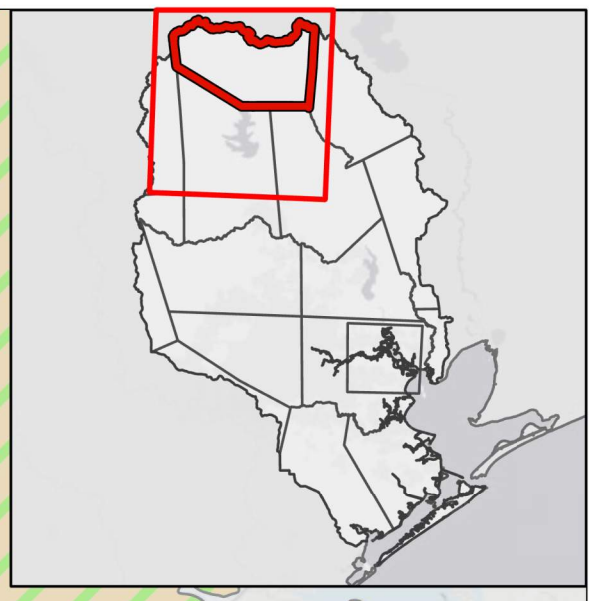
N W E S

MAP 21 Overview

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert


WALKER CO
Walker County Page #2
San Jacinto County Page #3
SAN JACINTO CO
Grimes County Page #7
GRIMES CO
W Montgomery County Page #6
MONTGOMERY CO
E Montgomery County Page #5
Liberty County Page #4
LIBERTY CO
NW Harris County Page #9
NE Harris County Page #10
Waller County Page #8
WALLER CO
SW Harris County Page #14
HARRIS CO
Chambers County Page #11
CHAMBERS CO
Fort Bend County Page #15
SE Harris County Page #12
Harris County Ship Channel Page #13
FORT BEND CO
Brazoria County Page #16
Galveston County Page #17
BRAZORIA CO
GALVESTON CO
Huntsville
Livingston
Lake Livingston
Lake Conroe
Sam Houston National Forest
Conroe
Cleveland
Pinehurst
The Woodlands
Tomball
Spring
Kingwood
Humble
Waller
Aldine
Jersey Village
Sheldon
Barrett
Crosby
Katy
Brookshire
Spring Valley
West University Place
Houston
Baytown
Sugar Land
Missouri City
Pearland
Friendswood
League City
Seabrook
La Marque
Texas City
Galveston
Alvin
Angleton
Needville
Rosenberg
Dayton
Liberty
Trinity River Nat'l Wildlife Refuge
Davis Hill SP
West Fork San Jacinto River
East Fork San Jacinto River
San Jacinto River
Lake Creek
Mill Creek
Peach Creek
Winters Bayou
Cypress Creek
Spring Creek
Greens Bayou
Whiteoak Bayou
Buffalo Bayou
Brays Bayou
Clear Creek
Cedar Bayou
Harris
Montgomery
Fort Bend
Waller
Grand Pkwy
Northwest Fwy
Southwest Fwy
North Fwy
Crosby Fwy
Gulf Fwy
Katy Fwy
Sam Houston Tllwy
Galveston
Brazoria
Crosby Huffman Rd
Legend
Map Book Page Index
County Boundary
San Jacinto River
Region Boundary
0 3 6 12
Miles
SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6
San Jacinto Regional Flood Plan
Recommended Flood Management Strategies - Index
N
W
E
S
MAP 21
FIGURE 1 of 17
Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Midway
Larrison Creek
MADISON
Caney Creek
Huntsville
West Fork San Jacinto River
East Fork San Jacinto River
Oakhurst
East Fork San Jacinto
Winters Bayou
Sam Houston National Forest
MONTGOMERY
420 ft
SAN JACINTO
Willis
Panorama Village
Montgomery
343 ft.
Lake Conroe
E Loop 336
Cut and Shoot
Conroe
Conroe
CONROE OIL FIELD
0 1.25 2.5 5
Miles

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

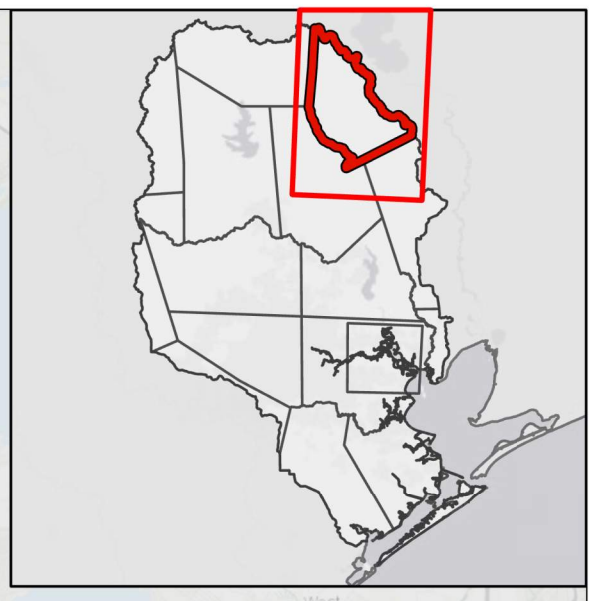
Recommended Flood Management Strategies - Walker

N W E S

MAP 21
FIGURE 2 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

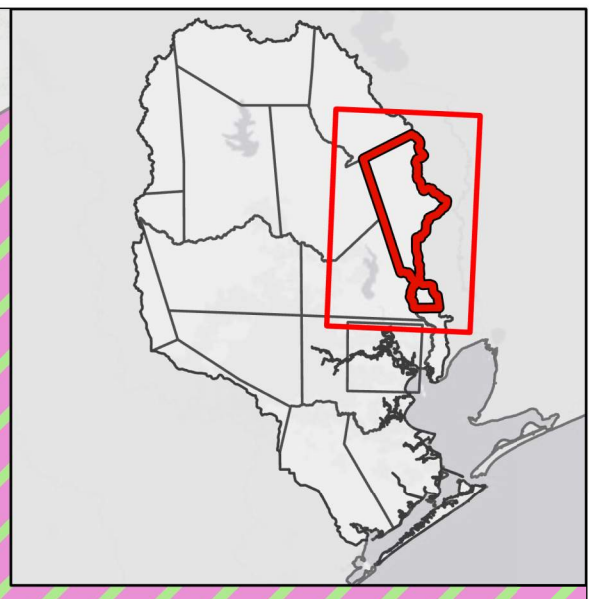
San Jacinto Regional Flood Plan

Recommended Flood Management Strategies - San Jacinto

MAP 21
FIGURE 3 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

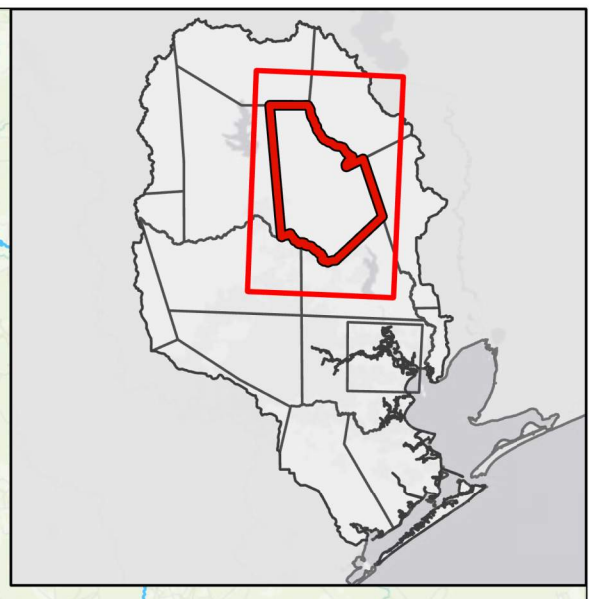
San Jacinto Regional Flood Plan

Recommended Flood Management Strategies - Liberty

MAP 21
FIGURE 4 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Conroe
The Woodlands
Spring
Humble

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Strategies - E Montgomery

N W E S

MAP 21
FIGURE 5 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
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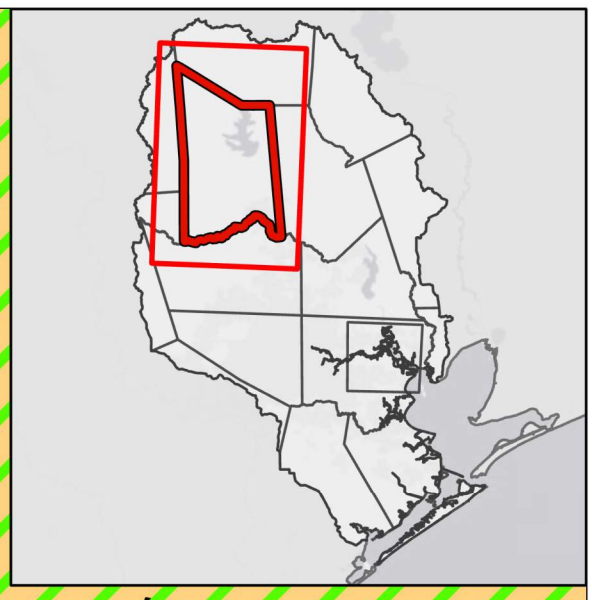

West Fork San Jacinto River
Anthony Branch
Caney Creek North
Sam Houston National Forest
MONTGOMERY
Little Lake Creek
Lake Creek
Landrum Creek
Mound Creek
Bentwater Golf Club
Lake Conroe
Montgomery
April Sound Country Club
373 ft
Bluejack National Golf Course
Grand Lake Golf Club
Woodforest Golf Club at Fish Creek
West Fork Golf & Country Club
Conroe
Willis
Panorama Village
343 ft
Lone Star Executive Airport
Caney Creek
Stewarts Creek
River Plantation Golf Club
420 ft
189 ft
Mill Creek
291 ft
Magnolia
Lake Windcrest Golf Course
Dry Creek
Mink Branch
Pinehurst
Woodlands CC Player Course
Carlton Woods Nicklaus Course
Woodlands CC Palmer Course
Panther Branch
Shenandoah
The Woodlands
Oak Ridge North
Golf Trails of the Woodlands
High Meadow Ranch Golf Club
Stagecoach
Walnut Creek
Spring Creek
105
15
45
242
249
336

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1 2 4 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Strategies - W Montgomery

N W E S

MAP 21
FIGURE 6 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
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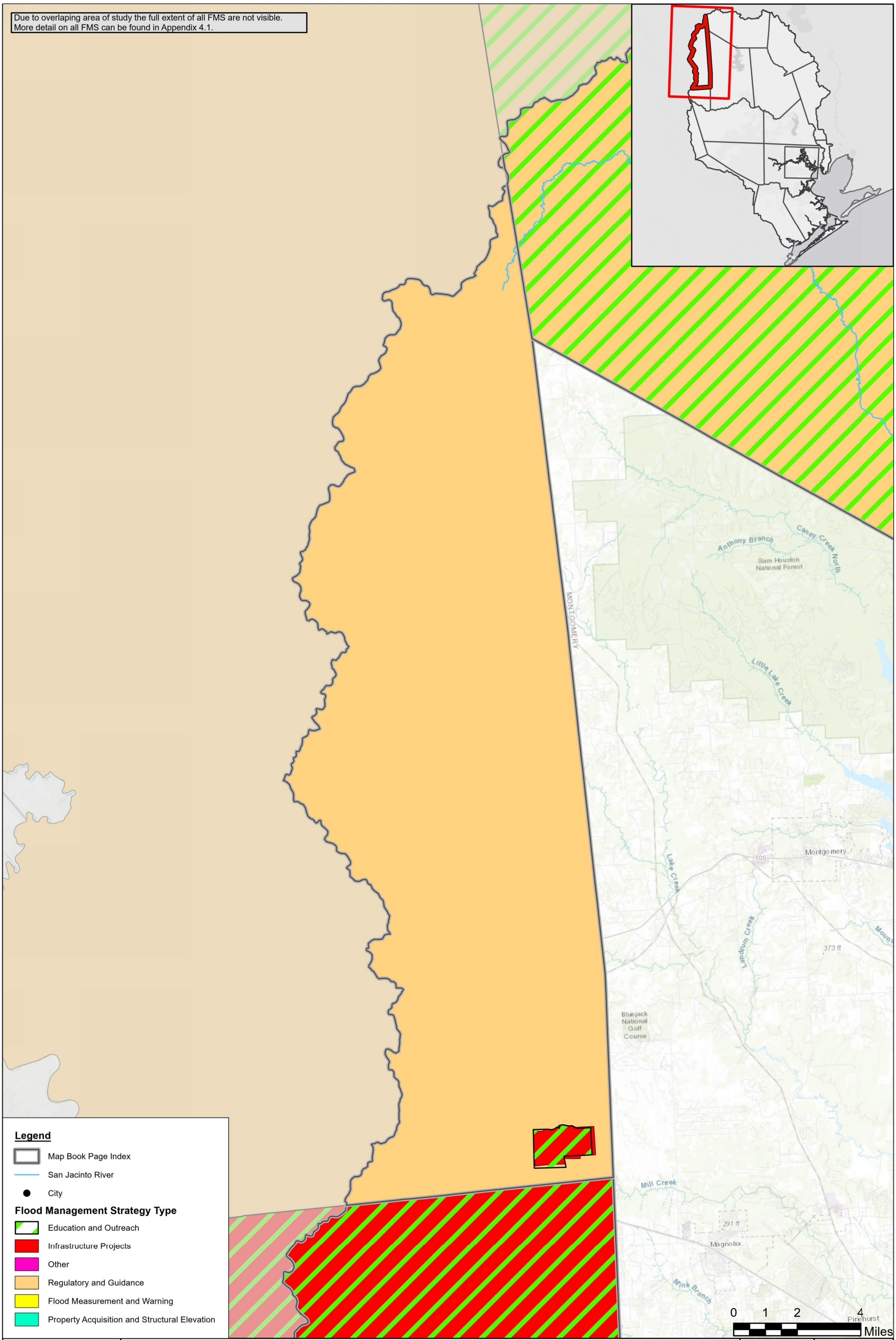


Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

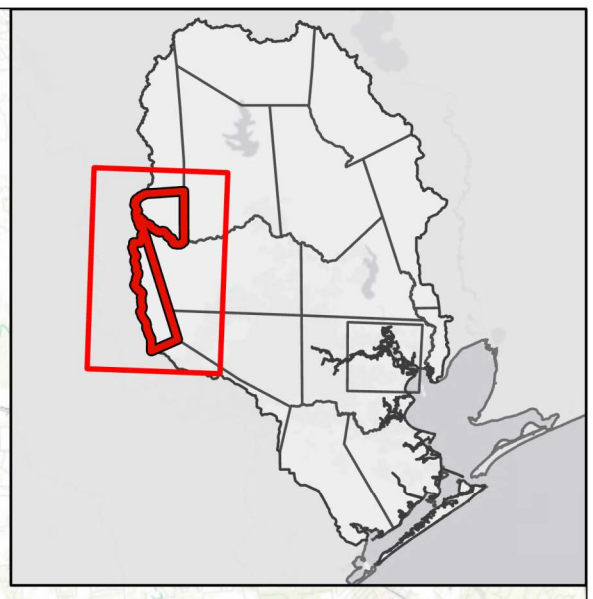
Recommended Flood Management Strategies - Grimes

N W E S

MAP 21
FIGURE
7 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Pinehurst
High Meadow Ranch Golf Club
Stagecoach
Walnut Creek
Spring Creek
MONTGOMERY
OIL FIELD
Katy
Club Falcon Point
FULSHEAR OIL FIELD
FORT BEND
Cinco Ranch
Barker Reservoir / George Bush Park
Buffalo Bayou
Westpark Tlwy
Fulshear
0 1 2 4 Miles

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

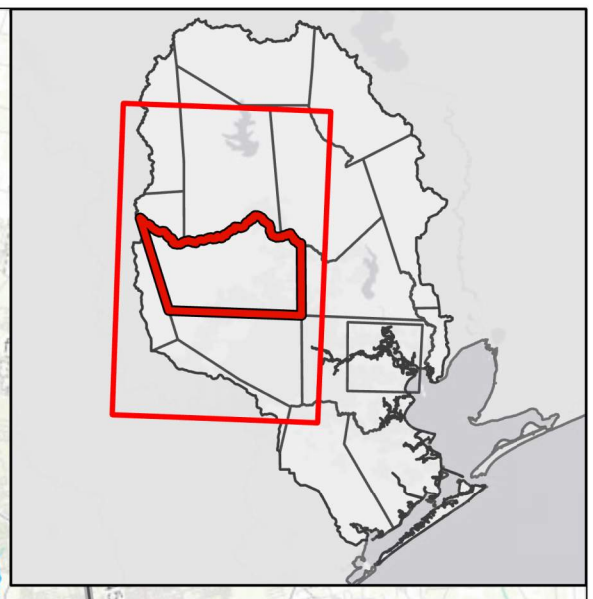
Recommended Flood Management Strategies - Waller

N W E S

MAP 21
FIGURE 8 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Montgomery
Lake Conroe
West Fork San Jacinto River
CONROE OIL FIELD
Lazy River Rd
Shenandoah
The Woodlands
Magnolia
Pinehurst
Stagecoach
MONTGOMERY
Spring
Katy
Houston
FULSHEAR OIL FIELD
Westpark Tlwy
George Bush Park
Pecan Grove
Sugar Land
Stafford
Missouri City
Richmond
Rosenberg
FORT BEND
0 1.5 3 6 Miles

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

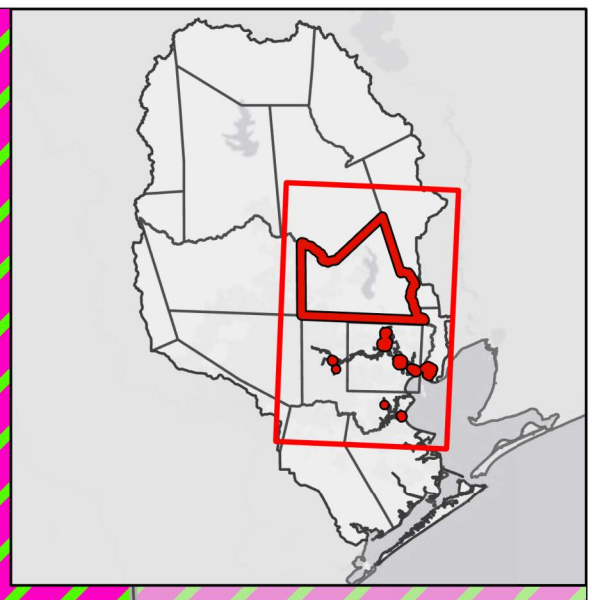
Recommended Flood Management Strategies - NW Harris

N W E S

MAP 21
FIGURE 9 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Spring
Humble
Houston
Jacinto City
Baytown
La Porte
Pasadena
Pearland
Friendswood
League City
Splendora
Woodbranch
Roman Forest
Lake Houston Wilderness Park
Lazy River Rd
Caney Creek
West Fork San Jacinto River
East Fork San Jacinto River
San Jacinto River
Mont Belvieu
Galveston Bay
FIELD
Woodlands
ndoah
242
69
59

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

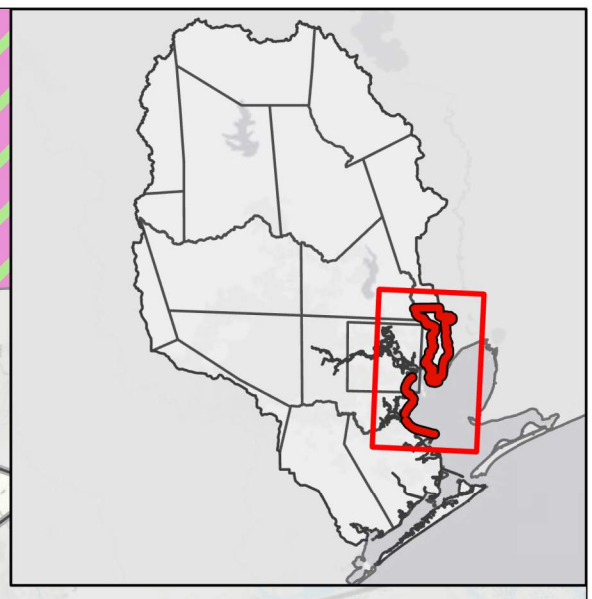
Recommended Flood Management Strategies - NE Harris

N W E S

MAP 21
FIGURE 10 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Baytown

La Porte

Mont Belvieu

Cedar Bayou

CHAMBERS

Eagle Point Golf Club

Cove

Cotton Lake

Dutton Lake

Beach City

Trinity Bay

Galveston Bay

San Jacinto River

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 0.75 1.5 3 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

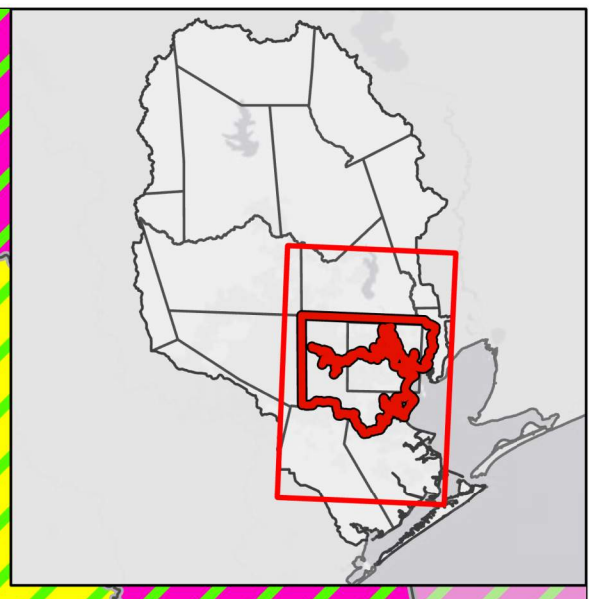
Recommended Flood Management Strategies - Chambers

N W E S

MAP 21
FIGURE 11 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Humble
Houston
Jacinto City
Baytown
La Porte
Pasadena
Pearland
Friendswood
League City
Texas City
La Marque
Alvin
Mont Belvieu
Galveston Bay
Porte
brook
East Fork San Jacinto River
San Jacinto River

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

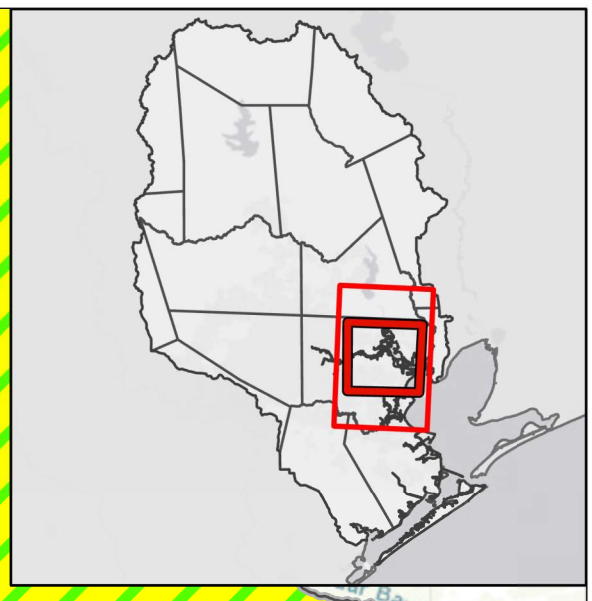
Recommended Flood Management Strategies - SE Harris

N W E S

MAP 21
FIGURE 12 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Jacinto City
Baytown
La Porte
Pasadena

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 0.75 1.5 3 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

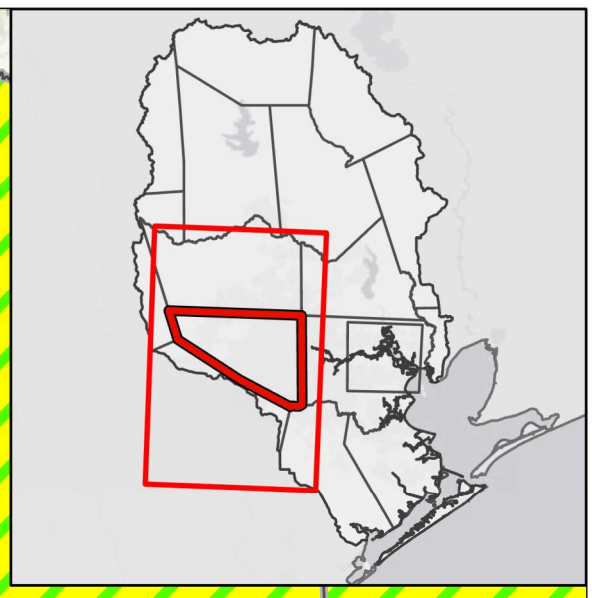
Recommended Flood Management Strategies - Ship Channel

N W E S

MAP 21
FIGURE 13 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



MONTGOMERY

Katy

Houston

FULSHEAR OIL FIELD

Cinco

Reservoir

George Bush Park

Westpark Tlwy

Mission B

Sugar Land

Stafford

Pecan Grove

Missouri City

FORT BEND

Richmond

Rosenberg

Kitty Hollow Park

Thompsons

Smithers Lake

Pleak

FORT BEND

OIL CREEK OIL FIELD

THOMPSONS OIL FIELD

Fairchilds

Brazos Bend SP

Guy

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

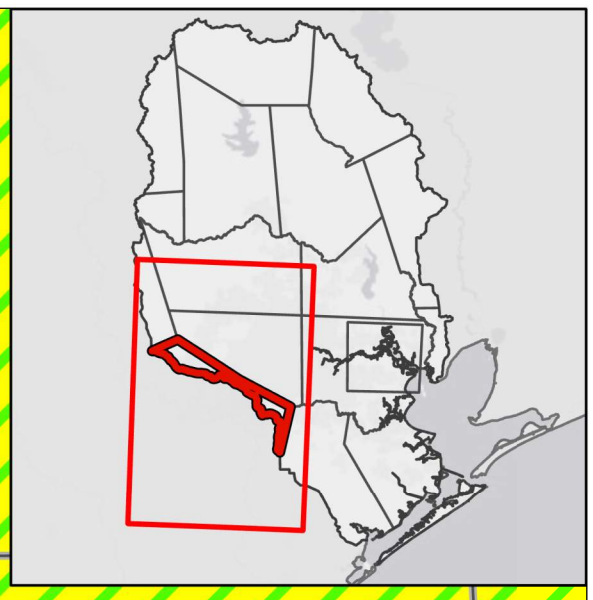
Recommended Flood Management Strategies - SW Harris

N W E S

MAP 21
FIGURE 14 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Katy
Houston
Stafford
Sugar Land
Missouri City
Simonton
Pecan Grove
Richmond
Rosenberg
Thompsons
Pleak
Needville
Fairchilds
Guy
Brazos Bend SP
FULSHEAR OIL FIELD
ORCHARD DOME OIL AND GAS FIELD
OIL CREEK OIL FIELD
THOMPSONS OIL FIELD
George Bush Park
Westpark Tlwy
36th Division Memorial Hwy
FORT BEND
San Bernard River

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

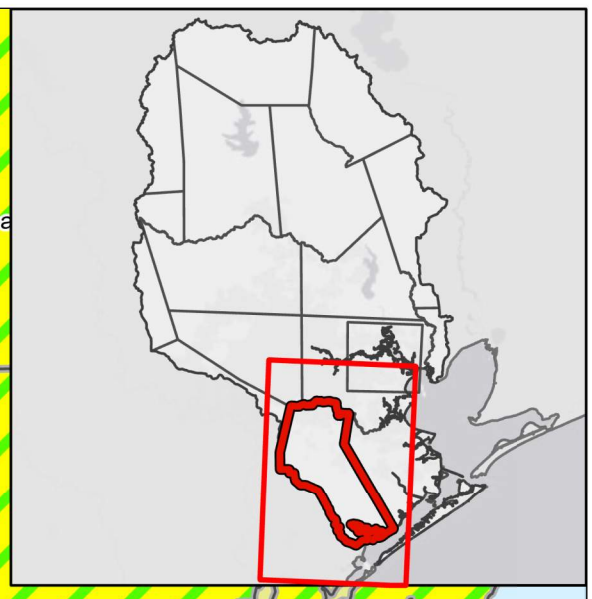
Recommended Flood Management Strategies - Fort Bend

N W E S

MAP 21
FIGURE 15 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Pasa

Pearland

Friendswood

League City

Alvin

La Marque

FORT BEND

Mustang Bayou

Fresno

0 1 2 4
Miles

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

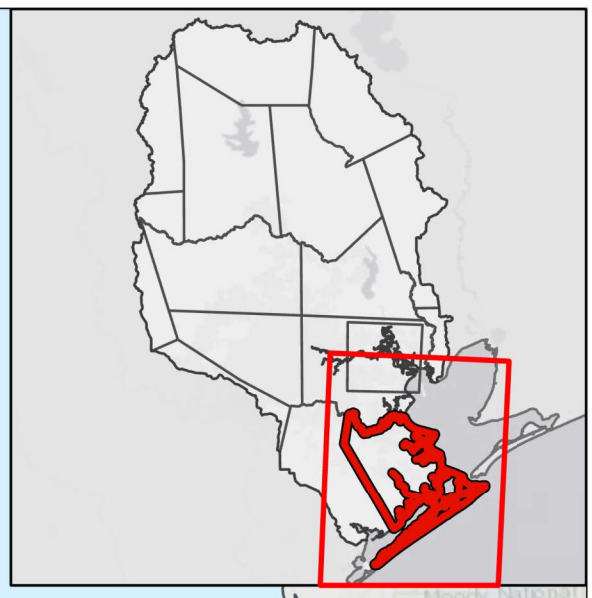
Recommended Flood Management Strategies - Brazoria

N
W E
S

MAP 21
FIGURE
16 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Due to overlaping area of study the full extent of all FMS are not visible.
More detail on all FMS can be found in Appendix 4.1.



Pasadena
La Porte
Galveston Bay
Friendswood
League City
Alvin
Texas City
La Marque
Galveston

Legend

- Map Book Page Index
- San Jacinto River
- City

Flood Management Strategy Type

- Education and Outreach
- Infrastructure Projects
- Other
- Regulatory and Guidance
- Flood Measurement and Warning
- Property Acquisition and Structural Elevation

0 1.25 2.5 5 Miles

SAN JACINTO REGIONAL FLOOD PLANNING GROUP
REGION 6

San Jacinto Regional Flood Plan

Recommended Flood Management Strategies - Galveston

N W E S

MAP 21
FIGURE
17 of 17

Coordinate System: NAD 1983 2011 Texas Centric Mapping System Lambert

Appendix 5-4:
Supplemental Source Documentation

Appendix 5-4A:
Non-Structural Flood Mitigation

APPENDIX 5-4A NONSTRUCTURAL FLOOD MITIGATION

The referenced report, Natural Hazard Mitigation Saves, can be accessed at the following location.

> "Natural Hazard Mitigation Saves." Principal Investigator Porter, K.; Co-Principal Investigators Dash, N., Huyck, C., Santos, J., Scawthorn, C.; Investigators: Eguchi, M., Eguchi, R., Ghosh., S., Isteita, M., Mickey, K., Rashed, T., Reeder, A.; Schneider, P.; and Yuan, J., Directors, MMC. Investigator Intern: Cohen-Porter, A., National Institute of Building Sciences, 2019.https://www.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf