



San Jacinto River Authority

ADMINISTRATIVE OFFICE
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June 15, 2020

Texas Water Development Board
ATTN: FIF Abridged Application
P.O. Box 13231
Austin, Texas 78711

Re: FIF Abridged Application: Lake Conroe – Lake Houston Joint Reservoir Operations Study

Dear Mr. Entsminger:

The San Jacinto River Authority thanks the Texas Water Development Board (TWDB) for the opportunity to submit an abridged application for funding via the recently created Flood Infrastructure Fund. Attached please find the abridged application for a Lake Conroe – Lake Houston Joint Reservoir Operations Study with the following attachments:

1. Attachment A: Project Benefit Area
2. Attachment B: Census/SVI Data and Calculations
3. Attachment C: Grant Percentage Calculator Spreadsheet
4. Attachment D: Disaster Declarations for Hurricane Harvey and Tropical Storm Imelda
5. Attachment E: NFIP Certifications from Montgomery County, Harris County, City of Conroe, and City of Houston
6. Attachment F: San Jacinto Regional Watershed Master Drainage Plan Project Fact Sheet
7. Attachment G: Upper San Jacinto River Watershed (Basin) Map

We appreciate your review and consideration of this application, and look forward to working with TWDB as a regional partner on efforts to reduce flood risks within the San Jacinto River Basin.

If you have any questions or require further documentation or data, please contact me at (936)-588-7177 or mbarrett@sjra.net.

Sincerely,

Matt Barrett, P.E.
Division Engineer

LAKE CONROE DIVISION
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FLOOD MANAGEMENT DIVISION
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SFY 2020 Flood Project Abridged Application

Due June 15, 2020 at 5:00 p.m.

Email to FIF@twdb.texas.gov

By submitting this Abridged Application, you understand and confirm that the information provided is true and correct to the best of your knowledge and further understand that the failure to submit a complete Abridged Application by the stated deadlines, or to respond in a timely manner to additional requests for information, may result in the withdrawal of the Abridged Application without review.

GENERAL INFORMATION

Entity Name		
San Jacinto River Authority		
Entity Type		
River Authority		
Contact Who should TWDB contact with questions during the review of this submission?	Name	Matt Barrett, PE
	Title	Division Engineer
	Phone	936-588-7177
	Email	mbarrett@sjra.net

PROJECT INFORMATION

Project Name	Lake Conroe – Lake Houston Joint Reservoir Operations Study		
Amount Requested from TWDB	\$500,000 (50% grant based on attached calculations (Attachment C))		
Financing from Federal Sources	\$0		
(if receiving federal funds, include the federal agency and program)	N/A		
Financing from Other Sources	\$500,000 (local match for remaining 50% not covered by grant)		
Total Project Cost (Check here if requesting loan funds only ☐)	\$1,000,000		
Category Applied For			
☒ <u>Category 1</u> Flood Protection Planning for Watersheds See item (G) in Description of Proposed Project for explanation.	☐ <u>Category 2</u> Planning, Acquisition, and Design, Construction / Rehabilitation (All combinations)	☐ <u>Category 3</u> Federal Award Matching Funds	☐ <u>Category 4</u> Measures immediately effective in protecting life and property

MINIMUM STANDARDS

Only projects that satisfy all minimum standards will be included in the prioritization.	☒	1. For applicable projects, the benefit-cost ratio of the proposed project is >1.0 or an explanation is provided. N/A for study/non-construction projects per Intended Use Plan.
	☒	2. For applicable projects, a proposed MOU and a project description was provided to all eligible political subdivisions and the list of political subdivisions that received this information is attached to the abridged application. N/A for Category 1 projects per Intended Use Plan.
	☒	3. The applicant has acted cooperatively with other political subdivisions to address flood control needs in the area in which the eligible political subdivisions are located; and all eligible political subdivisions substantially affected by the proposed flood project have participated in the process of developing the proposed flood project. City of Houston/CWA participated in the process of developing the project. See item (F) in <u>Description of Proposed Project</u> for further information.
	☒	4. The funding request does not include redundant funding for activities already performed and/or funded through another source.
	☒	5. a. The area to be served by the proposed project has floodplain ordinances in place and is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards. See Attachment E. OR
	☐	5. b. Requesting funds to fulfill additional requirements for participation in the National Flood Insurance Program. N/A
	☒	6. The proposed project was developed using the best and most recent available data. See item (A) in <u>Description of Proposed Project</u> for explanation.
	☒	7. a. (Construction applicants only) Operations and maintenance costs associated with proposed facilities have been considered. N/A
	☒	7. b. (Construction applicants only) Floodwater capture techniques have been considered. N/A, but see item (D) in <u>Description of Proposed Project</u>.

DESCRIPTION OF PROPOSED PROJECT

The purpose of this project is to develop a joint reservoir operations strategy for Lake Conroe and Lake Houston. The San Jacinto River Authority (SJRA) maintains and operates the Lake Conroe dam, including its five tainter gate spillway. The Lake Houston dam, consisting of an uncontrolled overflow weir more than 3,000 feet in length and a small gate structure capable of releases up to 10,000 cfs, is owned by the City of Houston (CoH) and maintained and operated by the Coastal Water Authority (CWA). CoH is currently in the design phase of a project to add new tainter gates at the Lake Houston dam which could greatly increase the controlled release capacity of the dam. Construction is anticipated to be funded with a grant from FEMA. Based on the current schedule and the best information available to date, construction of the new gates is to be completed by 2022, barring any permitting delays or other unforeseen issues. Once these gates are in place at Lake Houston, it will be beneficial to both water supply and flood mitigation in the region for a joint operations plan to be in place. The main goal of the plan is to determine the most efficient and safe operation of the two reservoirs in series by evaluating multiple individual components of operational strategy.

The first, and most critical, component to be evaluated is overall operational synergy between the two reservoirs. Gate operations protocols at each of the reservoirs would be synced to ensure that gate operational changes during a rainfall event at Lake Conroe (which is located in the upper reaches of the San Jacinto River watershed, approximately 49-river miles upstream of Lake Houston) are considered and analyzed so that comparable adjustments can be made at Lake Houston to accommodate changes in releases from Lake Conroe and account for runoff from the other watersheds upstream of Lake Houston that bypass Lake Conroe and drain directly to Lake Houston. As Lake Conroe is at the “top of the funnel” and must operate in such a fashion as to protect the tainter gates and earthen embankment that make up the Lake Conroe dam, its current operating protocol is not anticipated to change as a result of tainter gates being added at Lake Houston, but should be reviewed in concert with the gate operations protocol being developed for Lake Houston. The protocol for operating the gates at Lake Houston, however, should be based at least in part on the protocol at Lake Conroe. It is anticipated that information and strategies developed as part of this effort could impact the development of CWA’s operating protocol for the future Lake Houston gates.

Communications will be another important component of this study. Currently, SJRA has a notification protocol whereby downstream stakeholders and Offices of Emergency Management are notified each time a tainter gate on Lake Conroe changes position to either increase or decrease the flow rate from the dam. However, it is important that both reservoir operators develop joint notification protocols and public communication strategies, consistent with the requirements of House Bill 26 passed during the 86th Texas Legislative Session.

Another component to be studied is “pre-release.” Pre-release is the release of water from a reservoir in advance of a storm event with the goal of creating additional storage in the reservoir to capture storm water. Pre-release is a topic that has recently seen considerable public interest in response to major storm events which have impacted the region. This study will evaluate the feasibility and effectiveness of pre-releases at either or both reservoirs once the gates at Lake Houston are constructed by evaluating the impacts, benefits, and risks of this strategy. The evaluation will consider the impacts, benefits, and risks during different weather scenarios, to ensure that special considerations are made for unique situations such as storm surge during tropical events.

Impacts on water supply must also be determined as part of the proposed efforts. CoH owns 2/3 of the water rights in Lake Conroe. The legal aspects of pre-releases from either reservoir, as related to water rights permits, must be evaluated to ensure there are no detrimental impacts to water supply. Pre-releases from either reservoir, as well as standard releases from Lake Houston, must also be optimized to ensure that water supply is not unnecessarily released from either reservoir.

Finally, forecasting tools for the series of reservoirs could be evaluated as part of this project. SJRA is currently developing a reservoir forecasting tool for Lake Conroe, funded partially via a grant from the Texas Water Development Board (TWDB), which will predict lake levels and release rates from the Lake Conroe dam based on weather forecasts, observed rainfall, lake levels, and other data. A similar tool could potentially be developed for Lake Houston to sync up forecasting for both reservoirs and build upon the ongoing work funded by TWDB by expanding forecasting from the Lake Conroe watershed (approximately 450 square miles) to the entire Lake Houston watershed (approximately 3,000 square miles). This could potentially aid in each of the components described above by providing the best scientific data available to govern pre-release at either reservoir and operations at Lake Houston.

The operational components listed in the above paragraphs do not necessarily include all that would be evaluated as part of this project. If selected to submit a full application, SJRA would work with a professional engineering consultant to develop a formal scope of work.

- (A) The project will be performed utilizing the most recent/best available data, technology, and techniques available to SJRA. SJRA will work closely with CoH/CWA to ensure that all pertinent data obtained and utilized by those entities in the process of developing the Lake Houston dam gates project is also utilized in this project. The project will also take advantage of any relevant data, models, etc. developed as part of the in progress and nearing completion San Jacinto Regional Watershed Master Drainage Plan project (SJRWMDP) being performed by Harris County Flood Control District (HCFCD), which is utilizing Atlas 14 rainfall. The SJRWMDP is a \$2.7 million comprehensive regional study funded 25% by local partners HCFCD, SJRA, Montgomery County, and the City of Houston, and 75% by FEMA, conveyed through the Texas Division of Emergency Management. By utilizing data from the SJRWMDP, the proposed project will increase the benefits gained from the large investments made for the SJRWMDP. See Attachment F for more information on the SJRWMDP.
- (B) For the purposes of SVI and AMHI and other census bureau data calculations, the direct benefit area for the project was considered as any census block group "more than minimally" overlapping (i.e. approximately more than 10% overlapping) the 100-year (1% annual chance) storm event inundation extent along the West Fork of the San Jacinto River between Lake Conroe and Lake Houston, around Lake Houston, and downstream of Lake Houston to Interstate 10, acquired from the draft model developed for the SJRWMDP (see item (A) above). These are the areas anticipated to potentially experience direct benefits as a result of the proposed joint reservoir operations strategy, though the project is planning for the control/conveyance of floodwaters originating across the entire Lake Houston watershed (see item (G) below). See Attachment A for project benefit area map.
- (C) It is anticipated that this study can be completed within 36 months, as indicated in the Prioritization Criteria section below. The duration of the study is anticipated to be significantly shorter than 36 months (18 months or less), but there is expected to be a delay in starting the study due to the need to allow time for completion of efforts by CoH/CWA (the results of which will act as inputs into the study), as well as to allow for short-term budgeting uncertainties related to COVID-19 to be resolved. Implementation of the results of the study (i.e. the joint operations plan/strategy) will rely on the completion of the Lake Houston dam gates project.

- (D) As described in the project description paragraphs above, water supply is anticipated to be evaluated from multiple angles. It is anticipated that the project will benefit water supply by optimizing reservoir operations and ensuring that releases of water made for the purpose of flood mitigation are scientifically determined and governed. Lake Houston is the major water supply reservoir for the City of Houston and surrounding communities, and Lake Conroe is a major water supply source for Montgomery County.
- (E) The level of flood mitigation potentially provided by developing and implementing the proposed joint reservoir operations strategy is not quantified at this time. However, the goal of the CoH project to design and construct gates on Lake Houston is to mitigate flooding upstream of Lake Houston by allowing water to be released from the lake more quickly, and the joint reservoir operations strategy is anticipated to benefit and optimize operation of the new gates, in conjunction with operations at Lake Conroe. Flood mitigation is anticipated to benefit areas impacted by Hurricane Harvey and Tropical Storm Imelda (see Attachment D), as well as other recent and historical events in both Harris and Montgomery Counties.
- (F) The San Jacinto River Authority (SJRA) Flood Management Division is focused on creating and sustaining regional flood management partnerships and coordinating with stakeholders to provide regional flood mitigation solutions within the San Jacinto River Basin. Created in 2018 in response to Governor Abbott calling on SJRA to become more involved with regional flood management, the Division has acted cooperatively with various political subdivisions throughout the region to address flood control/mitigation needs within the jurisdictional area of SJRA, and is now leading efforts with other entities to submit multiple abridged FIF funding applications for projects which span the Upper San Jacinto River Basin (Lake Houston watershed). For this specific application, the City of Houston and CWA participated in the process of developing the project.
- (G) This project is being submitted as a Category 1 project as it is for the purpose of providing planning for control/conveyance of floodwaters originating across the entire Lake Houston watershed (Upper San Jacinto River Basin), which is larger than a HUC-10 watershed and in fact fully encompasses multiple HUC-10 watersheds. See Attachment G for a map of the Upper San Jacinto River Basin.

INFORMATION FOR GRANT FUNDING

Provide information for the applicable level of grant funding:

Category 1:

Study area AMHI (weighted average based on population)-\$97,967.69

(Optional – attached a copy of federal disaster declaration – flood related within the last 60 months) **See Attachment D**

~~Categories 2, 3, and 4 **N/A**~~

- ~~➤ For consideration of being outside MSA: Project is entirely located outside of an MSA - Yes ____ or No ____~~
- ~~➤ Project area AMHI (weighted average based on population)-\$_____~~
- ~~➤ Project area Unemployment Rate (weighted average based on population)-_____%~~
- ~~➤ Project area Population Decline (if any) (based on sum of the population in the project areas)-_____%~~
- ~~➤ For consideration of being an Rural Applicant: All entities within the project benefit area are outside MSAs and have populations <10,000; or the applicant is a district or municipality with a service area of 10,000 or less in population; or located in a county in which no urban area exceeds 50,000 in population - Yes ____ or No ____~~
- ~~➤ For consideration of being a Green or Nature-Based project: Percentage of total project costs that are considered green or nature-based- _____% (attach the calculation)~~

Note: If requesting grant funds that rely on a calculation of the AMHI, Unemployment Rate, or Population Decline then attach the calculation of the weighted average amounts for the project area based on the applicable U.S. Census Bureau geographic areas such as County, Place (City), Census Tract, or Block Group using the ACS data sources described in the IUP. **See Attachment B for US Census Bureau data calculations. See item (B) in Description of Proposed Project for explanation of project benefit area.**

During census data compilation efforts for abridged grant applications, it was noted by SJRA staff that the number of block groups included in each project benefit area did not always necessarily correlate to the same number of rows of census data in the census data spreadsheet provided by TWDB when queries were run to extract only the spreadsheet data related to the block groups for specific project benefit areas. This is not necessarily the case on all projects/grant applications submitted by SJRA, but SJRA wanted to make TWDB aware of this inconsistency.

PRIORITIZATION CRITERIA

Rural Applicant All entities within the project benefit area are (a) outside MSAs and have populations <10,000; or (b) a district or municipality with a service area of 10,000 or less in population; or (c) a county in which no urban area exceeds 50,000 in population.	☐ Yes ☒ No <i>(Please attach a list of all entities in the project benefit area and U.S. Census Bureau 2014-2018 American Community Survey (ACS) 5-year estimates data indicating the population of each area.)</i>
Emergency Need Due to Recent or Imminent Failure or recent Flood-related Disaster Declarations. A need exists for flood hazard mitigation actions to address a clear and imminent threat to public health, safety, and welfare or property due to recent or imminent failure of existing flood infrastructure or flood-related federal or state disaster declarations within the most recent 36 months that would be significantly mitigated by the proposed project.	☐ Yes, due to a recent failure. ☐ Yes, due to imminent failure. ☒ Yes, recent flood-related disaster declaration for the proposed project area Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR). See Attachment D and item (E) in Description of Proposed Project. ☐ No
Distributed Benefits Is the project expected to directly benefit or include the active participation of jurisdictions other than the applicant?	☒ Yes ☐ No Potential benefits to multiple entities, including City of Houston. City of Houston/Coastal Water Authority participated in the development of the project and are anticipated to participate in project. See items (B) and (F) in Description of Proposed Project and Attachment A.

Estimated Completion Date When would all project phases expected to be complete, assuming funds for the project are closed on in Fall of the current year?	☐ Within 18 months of closing ☒ Within 36 months of closing ☐ Other See item (C) in Description of Proposed Project for more information.
Construction Projects Only (Including PAD plus Construction combined) Project is anticipated to result in an integral, reliable, and quantifiable water supply benefit to a specific water user group with an identified need. May include groundwater recharge benefits.	☒ Yes ☐ No Not a construction project. However, optimization of reservoir operations could lead to water supply benefits in Lake Conroe and/or Lake Houston. See item (D) in Description of Proposed Project for explanation.
Construction Projects Only (Including PAD plus Construction combined) How many structures are anticipated to be removed from floodplains as a result of the proposed project?	Not a construction project. However, construction of gates on Lake Houston dam could lead to removal of structures from floodplain. Purpose of this project is to develop a plan to optimize joint operations of Lake Conroe and Lake Houston once those gates are installed at Lake Houston, and therefore could have an impact on removing structures from the floodplain. See item (E) in Description of Proposed Project.
Non-structural flood mitigation elements Non-structural flood mitigation elements constitute at least 20 percent of the total project costs.	Percentage of total project costs that are considered nature-based- 100% non-structural Project anticipated to provide benefits and does not include construction. Construction of gates at Lake Houston dam (separate project) is however required to achieve benefits. See Description of Proposed Project.

Tiebreaker: Social Vulnerability Index (SVI)	Average SVI of benefitting area: 0.2387 Geographic basis: ☒ Census Tracts ☐ Counties <i>Please attach a list of the selected geographies and an explanation of why they were selected. See item (B) in <u>Description of Proposed Project</u> for explanation of project benefit area. See Attachment A for project benefit area map. See Attachment B for SVI calculations. 2018 CDC statewide ranking SVI data was utilized, as opposed to 2016 nationwide ranking data found in the CDC SVI map referenced in the IUP. This was confirmed as appropriate by TWDB via email.</i>
Certification on MOUs (if MOUs will be required) If no MOUs will be required, check here: ☒ N/A for Category 1 projects per Intended Use Plan.	I, _____(Name), serving as _____(Title) hereby certify that _____(Applicant) has provided all eligible political subdivisions that will be required to submit a Memorandum of Understanding a copy of their proposed Memorandum of Understanding and an adequately detailed description of the proposed project. _____ Signature Date

ADDITIONAL INFORMATION FOR THE FLOOD INFORMATION CLEARINGHOUSE COMMITTEE

Responses to questions 1 through 7, along with other information included in this abridged application, will be shared with the Flood Information Clearinghouse Committee (FLICC), a new cooperative effort between the TWDB, General Land Office, Texas Division of Emergency Management, and other state and federal agencies that administer flood mitigation financial assistance programs. After review by the FLICC, the applicant may be advised of other available source(s) of funding.

1. Type of Assistance Requested (Check all that apply):	☐ Low Interest Loan ☒ Grant ☐ Loan/Grant Combination ☐ Local Match for Federal Funding
If requesting funds for the local cost share of a federally funded project, the name of the program:	N/A
2. County(ies) in which the project is located:	Montgomery and Harris Counties
3. (If applicable) Associated FEMA disaster name and number:	Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR), see Attachment D
4. Does the applicant have an approved Mitigation Action Plan?	No
5. Is the community to be served by the project in good standing with the National Flood Insurance Program?	Yes, see Attachment E
6. Will this project involve enlargement of a dam or levee beyond the original footprint of the structure that existed prior to a disaster event?	No
7. Will this project mitigate a repetitive or severe repetitive loss property?	See Attachment D and item (E) in <u>Description of Proposed Project</u> .

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: ☐	I, _____(Name), serving as _____(Title) hereby certify that _____(Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard. _____ Signature _____ Date
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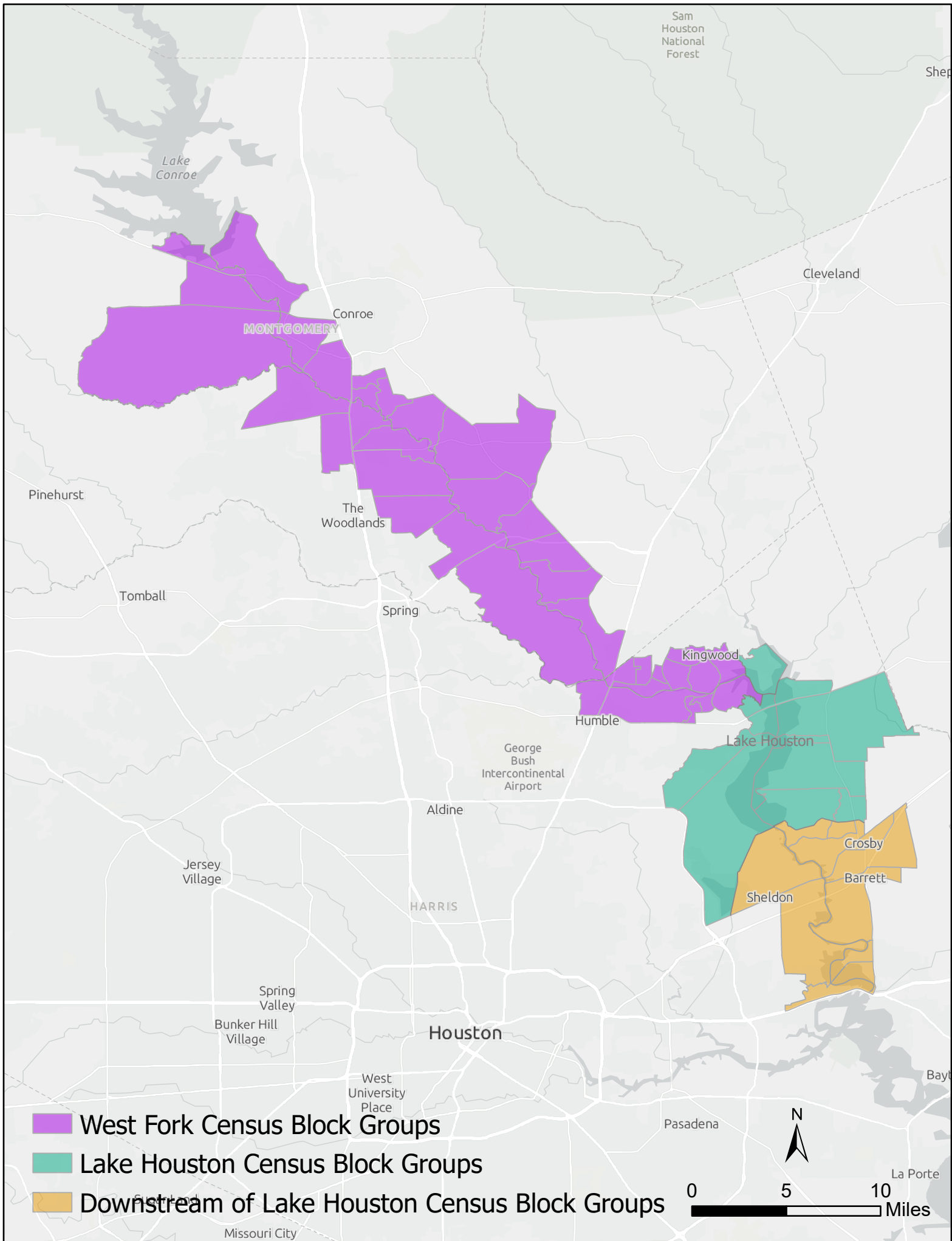
SEE ATTACHMENT E

ATTACHMENT CHECKLIST

☒	<u>N/A</u>	<u>Attachment Description</u>
☐	☒	List of entities receiving the proposed MOU and project description N/A for Category 1 projects per Intended Use Plan.
☐	☒	Benefit-Cost Ratio required information. N/A for study/non-construction projects per Intended Use Plan.
☒	☐	Documentation indicating the best/most recent data was used in the development of the proposed project. See item (A) in <u>Description of Proposed Project</u>.
☒	☐	Documentation demonstrating the area to be served by the proposed project has floodplain ordinances in place and the appropriate entity has certified that it is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards. (The only exception is an entity that is requesting FIF funding to fulfill the requirements for participation in the National Flood Insurance Program.) See Attachment E.
☒	☐	If requesting grant funds that rely on a calculation of the AMHI, Unemployment Rate, or Population Decline then attach the calculation of the weighted average amounts for the project area based on the applicable U.S. Census Bureau geographic areas such as County, Place (City), Census Tract, or Block Group and the ACS data sources described in the IUP. See Attachments A and B.
☐	☒	If requesting prioritization points for "Rural Applicant", a list of all entities in the project benefit area and U.S. Census Bureau 2014-2018 American Community Survey (ACS) 5-year estimates data indicating the population of each area.
☐	☒	(If applying for matching funds) Documentation of an existing federal award pending availability of local match.
☐	☒	(If the project involves property acquisitions) Documentation supporting the determination that acquisitions are the best solution and the properties are a high risk.
☐	☒	(Construction projects) Description of the anticipated funding source for operations and maintenance costs. Not a construction project.
☐	☒	(Construction projects) Map and description of area benefitting from the proposed project, including a list of all benefitting political subdivisions. Not a construction project.
☒	☐	(If applicable) Documentation of recent or imminent infrastructure failure causing an emergency need or a flood-related federal or state disaster declaration within the most recent 36 months that would be significantly mitigated by the proposed project. Hurricane Harvey (FEMA-4332-DR) and Tropical Storm Imelda (FEMA-4466-DR), see Attachment D and item (E) in <u>Description of Proposed Project</u>.
☒	☐	List and explanation of geographies used to determine average SVI. See SVI section of <u>Prioritization Criteria</u>, item (B) in <u>Description of Proposed Project</u>, and Attachments A and B.
☒	☐	Certification on enforcing floodplain management standards for all applicable areas See Attachment E.
☒	☐	Additional Information for the Flood Information Clearinghouse Committee

Attachment A:

Project Benefit Area



Attachment B:

Census/SVI Data and Calculations

Overall SVI	Location	Geography	County	2018 ACS 5 YR - Annual Median Household Income (B19013_001E)	2018 ACS 5 YR - Average Household Size (B25010_001E)	2014 ACS 5 YR - Total Population (B01003_001E) - Prior	2018 ACS 5 YR - Total Population (B01003_001E) - Current	2018 Unemployment Rate (derived from Civilian Labor Force-Unemployed/Total-B23025)	2018 ACS 5 YR - Civilian Labor Force: Total (B23025_003E)	2018 ACS 5 YR - Civilian Labor Force: Unemployed (B23025_005E)	AMHI x 2018 Population	Unemployment x 2018 Population	SVI x 2018 Population
0.0833	West Fork	Block Group 2, Census Tract 6945, Montgomery County, Texas	Montgomery	126989	3.06	5265	10193	3.53	5157	182	1294398877	35981	849
0.1189	West Fork	Block Group 5, Census Tract 6920.01, Montgomery County, Texas	Montgomery	116457	3.2	5687	7656	3.1	3873	120	891594792	23734	910
0.1189	West Fork	Block Group 2, Census Tract 6920.01, Montgomery County, Texas	Montgomery	94890	3.07	9034	10045	6.61	5177	342	953170050	66397	1194
0.1344	West Fork	Block Group 2, Census Tract 6905, Montgomery County, Texas	Montgomery	129612	3.16	3340	5787	3.52	2984	105	750064644	20370	778
0.64	West Fork	Block Group 4, Census Tract 6922, Montgomery County, Texas	Montgomery	52299	2.52	772	1248	0	438	0	65269152	0	799
0.0553	West Fork	Block Group 1, Census Tract 6943.02, Montgomery County, Texas	Montgomery	72165	2.24	1516	1877	1.98	908	18	135453705	3716	104
0.2041	West Fork	Block Group 1, Census Tract 2507.01, Harris County, Texas	Harris	94318	3.49	1662	1935	4.56	965	44	182505330	8824	395
0.3105	West Fork	Block Group 1, Census Tract 2510, Harris County, Texas	Harris	65966	2.53	2302	1877	8.64	995	86	123818182	16217	583
0.4497	West Fork	Block Group 1, Census Tract 2409.02, Harris County, Texas	Harris	26566	2.31	998	875	0	414	0	23245250	0	393
0.3034	West Fork	Block Group 3, Census Tract 6921, Montgomery County, Texas	Montgomery	101471	2.76	2283	2229	3.06	1405	43	226178859	6821	676
0.5311	West Fork	Block Group 3, Census Tract 6944, Montgomery County, Texas	Montgomery	57321	2.62	2027	2332	2.66	1203	32	136727572	6203	1239
0.3034	West Fork	Block Group 2, Census Tract 6921, Montgomery County, Texas	Montgomery	87514	3.02	7103	8014	3.9	4517	176	701337196	31255	2431
0.3034	West Fork	Block Group 1, Census Tract 6921, Montgomery County, Texas	Montgomery	79896	2.84	2985	4766	6.03	2489	150	380784336	28739	1446
0.64	West Fork	Block Group 2, Census Tract 6922, Montgomery County, Texas	Montgomery	54407	3.23	757	1026	7.87	432	34	55821582	8075	657
0.3654	West Fork	Block Group 1, Census Tract 6923, Montgomery County, Texas	Montgomery	66811	4.18	4162	4480	0	1657	0	299313280	0	1637
0.3654	West Fork	Block Group 4, Census Tract 6923, Montgomery County, Texas	Montgomery	55322	1.69	2890	2299	3.9	1129	44	127185278	8966	840
0.2089	West Fork	Block Group 2, Census Tract 6932, Montgomery County, Texas	Montgomery	93389	2.51	2136	1975	2.32	1076	25	184443275	4582	413
0.2089	West Fork	Block Group 3, Census Tract 6932, Montgomery County, Texas	Montgomery	66250	2.2	1457	981	5.19	443	23	64991250	5091	205
0.2089	West Fork	Block Group 4, Census Tract 6932, Montgomery County, Texas	Montgomery	122460	3.3	2056	1601	5.62	854	48	196058460	8998	334
0.3642	West Fork	Block Group 2, Census Tract 6933, Montgomery County, Texas	Montgomery	83365	3.07	2828	3119	5.3	1775	94	293361435	18651	1282
0.3642	West Fork	Block Group 3, Census Tract 6933, Montgomery County, Texas	Montgomery	62500	2.11	2731	3183	3.55	1889	67	198937500	11300	1159
0.0538	West Fork	Block Group 1, Census Tract 6920.02, Montgomery County, Texas	Montgomery	191486	3.37	2294	5885	0.98	3057	30	1126895110	5767	317
0.2419	West Fork	Block Group 2, Census Tract 6937, Montgomery County, Texas	Montgomery	96298	2.6	4797	5840	2.76	3041	84	562380320	16118	1413
0.2041	West Fork	Block Group 2, Census Tract 2507.01, Harris County, Texas	Harris	59444	1.92	1276	622	7.74	336	26	36974168	4814	127
0.0772	West Fork	Block Group 3, Census Tract 2508, Harris County, Texas	Harris	134007	3.05	4011	4453	2.51	2229	56	596733171	11177	344
0.2041	West Fork	Block Group 3, Census Tract 2507.01, Harris County, Texas	Harris	76440	3.23	3302	3090	7.76	1662	129	236199600	23978	631
0.3105	West Fork	Block Group 2, Census Tract 2510, Harris County, Texas	Harris	142350	2.7	661	1217	5.61	517	29	173239950	6827	378
0.2373	West Fork	Block Group 2, Census Tract 2511, Harris County, Texas	Harris	81477	2.37	1285	1116	5.71	700	40	90928332	6372	265
0.2373	West Fork	Block Group 3, Census Tract 2511, Harris County, Texas	Harris	111172	2.48	2118	1584	4.44	879	39	176096448	7033	376
0.64	West Fork	Block Group 3, Census Tract 6922, Montgomery County, Texas	Montgomery	59222	3.1	5957	4487	5.81	1962	114	265729114	26069	2872
0.2373	West Fork	Block Group 5, Census Tract 2511, Harris County, Texas	Harris	57014	2.9	1766	2745	11.6	1250	145	156503430	31842	651
0.0889	West Fork	Block Group 4, Census Tract 2513, Harris County, Texas	Harris	93008	2.65	1912	1687	4.28	724	31	156904496	7220	150
0.0889	West Fork	Block Group 5, Census Tract 2513, Harris County, Texas	Harris	57891	2.13	1190	745	0	289	0	43128795	0	66
0.2062	West Fork	Block Group 2, Census Tract 6907, Montgomery County, Texas	Montgomery	77625	2.02	6214	6646	2.63	3196	84	515895750	17479	1370
0.1254	West Fork	Block Group 2, Census Tract 2509, Harris County, Texas	Harris	81964	2.12	3238	3243	7.11	1632	116	265809252	23058	407
0.2373	West Fork	Block Group 4, Census Tract 2511, Harris County, Texas	Harris	86528	2.49	568	458	13.98	279	39	39629824	6403	109
0.0353	West Fork	Block Group 6, Census Tract 2515.02, Harris County, Texas	Harris	126458	2.39	1570	1015	5.55	559	31	128354870	5633	36
0.1521	Lake Houston	Block Group 3, Census Tract 2519.01, Harris County, Texas	Harris	86066	2.5	2179	2253	2.49	1045	26	193906698	5610	343
0.1521	Lake Houston	Block Group 2, Census Tract 2519.01, Harris County, Texas	Harris	102969	2.95	589	784	0	384	0	80727696	0	119
0.3715	Lake Houston	Block Group 4, Census Tract 2517, Harris County, Texas	Harris	44087	2.81	2281	2452	0	908	0	108101324	0	911
0.3715	Lake Houston	Block Group 2, Census Tract 2517, Harris County, Texas	Harris	56754	2.73	3528	2497	1.47	1160	17	141714738	3671	928
0.1123	Lake Houston	Block Group 3, Census Tract 2504.02, Harris County, Texas	Harris	66944	2.58	5165	5100	0.87	2188	19	341414400	4437	573
0.1521	Lake Houston	Block Group 1, Census Tract 2519.01, Harris County, Texas	Harris	88906	2.98	3923	3404	6.44	1739	112	302636024	21922	518
0.2133	Lake Houston	Block Group 1, Census Tract 2520, Harris County, Texas	Harris	127921	3.16	13818	19799	4.41	10952	483	2532707879	87314	4223
0.1521	Lake Houston	Block Group 4, Census Tract 2519.01, Harris County, Texas	Harris	60215	2.77	3105	3818	9.98	1883	188	229900870	38104	581
0.0772	Lake Houston	Block Group 2, Census Tract 2508, Harris County, Texas	Harris	81813	2.54	2583	2417	2.61	1035	27	197742021	6308	187
0.1123	Lake Houston	Block Group 1, Census Tract 2504.02, Harris County, Texas	Harris	123659	3.24	10305	15970	3.15	8393	264	1974834230	50306	1793
0.1254	Lake Houston	Block Group 4, Census Tract 2509, Harris County, Texas	Harris	221042	3.66	4331	4225	0	1553	0	933902450	0	530
0.7571	DS of LH	Block Group 1, Census Tract 2528, Harris County, Texas	Harris	60012	2.63	2533	2335	7.55	1139	86	140128020	17629	1768
0.153	DS of LH	Block Group 1, Census Tract 2519.02, Harris County, Texas	Harris	69896	2.45	1880	1076	3.96	505	20	75208096	4261	165
0.153	DS of LH	Block Group 2, Census Tract 2519.02, Harris County, Texas	Harris	77314	2.89	1269	2006	2.84	1021	29	155091884	5697	307
0.3685	DS of LH	Block Group 1, Census Tract 2521, Harris County, Texas	Harris	62375	3.26	2058	2274	4.53	1170	53	141840750	10301	838
0.6955	DS of LH	Block Group 2, Census Tract 2527, Harris County, Texas	Harris	36458	2.73	1746	1722	7.88	774	61	62780676	13569	1198
0.631	DS of LH	Block Group 2, Census Tract 2529, Harris County, Texas	Harris	31812	2.15	537	605	16.93	319	54	19246260	10243	382
0.153	DS of LH	Block Group 3, Census Tract 2519.02, Harris County, Texas	Harris	101064	2.96	2115	2938	9.14	1466	134	296926032	26853	450
0.8466	DS of LH	Block Group 4, Census Tract 2526, Harris County, Texas	Harris	46696	2.86	1675	2029	22.68	1045	237	94746184	46018	1718
0.8466	DS of LH	Block Group 3, Census Tract 2526, Harris County, Texas	Harris	61667	3.78	1755	1891	9.59	876	84	116612297	18135	1601
0.631	DS of LH	Block Group 1, Census Tract 2529, Harris County, Texas	Harris	45147	2.89	1608	1707	30.81	581	179	77065929	52593	1077
0.6955	DS of LH	Block Group 1, Census Tract 2527, Harris County, Texas	Harris	42115	2.84	1101	1461	2.86	664	19	61530015	4178	1016
Population Totals:						176,234	205,494						
											Total AMHI x 2018 Population (A) =		
											20,131,772,108		
											Total 2018 Population (B) =		
											205,494		
											Total Weighted Average AMHI (A/B) = \$		
											97,967.69		
											Total Unemployment x 2018 Population (C) =		
											940,859.93		
											Total 2018 Population (D) =		
											205,494		

Total Weighted Average Unemployment (C/D) =	4.58
SVI x 2018 Population (E) =	49,056.99
Total 2018 Population (F) =	205,494
Total Weighted Average SVI (E/F) =	0.2387

Attachment C:

Grant Percentage Calculator Spreadsheet

CATEGORY 1 - Lake Conroe – Lake Houston Joint Reservoir Operations Study

Project AMHI =	\$ 97,967.69	
State AMHI =	\$ 59,570.00	
Project/State =	164%	
Project/State $\leq$ 50% and Fed. Disaster Declaration Last 5 Years =	100% Grant	☐
Project/State $\leq$ 75% =	90% Grant	☐
Project/State $>$ 75% and $\leq$ 125% =	75% Grant	☐
Project/State $>$ 125% =	50% Grant	☒
AMHI Grant % =	50%	

TOTAL GRANT % =	50%
------------------------	------------

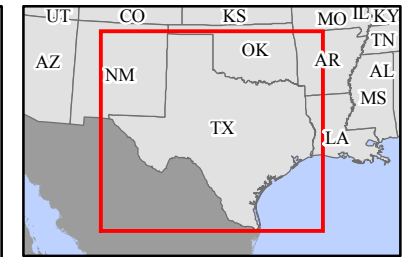
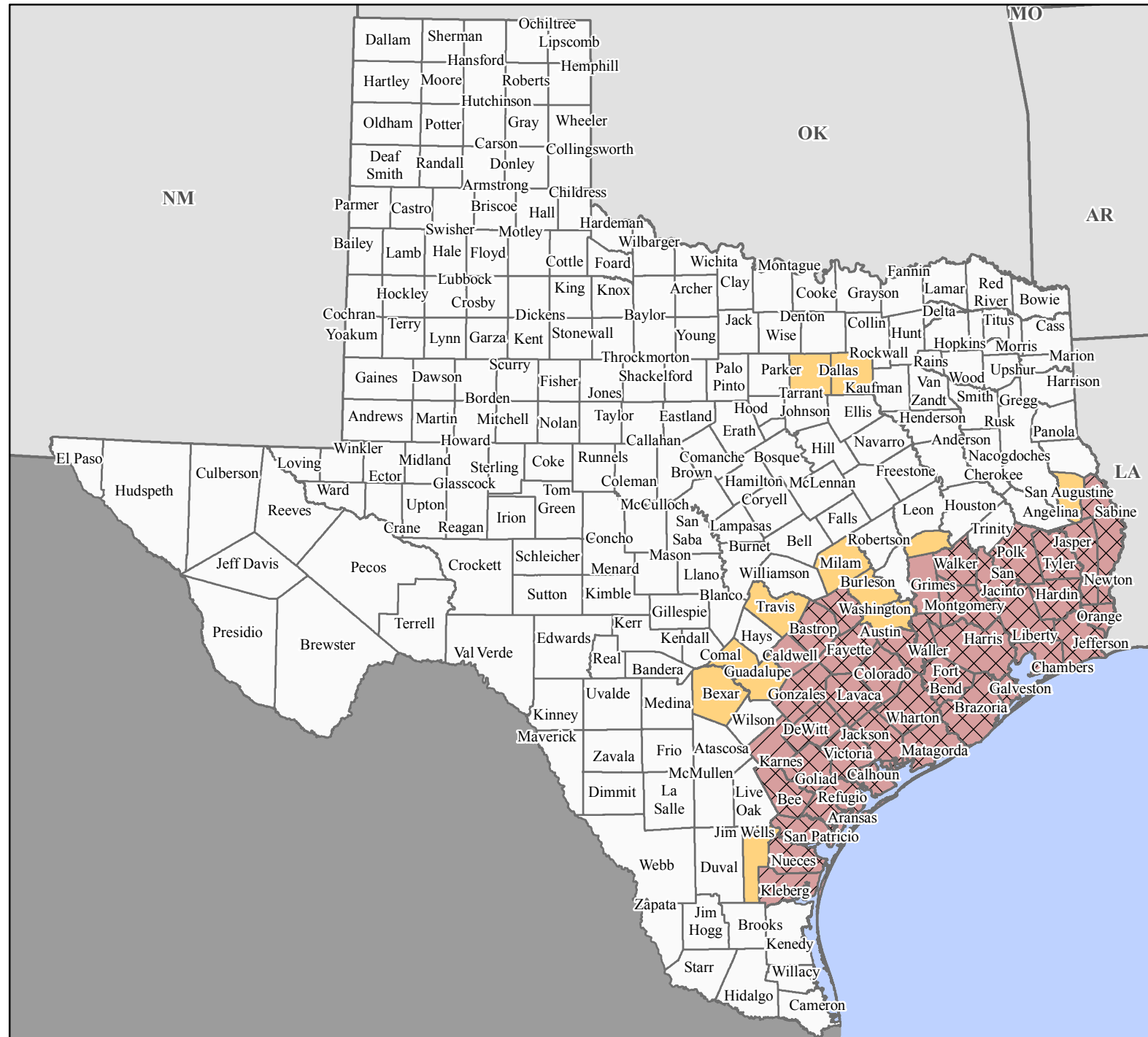
Attachment D:

Disaster Declarations for Hurricane Harvey
and Tropical Storm Imelda

FEMA-4332-DR, Texas Disaster Declaration as of 10/11/2017



FEMA

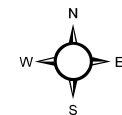


Data Layer/Map Description:
The types of assistance that have been designated for selected areas in the State of Texas.

All designated areas in the State of Texas are eligible to apply for assistance under the Hazard Mitigation Grant Program.

Designated Counties

- No Designation
- Public Assistance
- Individual Assistance and Public Assistance
- Public Assistance (Category B)
- Individual Assistance and Public Assistance (Categories A and B)
- Individual Assistance and Public Assistance (Categories A - G)



0 40 80 120 160
Miles

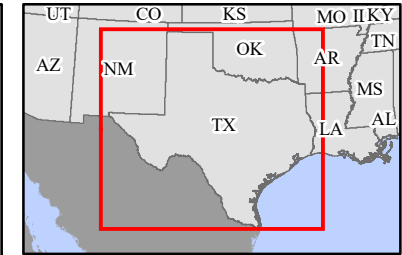
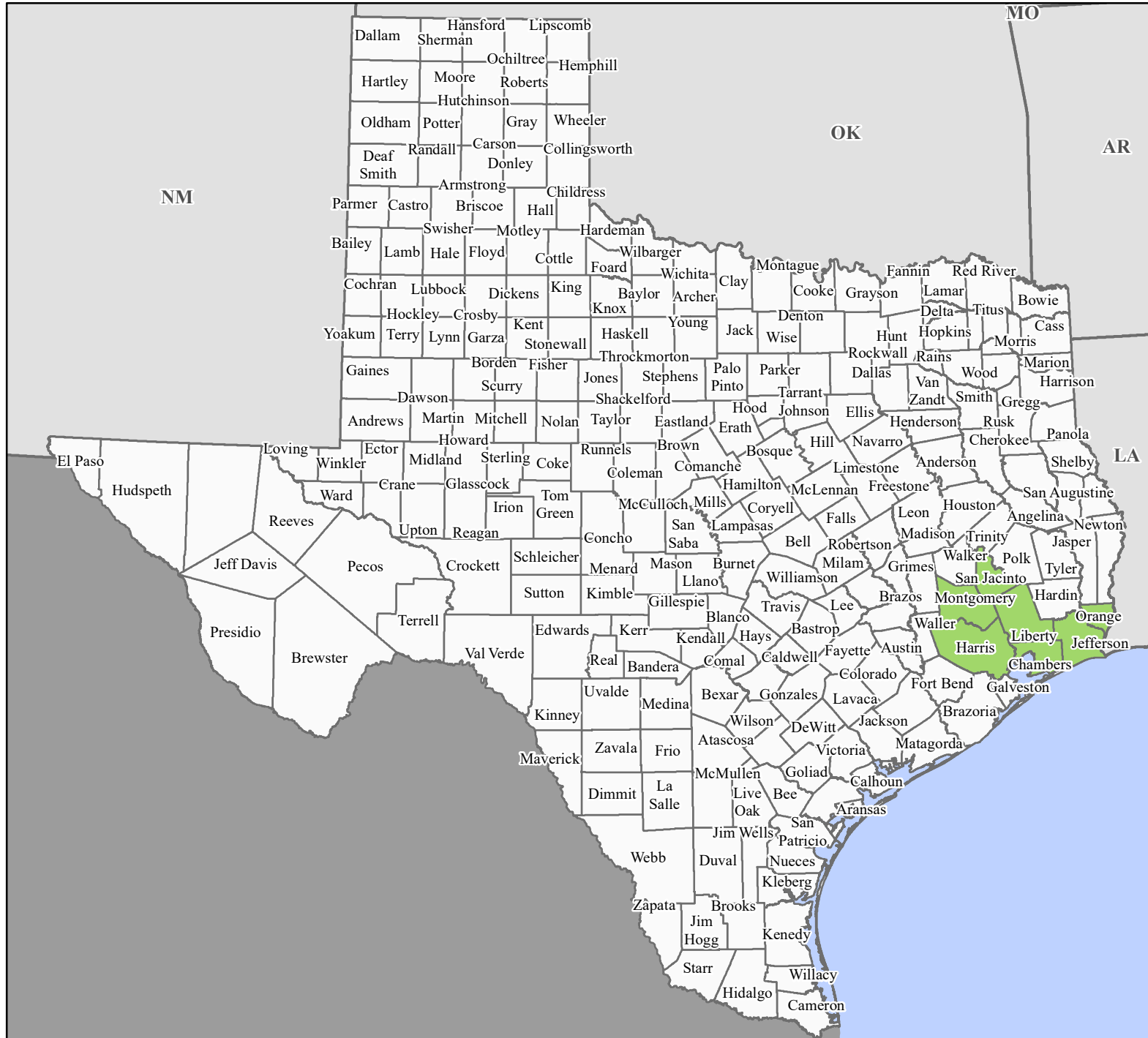
Data Sources:

FEMA, ESRI;
Initial Declaration: 08/25/2017
Disaster Federal Registry Notice:
Amendment #10 - 10/11/2017
Datum: North American 1983
Projection: Lambert Conformal Conic

FEMA-4466-DR, Texas Disaster Declaration as of 10/24/2019



FEMA



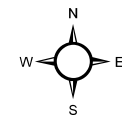
Data Layer/Map Description:

The types of assistance that have been designated for selected areas in the State of Texas.

All areas within the State of Texas are eligible for assistance under the Hazard Mitigation Grant Program.

Designated Counties

- No Designation
- Individual Assistance



0 40 80 120 160
Miles

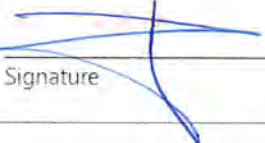
Data Sources:

FEMA, ESRI;
Initial Declaration: 10/04/2019
Disaster Federal Registry Notice:
Amendment #1: 10/24/2019
Datum: North American 1983
Projection: Lambert Conformal Conic

Attachment E:

NFIP Certifications

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards	I, <u>Jay Muschenheim</u> (Name), serving as <u>Flood Plain Administrator</u> (Title)
Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: ☐	hereby certify that <u>unincorporated Montgomery Co., TX</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.  _____ Signature _____ Date <u>April 29, 2020</u>

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: ☐	I, <u>Jonathan Steiber</u> (Name), serving as <u>Harris County Floodplain Administrator</u> (Title) hereby certify that <u>San Jacinto River Authority Harris County</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard.  _____ Signature <u>4-29-2020</u> _____ Date
--	---

CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: ☐	I, <u>Ann Colina</u> (Name), serving as <u>Floodplain Administrator</u> (Title) hereby certify that <u>the City of Caroe</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard. <u></u> Signature <u>5-15-20</u> Date
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CERTIFICATION ON ENFORCING FLOODPLAIN MANAGEMENT STANDARDS

Certification on enforcing floodplain management standards Exception: The only exception is an entity that is requesting FIF funding to fulfill additional requirements for participation in the National Flood Insurance Program. If this is the situation, check here: ☐	I, <u>Choyce Morrow</u> (Name), serving as <u>Flood Administrator</u> (Title) hereby certify that <u>City of Houston</u> (Appropriate entity for area to be served by the project) is currently enforcing floodplain management standards at least equivalent to National Flood Insurance Program (NFIP) minimum standards, but it may exceed the NFIP minimum standard. <u>Choyce Morrow</u> Signature <u>6/2/2020</u> Date
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Attachment F:

San Jacinto Regional Watershed Master
Drainage Plan Project Fact Sheet

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN FACT SHEET



The San Jacinto Regional Watershed Master Drainage Plan is a comprehensive regional study led by local partners including the Harris County Flood Control District, the San Jacinto River Authority, Montgomery County, and the City of Houston.

This integrated effort, kick started in April 2019, will identify future flood mitigation projects that can be implemented in the near- and long-term to reduce flood risks to people and property throughout the San Jacinto River regional **watershed**.

The goals of the San Jacinto Regional Watershed Master Drainage Plan are to:

- Identify the region's vulnerabilities to flood hazards using Atlas 14 rainfall
- Develop approaches to enhance public information and flood level assessment capabilities during a flood disaster event
- Evaluate flood mitigation strategies to improve community resilience
- Provide a comprehensive Flood Mitigation Plan that supports the needs and objectives of each regional partner

The goals of the project will be achieved by developing a set of hydrologic and hydraulic models for the major tributaries of the Upper San Jacinto River regional watershed (from the **headwaters** in Walker County to the Interstate 10 crossing at the San Jacinto River in Harris County). The models will use consistent, cohesive methodology and rainfall rates, regardless of the county in which those channels are located.

Information to be developed includes *non-regulatory* **inundation maps** (not intended to replace current effective maps) for the studied streams that show the extent and depth of **riverine flooding** of the larger rivers within the watershed for an array of simulated storm events. Additionally, information will be gathered about the number of structures, acres of land, properties, and miles of roadway that are located within the modeled floodplains. Study results will be used to inform and update **Hazard Mitigation Plans** for each of the participating partners and to provide guidance on regulations for future growth within the study area.

The project area covers nearly 3,000 square miles. The expected completion time frame is Fall 2020. The project is budgeted at \$2.7 million.

Contact Us

The participating project partners are interested in hearing from you. Please contact your local representative with comments and questions:

- **Harris County Flood Control District** – Jing Chen, jing.chen@hcfcd.hctx.net
- **San Jacinto River Authority** – Matt Barrett, mbarrett@sjra.net
- **Montgomery County** – Darren Hess, darren.hess@mctx.org
- **City of Houston** – Adam Eaton, adam.eaton@houston.tx.gov

GLOSSARY

Watershed: A geographical region of land or "drainage area" that drains to a common channel or outlet, mostly creeks and bayous. Drainage of the land can occur directly into a bayou or creek, or through a series of systems that may include storm sewers, roadside ditches, and/or tributary channels.

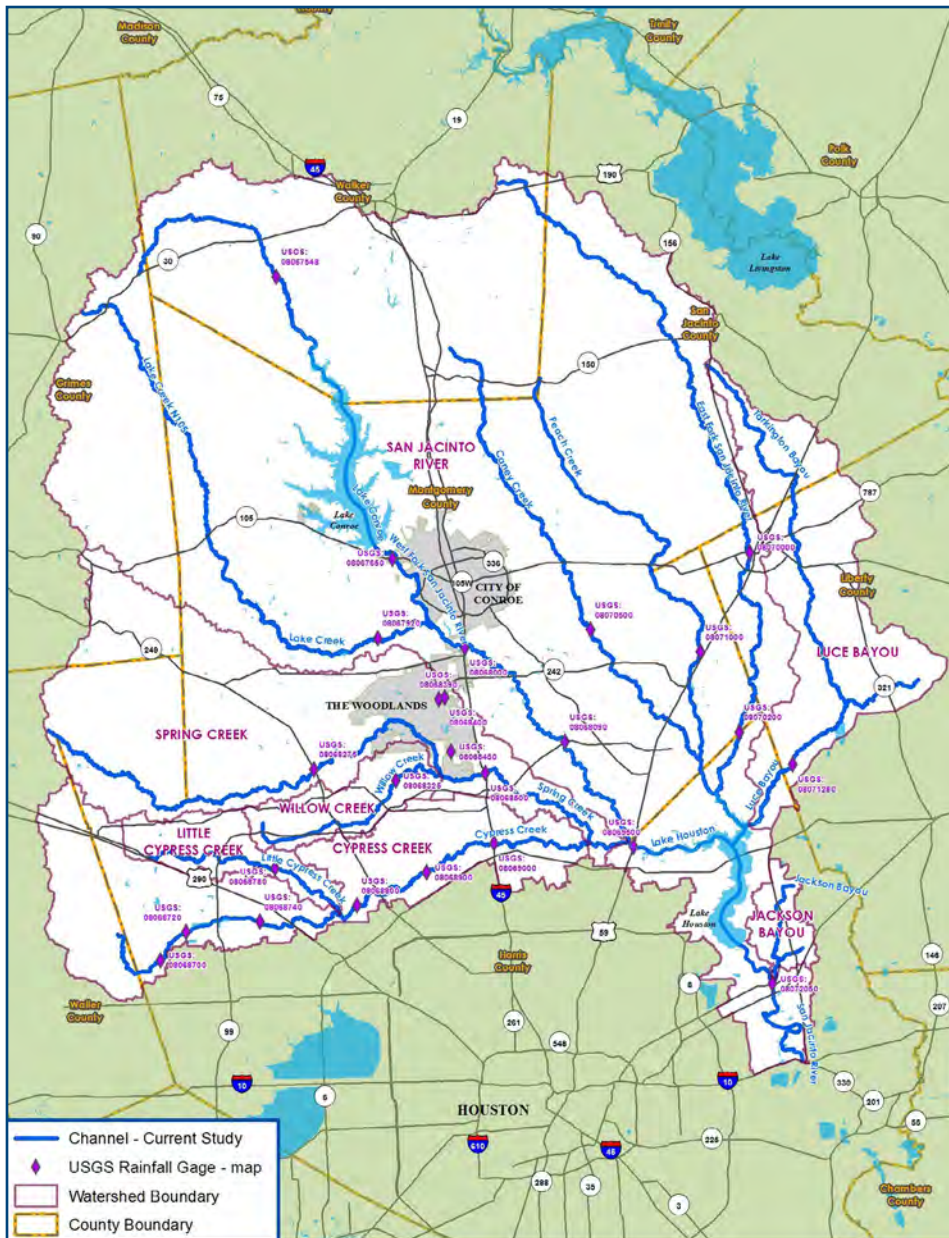
Headwaters: Headwaters are simply the initial source of the water in a river.

Inundation maps: Maps that show where flooding may occur over a range of water levels in a community's local stream or river.

Riverine flooding: Flooding that is the result of creeks and bayous leaving their banks due to heavy rainfall.

Hazard Mitigation Plans: Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters, such as flooding. Governmental organizations engage in hazard mitigation planning to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people and property. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage.

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN STUDY AREA



3,000 SQUARE MILES OF STUDY AREA

The watershed for the streams to be studied covers an expanse of nearly 3,000 square miles, located in seven different counties:

- Grimes County
- Harris County
- Liberty County
- Montgomery County
- San Jacinto County
- Walker County
- Waller County

The study includes approximately 535 miles of stream, including West Fork San Jacinto River, East Fork San Jacinto River, San Jacinto River, Lake Creek, Cypress Creek, Little Cypress Creek, Spring Creek, Willow Creek, Caney Creek, Peach Creek, Luce Bayou, Tarkington Bayou, and Jackson Bayou.

Stream Name	Stream Length (Miles)
West Fork San Jacinto River	61.4
East Fork San Jacinto River	73.2
San Jacinto River	16.3
Lake Creek	58.9
Cypress Creek	60.5
Little Cypress Creek	20.8
Spring Creek	69.6
Willow Creek	19.8
Caney Creek	49.3
Peach Creek	53.5
Luce Bayou	10.8
Tarkington Bayou	36.9
Jackson Bayou	4.6
Total	535.6



Attachment G:

Upper San Jacinto River Watershed (Basin)
Map

Upper San Jacinto River Watershed Map

