CAUSE NO. 1123430 (Consolidated)

VICENTE MEDINA, ASHLEY MEDINA, ARIS ANTONIOU, ET AL.	§	**COUNTY CIVIL COURT**
	§	
Plaintiffs	§	
	§	**AT LAW NO. 1**
V.	§	
	§	
SAN JACINTO RIVER AUTHORITY	§	
	§	
Defendant	§	**HARRIS COUNTY, TEXAS**

DECLARATION OF DR. PHILIP B. BEDIENT

My name is Dr. Philip B. Bedient. I am over the age of eighteen (18) years, have never been convicted of a felony or a crime of moral turpitude, and am competent to make this declaration. I have personal knowledge of the facts contained herein and the facts are true and correct. I submit this declaration in connection with the above-styled lawsuit.

I. Introduction

A. Purpose of Report

The purpose of this report is to present my findings and opinions regarding the allegations made in the Plaintiff's Petition in *Medina v. San Jacinto River Authority* that the design, construction and operation of Lake Conroe Dam by San Jacinto River Authority (SJRA) caused or contributed to the flooding of private property downstream of the Lake Conroe Dam during Tropical Storm Harvey starting on or about August 28, 2017. The location of Lake Conroe Dam, north of the City of Houston, is shown in **Figure 1**.

EXHIBIT 1

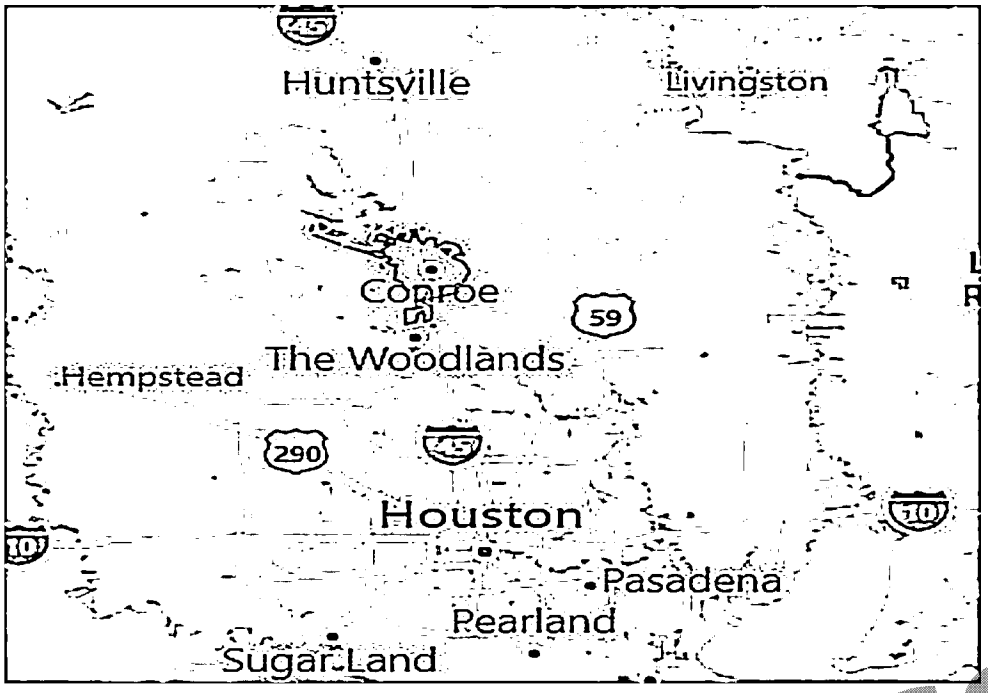

Figure 1. Location of Lake Conroe Dam/Lake in Montgomery County, Texas, north of Houston

B. Documents Reviewed

In formulating my conclusions, I reviewed various documents relating to the history of the San Jacinto River Authority and Lake Conroe Dam, some of which are described below, in order to evaluate the design, construction and operation of the Dam and give an opinion as to the intent, foreseeability and predictability by the San Jacinto River Authority of the inundation of private lands that would occur downstream of the Lake Conroe Dam following a release of waters of the magnitude that occurred following Tropical Storm Harvey.

Further, I reviewed documents regarding Harvey including precipitation, stream gage, and lake elevation data for Harvey, some of which are described below, in order to understand the magnitude of the Harvey event and possible causes of the flooding of the private property.

I also reviewed and utilized some of the computer modeling provided by the SJRA consultant, HDR, to demonstrate the contribution that the water released from Lake Conroe by SJRA during Harvey had on the flooding downstream at the various Plaintiffs' properties. Some of this HDR modeling also provides information about potential downstream flooding without the Lake Conroe Dam.

Finally, I reviewed data relating to slab elevations at various private properties as well as high water marks evidencing the depth of flooding at each of those properties.

C. Summary of Findings and Opinions

- The releases from the Lake Conroe Dam by SJRA during Harvey caused or exacerbated the flooding of the Plaintiff's properties, as demonstrated by the model results of SJRA's consultant, HDR, as shown in M. Forest's affidavit attached to the SJRA Plea to the Jurisdiction in this case.

- The releases from the Lake Conroe Dam by SJRA during Harvey caused or exacerbated the flooding of the Plaintiff's properties, as demonstrated by the model results of SJRA's consultant, HDR, as compared to what would have happened if No Dam had been constructed (i.e. natural conditions).

- The releases from the Lake Conroe Dam by SJRA during Harvey caused or exacerbated the flooding of the Plaintiff's properties, as demonstrated using the modeling of SJRA's consultant, HDR, as compared to what would have happened if SJRA had followed its pre-2010 Gate Operating Procedures (GOP).

All opinions and conclusions are stated to a reasonable degree of scientific and engineering certainty, and are generally provided at the end of this report.

D. Qualifications

I am the Herman Brown Professor of Engineering in the Department of Civil and Environmental Engineering at Rice University, where I have served since 1975. From 1992 to 1999, I served as Chair of Environmental Engineering at Rice University. In 2006, I was elected as a Fellow to the American Society of Civil Engineers ("ASCE").

I have a Ph.D. (1975) in Environmental Engineering Sciences from the University of Florida, an M.S. (1972) in Environmental Engineering from the University of Florida, and a B.S. (1969) in Physics from the University of Florida.

I teach and perform research in surface water hydrology, groundwater hydrology, floodplain analysis, flood prediction systems, coastal resiliency and disaster management, and storm water quality control. I have directed 60 research projects over the past 40 years.

I have been working with regulated reservoirs, including both federal (USACE-operated) and non-federal reservoir projects, since the mid-1970s. As part of my Ph.D. work at the University of Florida, I analyzed the channelization and associated reservoirs on the Kissimmee River in south-central Florida. More recently, I was involved in the analysis of the 2010 flood in Nashville, Tennessee, on the system of USACE reservoirs along the Cumberland River; my analysis was particularly focused on the role of the associated dams within the Cumberland River reservoir system and comparing the operational plans with how the dams operated during the flood event. Most recently, I testified on behalf of the State of Georgia against the State of Florida regarding reservoir operations by the Corps of Engineers along the Chattahochee River. I have also been involved with two non-federal reservoirs located in Houston, including a flood warning-related analysis of Lake Conroe (a flood storage, recreational, and water supply project) as well as various water quality-related studies associated with Lake Houston (a water supply and recreational project). I have also worked on river and lake projects near Austin, Texas, including analysis on Lake Austin and Lake Travis with respect to flows, storage, and environmental impacts.

I have extensive experience working with USACE Hydrologic Engineering Center ("HEC") software packages including HEC-1, HEC-2, HEC-HMS, HEC-RAS, HEC-ResSim, and HEC-FIA.

I have been analyzing complex hydrologic systems, and developing and running advanced hydrologic and hydraulic models, my entire career. I have worked in dozens of large urban and rural watersheds across the United States on issues involving flood and drought flows, urban impacts, and associated flow statistics. I have modeled lakes, rivers, and watersheds throughout the South and Southeast, including: the Kissimmee River and Lake Okeechobee in Florida; and the San Jacinto River (10 urban basins in the Houston area), the Colorado River, the Trinity River, the Brazos River, Lake Austin, and Lake Travis in Texas. I have also performed similar work in California, Louisiana, and Michigan. These studies have included both flood and hydrologic response studies over multi-year time periods. I have also performed long-term statistical analyses of rainfall and low flow runoff in Texas related to environmental flows.

In 1998, I invented the first real-time flood warning system (FAS) used in the United States. FAS was developed for the Texas Medical Center using NEXRAD radar and real-time hydrologic prediction. The system has been in place for almost 20 years. When Tropical Storm Allison hit Houston in 2001 causing $5 billion in flood damage, I was involved for over five years with the redesign of the infrastructure to manage flood flows based on HEC models and SWMM simulations.

In 2006, I formed the Severe Storm Prediction ("SSPEED") Center with funding from Texas after Hurricanes Katrina and Rita impacted the Gulf Coast. Since 2007, I have been the director of the Center, which consists of a team of five universities and 15 investigators from the Gulf Coast dedicated to improving severe storm prediction, education, and evacuation from disaster. SSPEED has received major funding from the Houston Endowment since 2009 and is currently developing the Houston-Galveston Area Protection System for mitigating storm surge in the region.

I have written over 180 articles in journals and conference proceedings. I have also authored four textbooks, and I am the lead author on Hydrology and Floodplain Analysis (Prentice Hall, 6th ed., 2018), which is one of the leading hydrology textbooks used in over 75 universities across the United States.

In 2007, I received the prestigious C.V. Theis Award from the American Institute of Hydrology. I also received the Shell Distinguished Chair in Environmental Science (1988–1993). I am also a Fellow with the American Society of Civil Engineers. During Hurricane Harvey (2017), Buffalo Bayou in the Houston area suffered an extensive flooding. The flooding was caused by combined factors from both local rainfall and the upstream reservoirs release (Addicks and Barker reservoirs). In order to better understand the flood inundation caused by these two combined factors, I performed a hydrologic/hydraulic analysis for Buffalo Bayou during the event. (See my attached curriculum vitae and list of legal cases in last 4 years).

A full copy of my CV is provided in **Appendix A**.

E. Compensation

I am being compensated for my work on this case at $300 per hour, plus reasonable expenses, and at $400 per hour for time spent testifying at depositions or trial.

F. Last 4 years of testimony

I have provided in **Appendix B** a list of all of the cases in which I have given expert testimony either in deposition or at trial.

G. Documents considered in preparing my report

The documents that were reviewed and utilized in preparing my report are listed in **Appendix C** attached hereto, including the following:

- all interrogatory answers signed by Plaintiffs;
- elevation certificates from Plaintiffs;
- all exhibits attached to Plaintiffs' Response to SJRA Plea;
- Depositions with exhibits of Olmos, Houston and Forest

II. Design, Construction and Operation of Lake Conroe Dam

A. General Dam Design, Criteria, and Policy

A "dam" is a barrier that obstructs or blocks the flow of water, then captures and stores the water behind it. The area behind a dam where the water is being stored is known as the "reservoir". A dam usually consists of an earthen or concrete embankment built across a river or creek, and is normally built to reduce the potential of downstream flooding, provide a reliable source of water supply, and/or provide recreational opportunities. An outlet structure through the dam (e.g. culverts) is usually provided at or near the bottom of the flood control portion of the dam so that any flood waters that are being stored behind the dam can be released and the reservoir emptied to make room for the storage of additional flood waters when the next storm event occurs. An emergency (or auxiliary) spillway is also normally included near the top of the dam to provide for the release of excess flood waters during a major flood event so that overtopping of the dam can be avoided and the integrity of the dam maintained (i.e. preventing a dam failure). **Figure 2** shows a schematic of a typical flood control dam and reservoir.

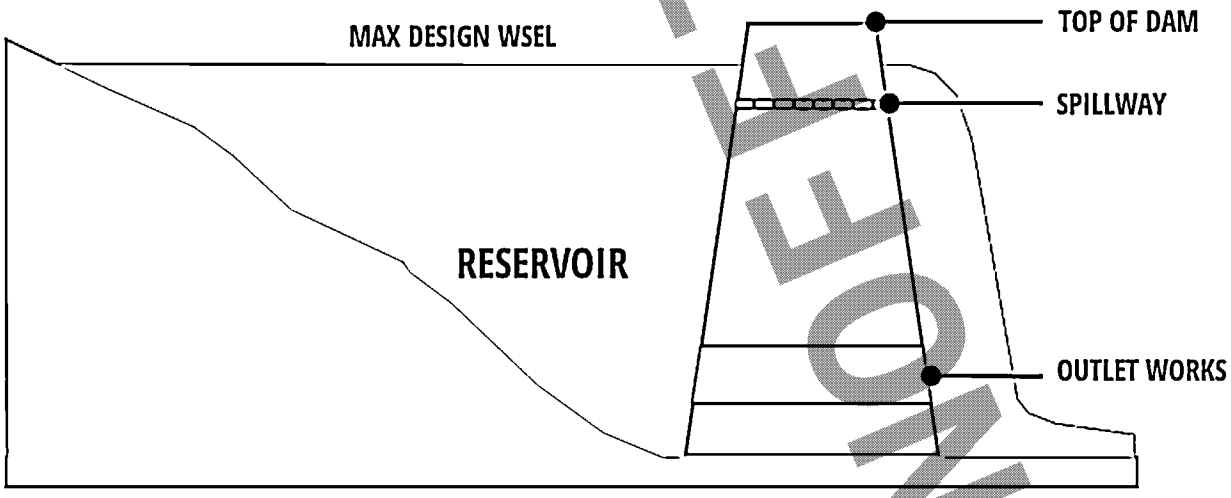

Figure 2. Schematic of Typical Flood Control Dam and Reservoir

Flood control dams have as their primary or sole purpose the reduction of flood damages downstream. Such dams are normally designed to safely handle the probable maximum storm that would be reasonably expected to occur in the area. Prior to the 1960s, such a design storm was based on the largest historic storm recorded for the region. Since then, the National Weather Service (NWS) has published probable maximum precipitation (PMP) data that is used in dam design.

Water supply dams have as their primary or sole purpose the storage of water to serve as a water supply source for local communities. These dams provide a constant water level behind them, creating a lake/reservoir that can be used to serve other purposes, such as recreation (e.g. Lake Conroe Dam).

The U. S. Army Corps of Engineers (USACE) has designed, constructed, and operated hundreds of dams and reservoirs across the United States, and has established engineering regulations (ERs), manuals (EMs) and Technical Letters (ETLs) to provide policy, criteria and guidance associated with these activities. For example, ER 1110-8-2 (Mar 1991) titled "Inflow Design Floods for Dams and Reservoirs" is a USACE Engineering Regulation that sets forth requirements for establishing design floods to evaluate the adequacy of dams and their spillways. In addition, EM 1110-2-1420 (October 1997) is a USACE Engineering Manual titled "Hydrologic Engineering Requirements for Reservoirs" that provides design criteria, policy and guidance regarding dam design, including real estate acquisition.

The USACE issued an engineering manual (EM 1110-2-3600) in 1959 regarding reservoir regulation and operation, in which it discusses the generally recognized effects of large, deep reservoirs on the natural discharge of rivers (e.g. Lake Conroe). Such effects include creating an earlier and higher peak inflow to the dam than would be expected under natural (non-dam) conditions. This manual also discusses how to operate the gated spillways of such dams to help prevent increased flood damages downstream, such as keeping peak release rates below those rates that would have occurred under natural conditions. In addition, the manual states that the rate of increase in reservoir releases should not create a major hazard to downstream interests. The pertinent section of this manual (4-05. Operation of Gated Spillways) is shown below. (Note that the Lake Conroe Dam was designed in the 1960s).

4-05. **OPERATION OF GATED SPILLWAYS** *a.* **General.** The effects of large, deep reservoirs on the natural discharge of rivers are generally recognized and accounted for by developing "inflow to full pool" hydrographs as well as hydrographs for corresponding design floods under natural river conditions. Refer to EM 1110–2–1405. The earlier and higher peak of the "inflow to full pool" hydrograph results primarily from the increased depth of flow and decreased friction in the flooded or reservoir pool sections of the main river and tributary streams above the dam. The flow from the upper basin reaches the dam earlier and usually synchronizes to a greater extent with the inflows from the local areas and lower tributaries discharging directly into the reservoir pool and also reaching the dam earlier than would occur under natural river conditions. A secondary effect in the increase of the "inflow to full pool" hydrograph results from the fact that the dampening effect of valley storage within the reservoir pool is considerably less under artificial conditions of flow through reservoirs being held at fairly constant level than under natural river conditions. Where a number of reservoirs in sequence are involved, a material shortening of the concentration time of floodwaters can result and uncontrolled peaks may be increased.

Until recent years it was common practice in the study of gated spillways to assume that the reservoir level would not be permitted to rise above the static-full-pool elevation near the dam until all spillway gates were open, after which reservoir outflow would be uncontrolled as long as inflow exceeded the capacity of the spillway at static-full-pool elevation. However, experience in the operation of gated spillways has shown that significant flood damages may arise because of the fact that reservoir releases under this plan of operation may be larger during floods occurring when the reservoir is full, or near full, than would have been the case under natural conditions before construction of the reservoir. The operation of gated spillways because of sudden increases in the rate of outflow may result in a damaging flood wave. For these reasons, insofar as practicable, reservoirs controlled by gated spillways should be designed and operated to accomplish the following objectives during periods when the reservoir is filled or nearly filled:

(1) Peak rates of reservoir release during damaging floods should not exceed peak rates of the corresponding floods that would have occurred under runoff conditions prevailing before construction of the reservoir.

(2) The rate of increase in reservoir releases during a significant increment of time should be limited to values that would not constitute a major hazard to downstream interests.

B. Original and Revised Design of Lake Conroe Dam

- Creation and Purpose of the SJRA

The San Jacinto River Conservation and Reclamation District (predecessor to the San Jacinto River Authority) was created by the Texas Legislature in 1937 and is one of 15 major river authorities in the State of Texas. It was established to develop the State's water resources and to control, store, and distribute flood waters. The authorizing legislation for the San Jacinto River Conservation and Reclamation District was passed in 1937. *See* Act of May 12, 1937, 45th Leg., R.S., ch. 426, § 1. Among the powers vested in the San Jacinto River Conservation and Reclamation District was the power to "stor[e], control[], and conserv[e] storm and flood waters of the San Jacinto River... and the prevention of the escape of any such waters ... for the prevention of devastation of lands from recurrent overflows, and the protection of life and property in such watershed area from uncontrolled flood waters." *Id.*

This legislation, as well as others creating river authorities throughout Texas, was passed in response to decades of severe river flooding at great financial and human cost, such as the following:

- Dec. 1–5, 1913: 15 inches fell in Central Texas and caused major flooding on the Brazos River, causing the loss of 177 lives and $8.5 million of damage
- April 20–26, 1915: 17 inches of rain fell in North and East Texas causing floods in the Trinity, Brazos, Colorado and Guadalupe rivers. 40 lives were lost and $2.3 million in property damage occurred

- Sept. 8–10, 1921: 23.98 inches of rainfall fell over a period of 35 hours. Five to nine feet of water stood at downtown San Antonio. 215 people were killed with $19 million in property damage
- May 24–31, 1929: 12.9 inches of rain fell over multiple rivers and caused substantial damage in Houston from overflow of bayous
- June 30–July 2, 1932: flooding in the Nueces River and Guadalupe River watersheds
- July 22–25, 1933: flooding from 22.30 inches of rainfall in east Texas resulted in $1.1 million in damage
- Sept. 15–18, 1936: 25.19 inches of rain caused the Concho River to overflow its banks and flooded 500 homes in San Angelo, resulting in $5 million in damage and four deaths.

It is against this historical context that the Texas legislature created the San Jacinto River Conservation and Reclamation District and the other river authorities. Alleviating flooding across the state was a primary consideration. The jurisdictional boundary that the Texas legislature assigned to the SJRA is shown in **Figure 3,** in relation to the upper portion of the San Jacinto River watershed.

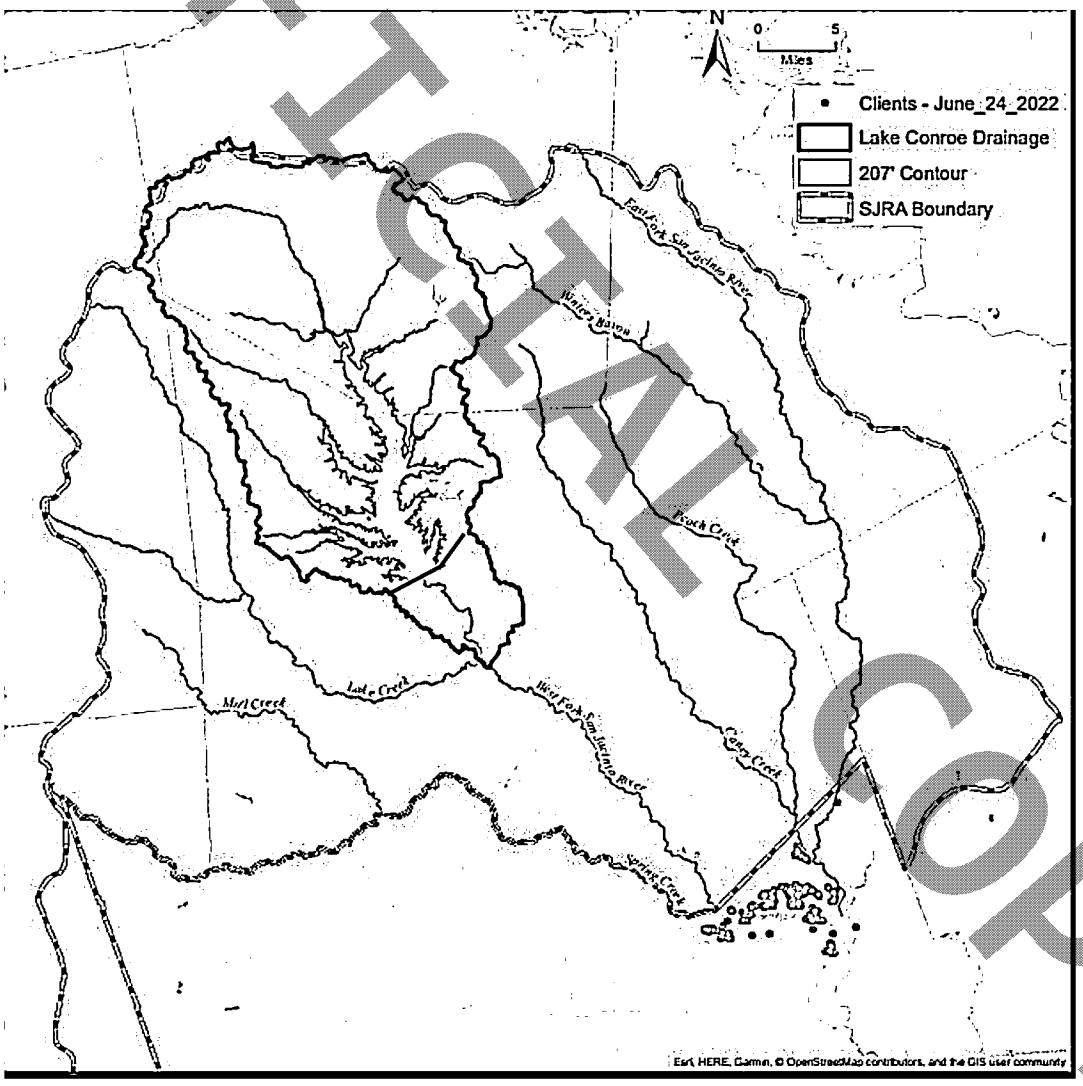

Figure 3. Jurisdictional Boundary of the SJRA in relation to the San Jacinto River Watershed above Lake Houston and the Plaintiffs' Properties

- **SJRA's Master Plan (1943)**

In its November 1943 Master Plan Report for the Full-Scale Development of the San Jacinto River system within the boundaries of the San Jacinto River Conservation and Reclamation District, the District acknowledged flood control as one of its "prime purposes and objectives". Recurrent flooding in the San Jacinto River was noted to have caused loss of life and property and a depletion of the fertility of the land in the watershed. To accomplish this objective, the plan proposed the construction of a series of flood control dams upon the San Jacinto River and its principal tributaries (see **Figure 4**), as well as widening the channels of streams in the watershed. Uncontrolled flooding was noted as having also caused substantial damage to the lower stretches of the San Jacinto River, necessitating the frequent closure of the Houston Ship Channel. Flooding in 1929 had resulted in the San Jacinto River dumping large amounts of silt into the Houston Ship Channel, preventing vessels from entering or leaving the Port of Houston for five days. In 1935, the report stated that silt deposits from flooding again closed the Ship Channel for three days. To date, none of these flood control dams have been constructed.

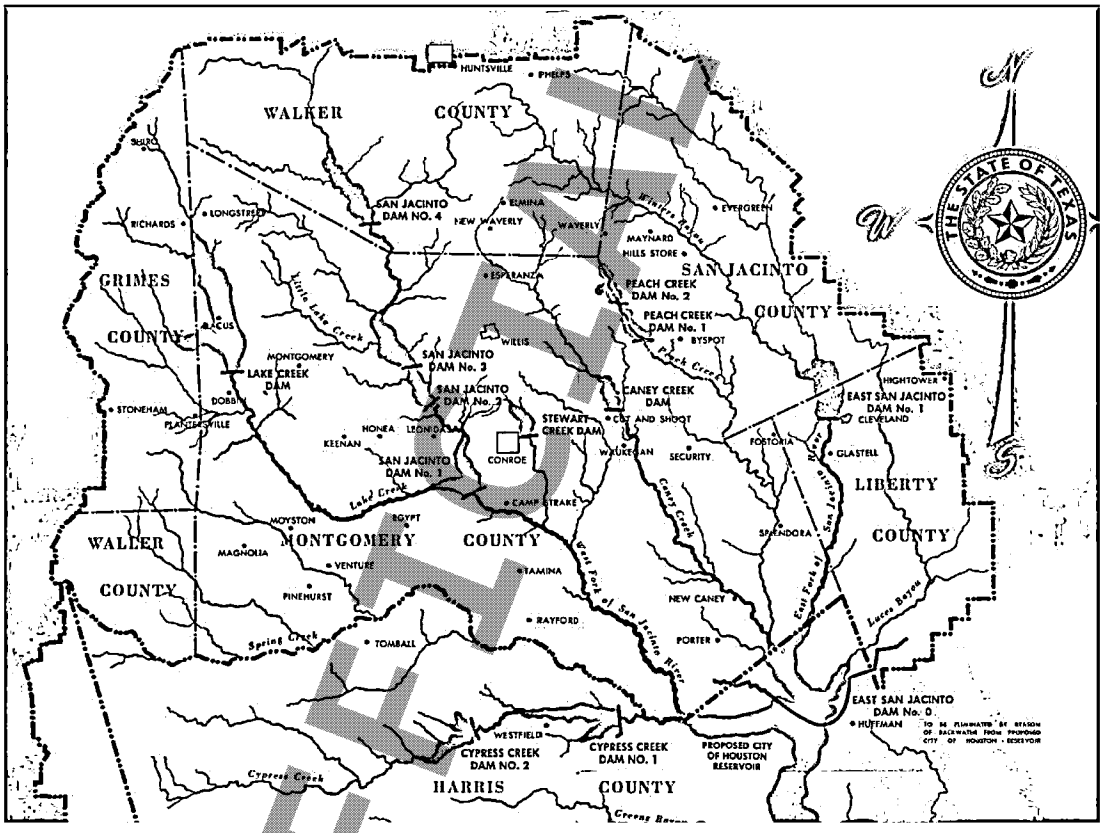

Figure 4 – Master Plan Map for SJRA's Flood Control Dams (ref. Exhibit C to 1957 Master Plan Report)

- **SJRA's Original Design of the Lake Conroe Dam for Flood Control/Water Supply**

In the mid-1960s, the SJRA had its engineers (Freese & Nichols, Inc. or FNI) originally design the Lake Conroe Dam as a multi-purpose dam, including both flood control and water supply. The top of the dam was to be at an elevation of 222 feet above mean sea level (msl), with the maximum design water surface elevation to be set at 217 feet, with the normal water surface elevation or conservation pool set at 201 feet. ARCH 4256-57. This design would provide for the normal lake level of 201 feet, but then

allow for the capture and storage of incoming floodwaters behind the dam for the purpose of reducing the risk of flooding downstream properties. Based on this design, the SJRA purchased land in the area which would later become Lake Conroe, as well as flowage easements in the surrounding lands up to an elevation of 207 feet above mean sea level (msl). ARCH 4025-26. They obtained these flowage easements, recognizing that during major flood events, the lake level could exceed this 207-foot flowage easement limit, and reach up to elevation 217 feet.

The San Jacinto River Authority applied for and received Permit 1962 (in 1960), which allowed it to be able to construct this multi-purpose Lake Conroe Dam and to appropriate storm, flood, and unappropriated waters of the West Fork of the San Jacinto River. The permit authorized the SJRA to permanently impound up to 380,430 acre-feet of water. The SJRA later obtained authorization to increase the permanent impoundment capacity to 430,260 acre-feet, approximating the capacity of the lake at its normal elevation of 201 feet (its conservation pool level). *See* Certificate of Adjudication 10-4963, Exhibit 3 to Gillman Declaration.

- **SJRA's Revised Design of the Lake Conroe Dam for only Water Supply**

After reviewing this original design and its estimated cost, the City of Houston, as a partner with the SJRA in this Lake Conroe Dam project, requested that the SJRA and its design engineers consider a water supply only dam design, rather than the multi-purpose dam design that had been prepared. Subsequently, the SJRA and its engineers redesigned the Lake Conroe Dam to be a water supply only dam, removing the flood control feature of the original design. As a result, the crest of the dam was lowered from 222 feet to elevation 212 feet, and the maximum design water surface elevation was reduced from 217 feet to 205 feet, which resulted in a reduction of total storage capacity from 864,580 acre-feet to 520,050 acre-feet. Also, the type, configuration and location of the primary gated outlet structure was changed. ARCH 4025-26; ARCH 4256-57.

Construction on Lake Conroe Dam began in 1969, completed in January 1973, and was filled by October 1973. It is located roughly 50 miles north/northwest of the City of Houston and approximately seven miles northwest of Conroe, Texas. This Dam is comprised of an earthen-filled embankment, extending 11,350 feet in length. The design crest elevation of the dam is 212.0 feet above mean sea level. Control of the lake level is from a spillway with its crest at elevation 172.66 feet and with five tainter gates, 40 feet in width by 30 feet in height, that have a top elevation of 202.5 feet. See Olmos Declaration to SJRA Plea. According to a TWDB 2010 volumetric survey, at the conservation capacity pool elevation of 201 feet, the lake covers approximately 20,985 acres of water surface and has a storage volume of 411,022 acre-feet.

- **Description of the Lake Conroe and West Fork San Jacinto River Watersheds**

The Lake Conroe Dam is located on the upper portion of the West Fork of the San Jacinto River and has a watershed area of about 445 square miles, as depicted in **Figure 5** below. The 90-mile-long West Fork of the San Jacinto River has its upper portion above the dam flow south through Montgomery County and western Sam Houston National Forest, feeding Lake Conroe. Downstream from Lake Conroe, the West Fork San Jacinto River flows past the City of Conroe and through Montgomery and Harris Counties, joining several creeks along the way. It then merges with the 69-mile-long East Fork of the San Jacinto River at the northern rim of Lake Houston in Harris County, as shown in **Figure 6**.

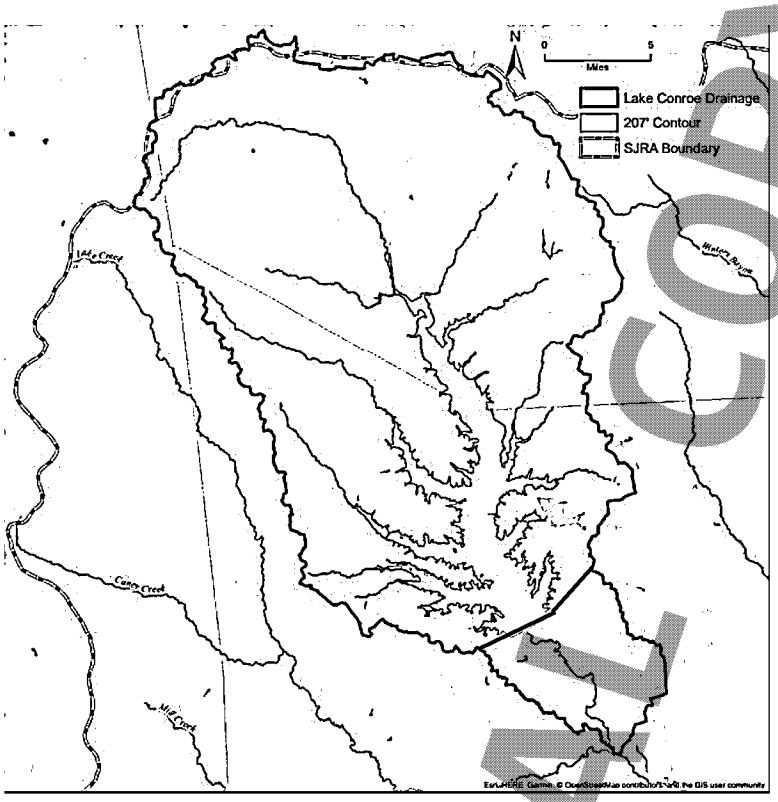

Figure 5. Watershed of Upper West Fork San Jacinto River including Lake Conroe

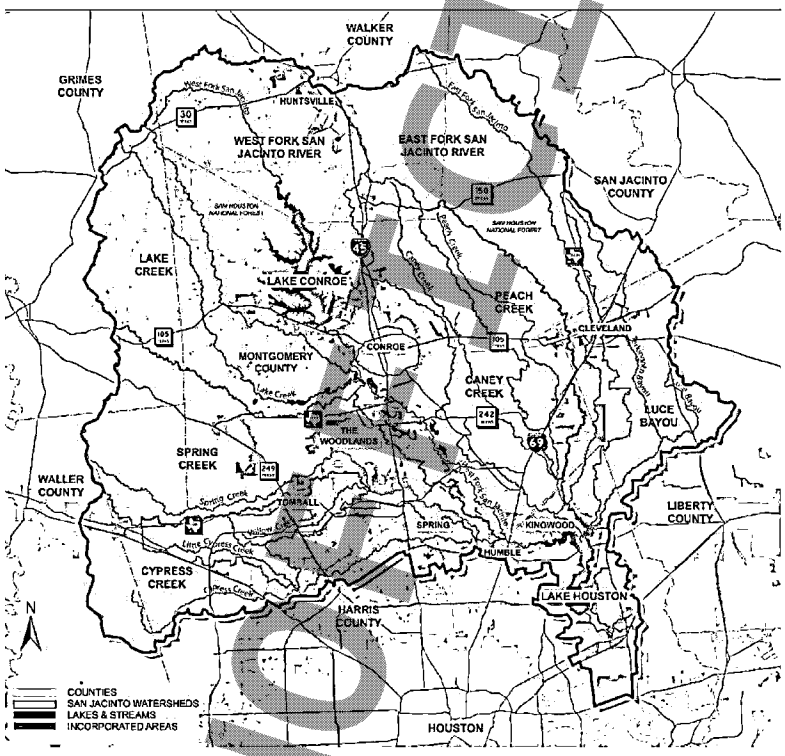

Figure 6. Watershed of Lake Houston, including the West and East Forks of the San Jacinto River

C. Original and Revised Gate Operating Procedures (GOP) for Lake Conroe Dam

- **Original Gate Operating Procedures (GOP)**

Given that the Lake Conroe Dam was now a water supply only dam, with a gated spillway to control the level of this long and deep lake, it was important to recognize that the inflows to this dam would come earlier and higher, as discussed in the USACE's manual described above. Thus, the operating plan for this dam needed to account for this so that flooding downstream would not be increased over what would have happened under natural conditions (i.e. without the dam).

The original gate operating procedures were developed by SJRA's design engineers, Freese & Nichols, Inc. (FNI), who recognized its operating plan needed to account for this phenomenon so that downstream flooding would not be increased. Therefore, FNI's plan called for releases whenever the lake elevation exceeded 201.0 feet msl, at an initial rate of 175 cfs (cubic feet per second) through one gate. Every two hours the gate opening can be adjusted – raising one gate 0.2 or 0.3 feet, then two gates, then four gates, then five gates, then increase all gate openings 0.1 foot at a time, until (1) outflow equals inflow (excluding direct rainfall on the reservoir), (2) outflow reaches 2,000 cfs, or (3) there are flooding conditions downstream. Upon the occurrence of any of those three conditions, the gate operating procedures dictated that outflow or water release from the dam should not exceed 75% of the inflow to the lake surface (since it excludes considering direct rainfall onto the lake surface) until downstream flooding recedes. The procedure further called for the operator to maintain an outflow rate that reduces the lake level down to a normal elevation of 201.0 feet without creating additional flooding downstream. ARCH 11313-11325.

The inflow to the lake surface was to be based on using rainfall data from a series of gages installed by the SJRA throughout the Lake Conroe watershed as part of its ALERT system. *Id.* If rains of 4 inches or more have been reported in the watershed in 24 hours, this GOP called for the dam operator to contact the NWS for anticipated inflows into the reservoir. *Id*. This would allow the SJRA gate operator to understand the inflows to be expected that would be entering the lake surface from rainfall that had already occurred in the watershed above it. Eliminating the direct rainfall onto the lake surface in this inflow analysis avoided the short-term spikes of inflow to the lake associated with this rainfall (over about 30 square miles of lake surface) and provided a better understanding of the long-term inflows coming from the majority of the upstream watershed of over 400 square miles.

- **1990 revision to GOP – CONGO software**

In April 1990, SJRA retained FNI to develop a computer program to use the ALERT system gage information to predict inflows to the lake, and that could also calibrate rainfall runoff calculations in real-time to increase the accuracy of the results. ARCH 4719. SJRA subsequently adopted CONGO, a software control system developed by FNI to make gate opening recommendations based on various data inputs, including observed rainfall (from the SJRA ALERT gage network), previous gate openings, and current lake elevations. Predicted rainfall and predicted gate openings could also now be used as inputs. The system made real-time predictions of rainfall-runoff from the Lake Conroe watershed and a resulting inflow hydrograph entering the lake surface for the inputted rainfall. CONGO outputs included the input rainfall and estimated rainfall excess for each gage, a listing of gate openings, inflow, outflow and reservoir elevation. Discharge was provided in both cfs and in acre-feet. The CONGO program provided

recommended gate openings to the gate operator to minimize potential flooding from incoming runoff. ARCH 11326-11386.

For a lake elevation exceeding 201.5 feet msl, the program used the smallest calculated gate opening that would keep the estimated peak reservoir level below a target elevation. The guidelines within the CONGO system further provided that the outflow or release from the dam (i.e. discharge) was now to be limited to a maximum of 75% of the current inflow or past peak inflow from the current storm, whichever is higher. This change allowed for the releases to be higher than the inflows so long as the releases are still lower than the past peak inflow during that storm event. However, the same restrictions applied as before, including that such releases would not contribute to flooding downstream on the receding limb of inflows by not exceeding such inflows. ARCH 4719.

This 1990 Gate Operating Procedure was in place during the October 1994 storm event when over 20 inches of rain fell over the Lake Conroe watershed, along with heavy rains over other parts of the San Jacinto watershed and Harris County. This storm resulted in widespread flooding throughout north Harris County, setting records along Spring Creek (which forms the boundary between Montgomery and Harris Counties), a tributary to the West Fork San Jacinto River. The estimated peak inflow to Lake Conroe during this 1994 storm event was about 180,000 cfs. *See* Houston Chronicle article titled "Flood of 1994: History could repeat itself;" SJRA Document titled "Flooding Facts Rather Than Rumors;" and The Courier of Montgomery County article titled "The flood of 1994: Taking a look back." The SJRA, in following its 1990 Gate Operating Procedure, stored some of this inflow in Lake Conroe while releasing a peak outflow of about 33,000 cfs. SJRA 1513962. Flooding in the Kingwood area occurred during this storm event, and a lawsuit was filed by Kingwood residents against the SJRA over their flooding.

- **2010 Gate Operating Procedures (GOP)**

Following the Court's decision in the lawsuit involving the 1994 flooding in Kingwood, the SJRA directed its design engineers, FNI, to re-evaluate the Gate Operating Procedures for Lake Conroe, even though there was no information that the old policy or procedures had any flaws (J. Houston Depo pgs. 81-82). SJRA instructed FNI to develop a GOP such that the peak outflow rate would not exceed the peak inflow rate, while also trying to achieve one of SJRA's goals being to reduce the natural flow in the river downstream of the dam (SJRA Plea, Exhibit B, J. Houston Paras. 3 & 5). It should be noted that H. Olmos with FNI stated that he was not aware of anyone modeling what would happen if the dam had never been built in developing this new GOP (H. Olmos Depo, pg 61-62).

FNI thus developed in 2010 a new concept for establishing the inflows and associated gate operations by monitoring only the lake levels and releases in real-time, with no more calculating the inflow hydrograph that would be entering the lake from gaged rainfall data. ARCH 10988-11000 (September 2010 Gate Operation Policy); Jace Houston Affidavit signed January 26, 2021. Instead, inflows would be calculated based on the change in lake levels and the current release rate using a spreadsheet to keep track of this information. From this information, gate operations are recommended to the SJRA gate operator, those being referred to as "target" gate openings, with "minimum" and "maximum" values provided as well. The 2010 Gate Operating Procedures purportedly introduced flexibility to keep gates closed up to a water elevation of 202.6 feet msl.

The 2010 Gate Operating Procedures are associated with this new spreadsheet concept, to be filled out during a storm event and maintained by the SJRA. Lake water elevations are recorded at the

recommended intervals. The spreadsheet calculates the average inflow rates based on the lake level inputs. Based on real-time lake level changes, the spreadsheet computes an estimated inflow rate, and with the current gate opening, generates recommended minimum, target, and maximum gate openings. Total estimated discharge through the gate openings is also provided in the spreadsheet.

The 1973 GOP was superseded by this new 2010 GOP, with every provision of the old GOP now being replaced with implementation of this new 2010 GOP (J. Houston Depo, pgs. 81 & 97). In April 2017, minor revisions were made by FNI to the 2010 Gate Operating Procedures to give the operator more flexibility in the gate operations. Jace Houston Affidavit signed January 26, 2021.

- **Major Flooding in the Kingwood Area**

October 1994:

Rainfall in southeast Texas, ranging from 8 to over 28 inches during October 15-19, 1994, caused severe flooding in a 38-county area. Flooding was most severe in the San Jacinto River Basin along the East and West Forks of the San Jacinto River and along Spring Creek. SJRA 1468596.

The Kingwood area experienced major flooding in October 1994. A storm event brought 20-25 inches of rainfall on the Lake Conroe and West Fork San Jacinto River area. SJRA 16526-31; Houston Chronicle article titled "Flood of 1994: History could repeat itself" (Pl 284-85); Affidavit of James Adams signed May 2, 1996. Lake Conroe reached a peak elevation of 205.58 feet. SJRA 1513962 at PDF p. 17. The previous record was 204.6 feet in May 1983. SJRA 725542 at PDF p. 6. Peak inflow into Lake Conroe during a 1-hour period was 180,000 cfs. See SJRA Document titled "Flooding Facts Rather Than Rumors." The maximum outflow from Lake Conroe was 33,343 cfs. The USGS streamgage along the West Fork San Jacinto River near Conroe, which includes releases from Lake Conroe Dam and flows from Lake Creek, measured a streamflow of 92,000 cfs at a stage of 27 feet above median flow. West Fork San Jacinto River overflowed its banks and inundated Interstate 45 near Conroe for most of Monday, October 17; and Highway 59 near Humble was inundated and closed from Monday, October 17, to Friday, October 21. SJRA 1468596.

A lawsuit was filed by Kingwood residents against the SJRA over their flood damages, claiming their flooding was caused by the Lake Conroe releases.

Tropical Storm Harvey (August 2017):

Harvey formed as a tropical depression in the Gulf of Mexico on August 23, 2017 and rapidly intensified into a Category 4 hurricane. It made landfall near Port Aransas on August 25. It subsequently re-entered the Gulf and moved easterly. As Harvey moved inland again near Houston, its forward motion slowed to near 5 mph. Rain bands on the eastern side of the circulation of Harvey moved into southeast Texas on the morning of the 25th and continued into the 26th. This resulted in flash flooding in the overnight hours of the 26th in much of Harris County. Rainfall totals varied geographically. Areas south and east of Houston received greater precipitation. League City, for instance, received 49.84" of rain over a five-day period, while Lake Creek received 25.50" and Spring Creek received 29.48". Generally speaking, Montgomery County received roughly 20" over a five-day period; other areas in the upper West Fork San Jacinto River Watershed recorded totals between 27-35". Specifically, precipitation gages at Lake Conroe Dam recorded 20.60" of rainfall. Affidavit of Hector Olmos (at ¶ 34) signed January 22, 2021. **Figure 7** below shows some of the rainfall totals.

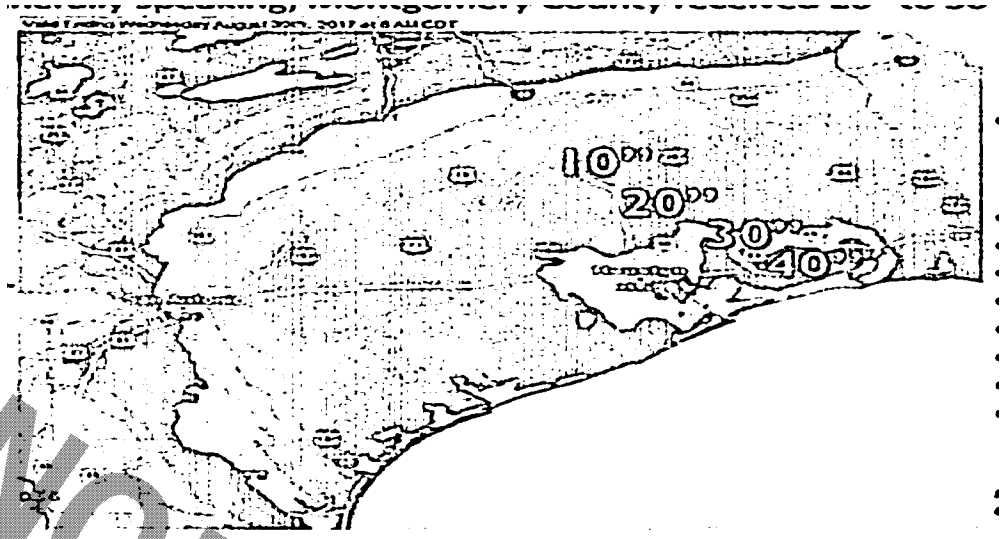

Figure 7. Rainfall Totals from Harvey in August 2017 across Southeast Texas

Peak inflow into Lake Conroe from Harvey was reported by the SJRA as 130,000 cfs. Peak outflow from the dam was reported as over 79,000 cfs. The lake elevation reached a maximum level of 206.2 feet msl. The West Fork San Jacinto River at the I-45 gage at Conroe reported maximum flows of 115,000 cfs and the river depth rose to over 20 feet. Various other peak flows at gages throughout the San Jacinto River watershed were provided by the SJRA for the Harvey event, as shown in **Figure 8** below, along with total rainfall values. Flooding during Harvey reached approximately 500-year levels in the Kingwood area. (M. Forest's report as Exh. C of SJRA Plea, Exh. 5 Para. 5).

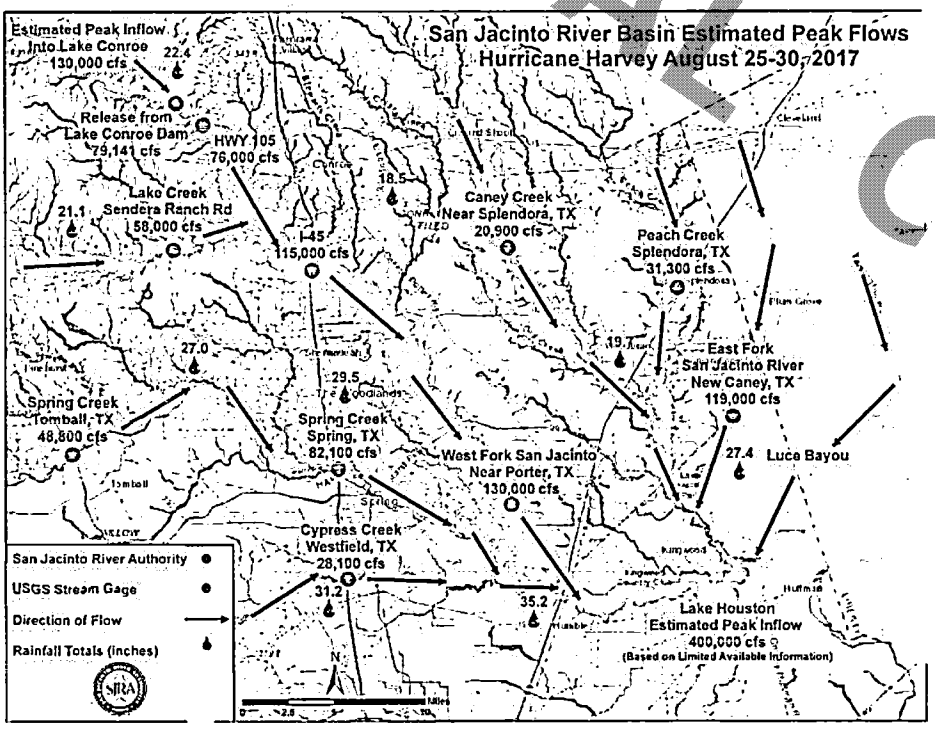

Figure 8. SJRA reported Peak Flows and Rainfall Totals from Harvey

III. Scope of Investigation

The objective of this investigation is to determine if SJRA's design, construction and/or operation of the Lake Conroe Dam caused or contributed to the flooding of Plaintiffs' properties downstream of the Lake Conroe Dam during Harvey.

The first step was investigation of the extent and intensity of rainfall during Harvey on the San Jacinto River Watershed. Data was gathered from SJRA and other publicly available sources including the rainfall gages maintained by the USGS.

Second, the rainfall-runoff response of the watershed during Harvey was analyzed. A rainfall-runoff model was developed by a SJRA consultant, HDR, using the computer program HEC-HMS (Hydrologic Modeling System), an open-source software developed and maintained by the US Army Corps of Engineers' Hydrologic Engineering Center (HEC). The model computes discharge rates for basins throughout the watershed from inputted rainfall.

Next, a hydraulic analysis was conducted using an HDR developed HEC-RAS computer model to determine the flood levels along the San Jacinto River and major tributaries during Harvey. HEC-RAS (River Analysis System) is also developed by US Army Corps of Engineers' Hydrologic Engineering Center.

I further reviewed reports that have been submitted by the SJRA in its Plea to the Jurisdiction as well as relevant deposition testimony, documents that have been produced during this litigation, and open-source/publicly available data and records.

Using these documents and materials, I evaluated the operation of Lake Conroe Dam during Harvey and its effects on the flooding of properties downstream of Lake Conroe Dam.

IV. Methodology

A. Review of HDR Model Scenarios

SJRA's consultant, HDR, conducted a number of hydrologic and hydraulic computer modeling analyses that have been included in the SJRA Plea to the Jurisdiction that has been filed in this case, as well as in other cases involving flooding downstream of Lake Conroe Dam during Harvey in August 2017. We reviewed these modeling analyses to understand what they involved and what were their results.

The HDR modeling that was provided to us used the HEC-HMS model software to model the rainfall-runoff process in the upper San Jacinto River watershed, as well as used the HEC-RAS model software to model the flow of water and its resulting water levels along the various creeks and river segments below Lake Conroe, particularly in the area of the Plaintiffs' properties. I have not fully evaluated the accuracy of this HDR modeling, but an initial review indicates that the HDR model results seem reasonable.

The 3 different model scenarios that were run by HDR in its modeling for the SJRA Plea and discussed in Mr. Forest's Affidavit (attached as Exhibit C to the SJRA Plea) are as follows:

1. **Existing Conditions with Reported Releases from Lake Conroe (Existing)–**

   This scenario is essentially modeling what happened during Harvey, with inputting the rainfall from Harvey into its HMS model above the dam, computing the inflow to the dam and resulting water levels in the dam, inputting the reported releases from Lake Conroe

Dam into the HDR's HMS model below the dam, inputting the rainfall from Harvey into this HMS model to compute the runoff from the watershed between the dam and that part of the West Fork upstream of its confluence with Spring Creek, and then inputting the resultant flow hydrograph at that location into the HDR's RAS2D models below that location to simulate the flows and water levels along the West Fork, East Fork, Spring and Cypress Creeks and Lake Houston. This HDR RAS2D model setup is shown in **Figure 9**.

This RAS2D model setup actually is made up of 5 separate RAS2D models, with each model covering a particular area (domain) of the San Jacinto River watershed below the Lake Conroe Dam. However, HDR did not run any of its scenarios of releases from the dam through all 5 of these 2D models in sequence; rather, HDR ran its 3 model scenarios (Existing Harvey, Full Capture and Conroe only) through its HMS model past the dam and down to the river's confluence with Spring Creek, where HDR then ran the remaining 4 RAS2D models. HDR later ran its 5th 2D model (from the dam to the confluence with Spring Creek), but used output from the other 2D model runs to force-fit the results of this 5th 2D model. This 5th 2D model run does not affect any of the Plaintiffs' property results from the HDR modeling.

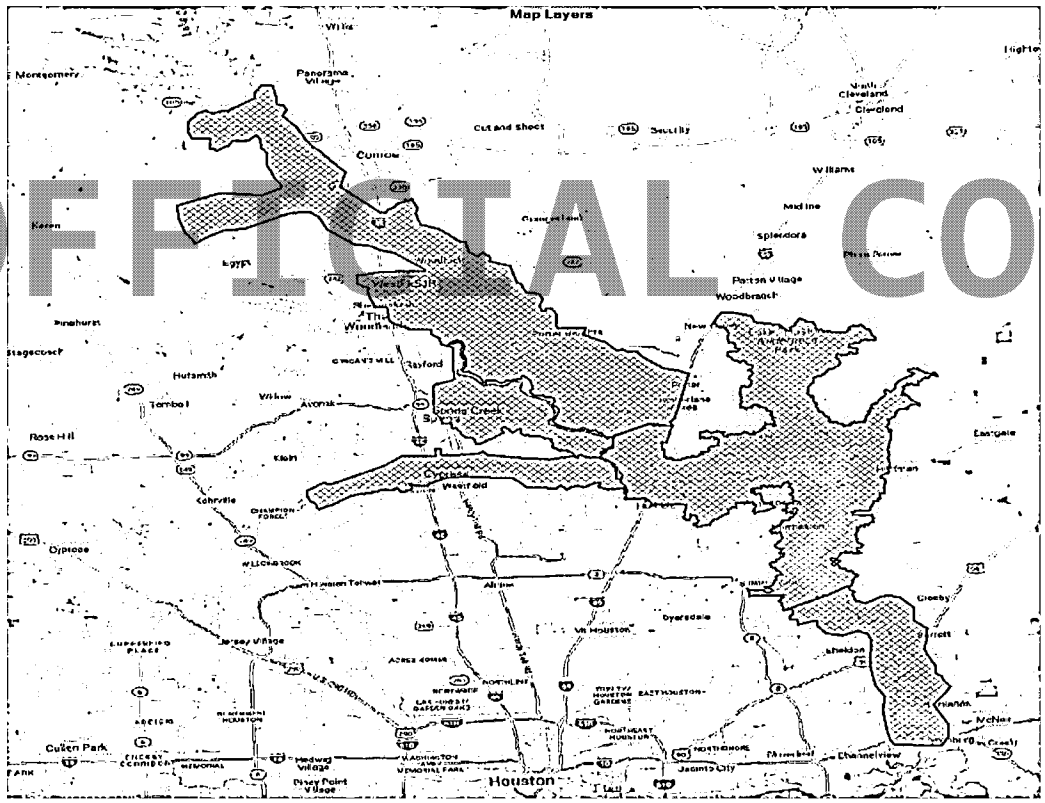

Figure 9. HDR RAS2D Model Setup covering 5 domains for Area Between Lake Conroe Dam and Lake Houston Dam and below.

The HDR's HMS modeled inflows and reported releases from the dam during Harvey are shown in **Figure 10**. The various spikes on the inflow hydrograph (in green) reflect rain on the lake surface, with the peak being 106,000 cfs, while the main peak inflow is about 80,000 cfs, and the outflow hydrograph (in red) shows the peak outflow is about 80,000 cfs

also. HDR's modeled inflows are lower than SJRA's calculated inflows, but are considered closer to the true values, according to M. Forest from HDR (M. Forest Depo pg. 119-120).

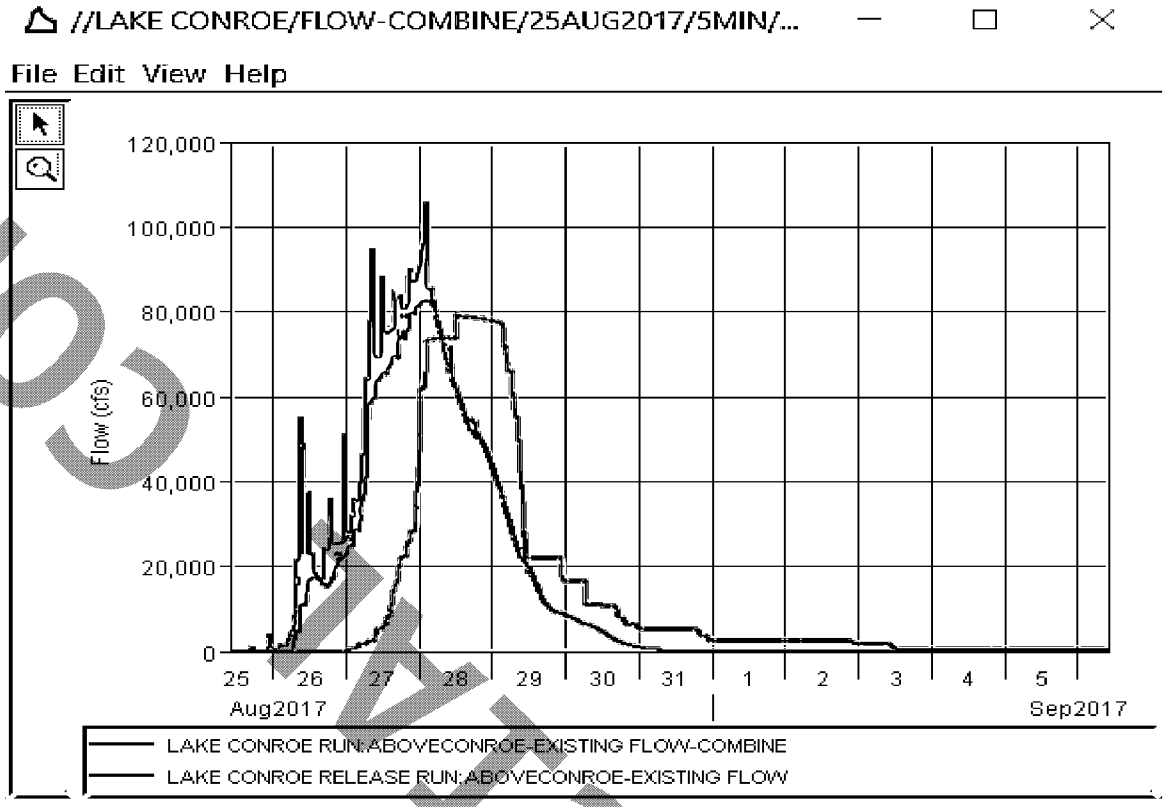

Figure 10. HDR's HMS modeled inflows (green) and reported outflows (red) for the Lake Conroe Dam during Harvey

2. **Existing Conditions with No Releases from Lake Conroe (Full Capture) –**

   This scenario is the same as the above scenario except that there is assumed to be no releases from Lake Conroe Dam during Harvey, as if Lake Conroe Dam fully captured and held all of the inflows into the lake. The results of this scenario would demonstrate the impact that the reported releases did have on downstream flows and water levels when compared to the first scenario that was attempting to show what happened during Harvey with releases from the dam as reported by SJRA. This scenario can also be used to evaluate what would have happened had the SJRA built Lake Conroe Dam to also be a flood control reservoir, as it was originally designed, which would have captured and stored incoming floodwaters up to its design level.

3. **Existing Conditions with Lake Conroe Releases Only (Conroe Only) –**

   This scenario is intended to show what would have happened during Harvey if the only water flowing downstream below Lake Conroe was the actual releases from this dam, with no other inflows entering the river downstream in the Kingwood area.

4. **Existing Conditions with No Lake Conroe (No Conroe) in HEC-HMS only –**

A fourth scenario, a No Dam scenario, was found in the HDR modeling work provided to us as part of the production of documents associated with the SJRA Plea, even though it was not discussed in Mr. Forest's Affidavit attached to the Plea. Surprisingly, Mr. Forest from HDR and Mr. Olmos from FNI both testified in their depositions that they were not aware of anyone ever running a model scenario assuming No Lake Conroe Dam (i.e. natural conditions). (Forest Depo, pg. 210-212; H. Olmos Depo, pg. 61-62). This is surprising since one of the ideas of developing a GOP for this dam has always been to make sure any releases would not cause or contribute to downstream flooding beyond what would have happened under natural conditions (i.e. no dam). Nonetheless, neither SJRA nor FNI provided any discussion or information about a No Dam scenario, other than what we found in HDR's modeling.

This HDR scenario we found in its HMS modeling showed its hydrologic model setup as if there were no Lake Conroe or dam, representing a natural condition in this watershed as if this lake and dam had never been built. This HDR model setup is different than the HDR model setup for the Existing Conditions with Lake Conroe Dam in place, as shown below in **Figure 11**.

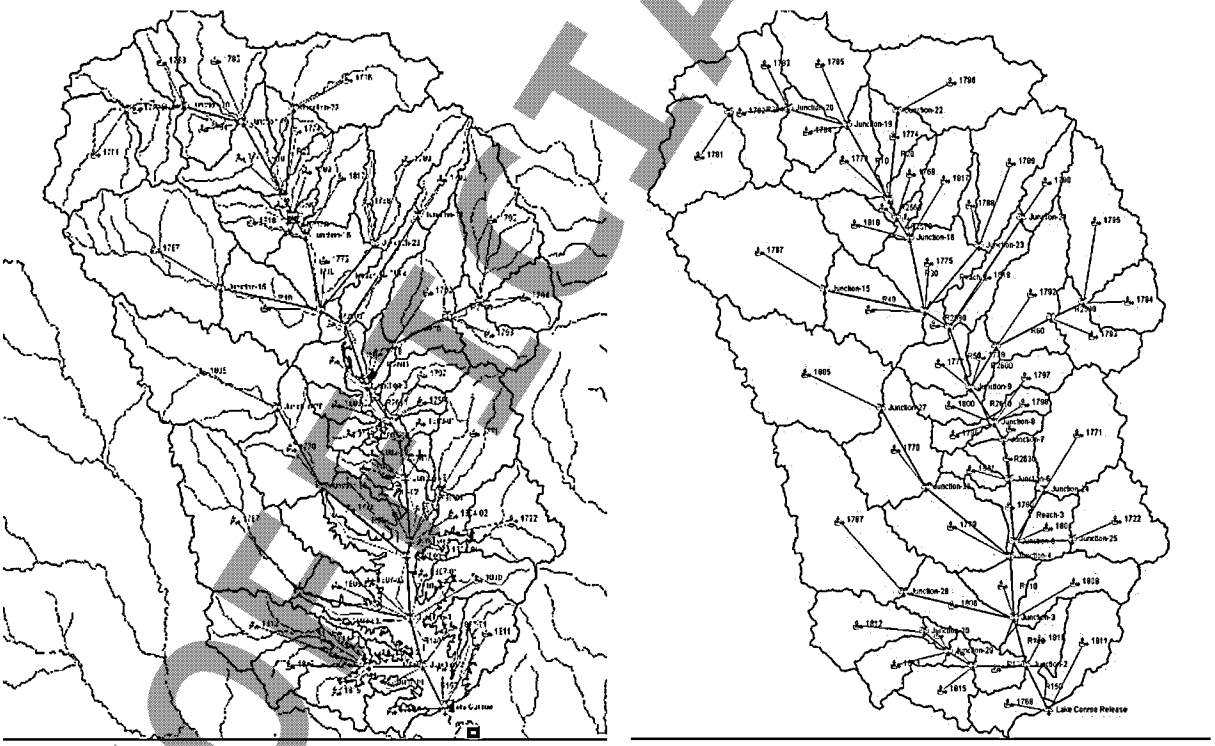

Figure 11. HDR's HMS Model setup for Watershed Area above Lake Conroe Dam: With Dam (Left) and Without Dam (Right)

B. Additional Model Scenarios Run under Original GOPs

In addition to the model scenarios run by HDR, we used the HDR models and ran two additional model scenarios:

1. **Existing Conditions with Modified Releases reflecting the Original GOP for Lake Conroe by capping the maximum release rate at about 60,000 cfs (Mod X1) –**

   This scenario is the same as the first scenario run by HDR (Existing), except that we modified the releases from the dam to be capped at about 60,000 cfs. This was done to represent the original GOP for the Lake Conroe Dam where the releases were not to exceed 75% of the peak inflow, not including the direct rainfall on the lake. HDR's inflow hydrograph entering the lake surface, without that direct lake rainfall, peaked at about 80,000 cfs. Therefore, the reported releases from the dam that exceeded 79,000 cfs were capped at about 60,000 cfs, as shown in **Figure 12**.

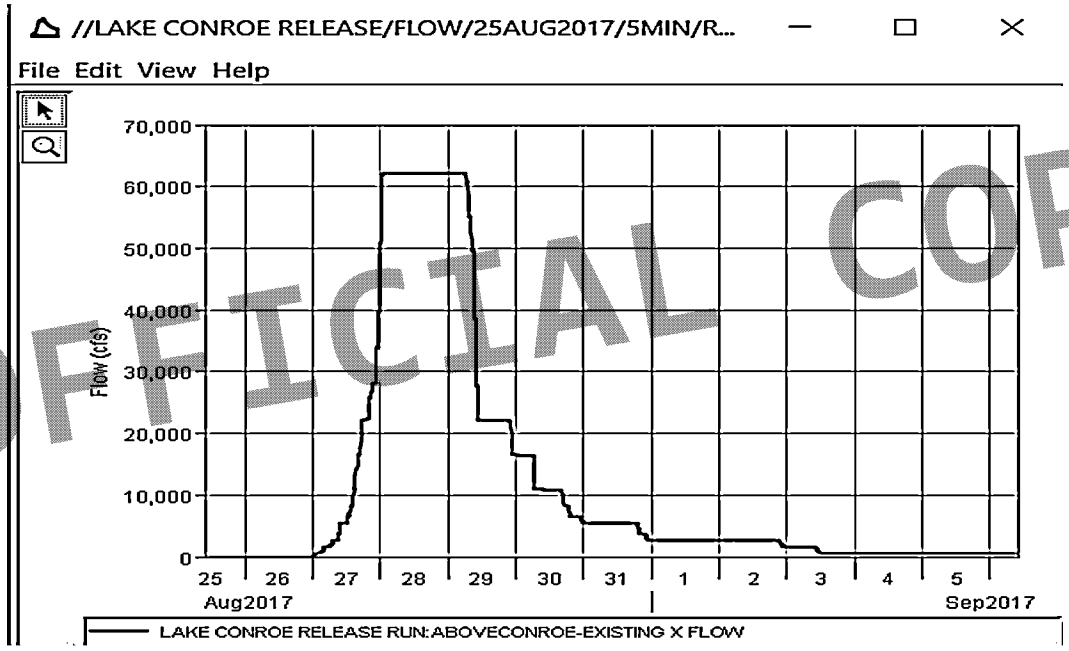

Figure 12. Release Hydrograph from Dam following Original GOP (for Mod X1)

2. **Existing Conditions with Modified Releases reflecting the Original GOP for Lake Conroe by capping the maximum release rate at about 60,000 cfs and limiting outflows to no more than inflows (Mod X2) –**

   This scenario is the same as the one above, except that we modified the releases from the dam to not only be capped at about 60,000 cfs, but also capped them so that they did not exceed the inflows on the receding side of the inflows, as shown in **Figure 13**.

A comparison of the 3 release scenarios (Existing, Mod X1 and Mod X2) are shown below in **Figure 14**, along with the HDR modeled inflow hydrograph to the Lake Conroe Dam.

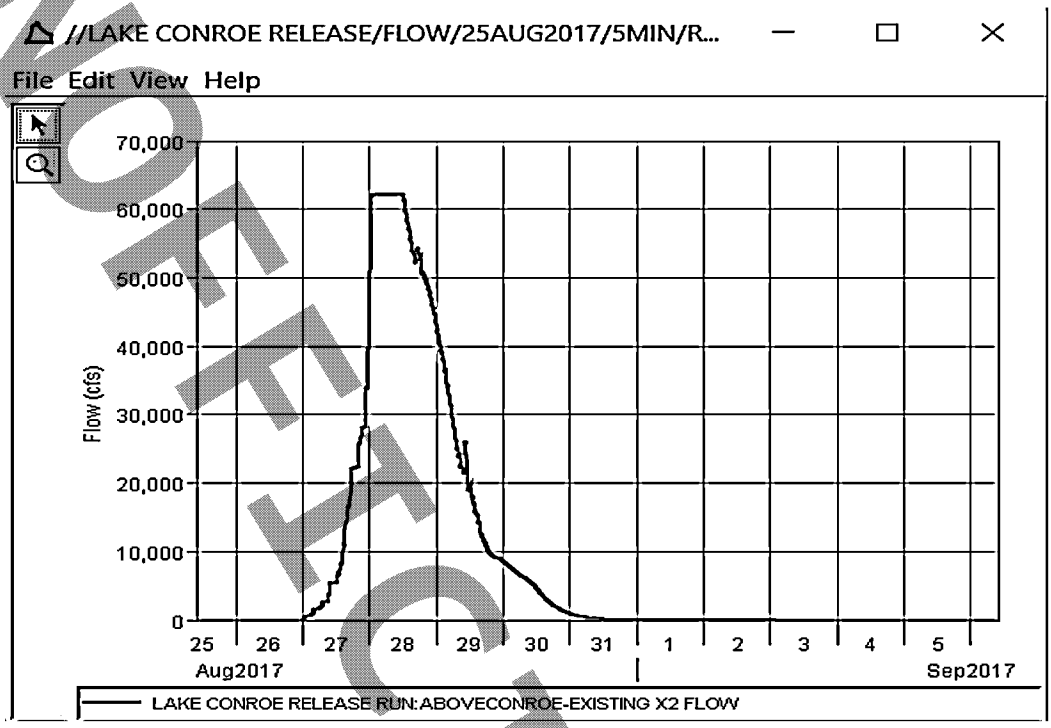

Figure 13. Release Hydrograph from Dam following Original GOP (for Mod X2)

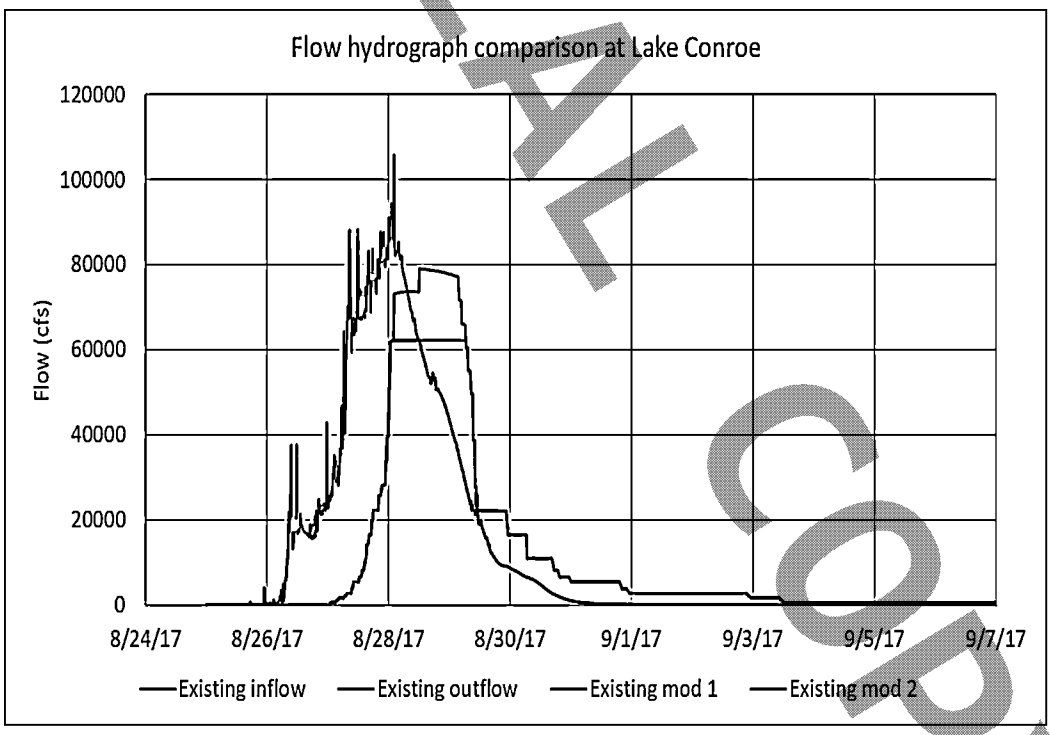

Figure 14. Comparison of Dam Releases for Existing (blue), Mod X1 (red) and Mod X2 (green) Scenarios

V. Findings, Opinions and Conclusions

A. Plaintiffs' Properties

The Medina Plaintiffs' properties in Harris County are located outside of the SJRA jurisdictional boundary, which ends along the West Fork San Jacinto River where it meets Spring Creek, just upstream of Hwy 59 in Humble, as shown in **Figure 15**. These Plaintiffs' properties generally lie along and within the 500-year floodplain of the West Fork, East Fork, Spring Creek and Lake Houston. Mr. Diggs' property is not located in any of these watersheds.

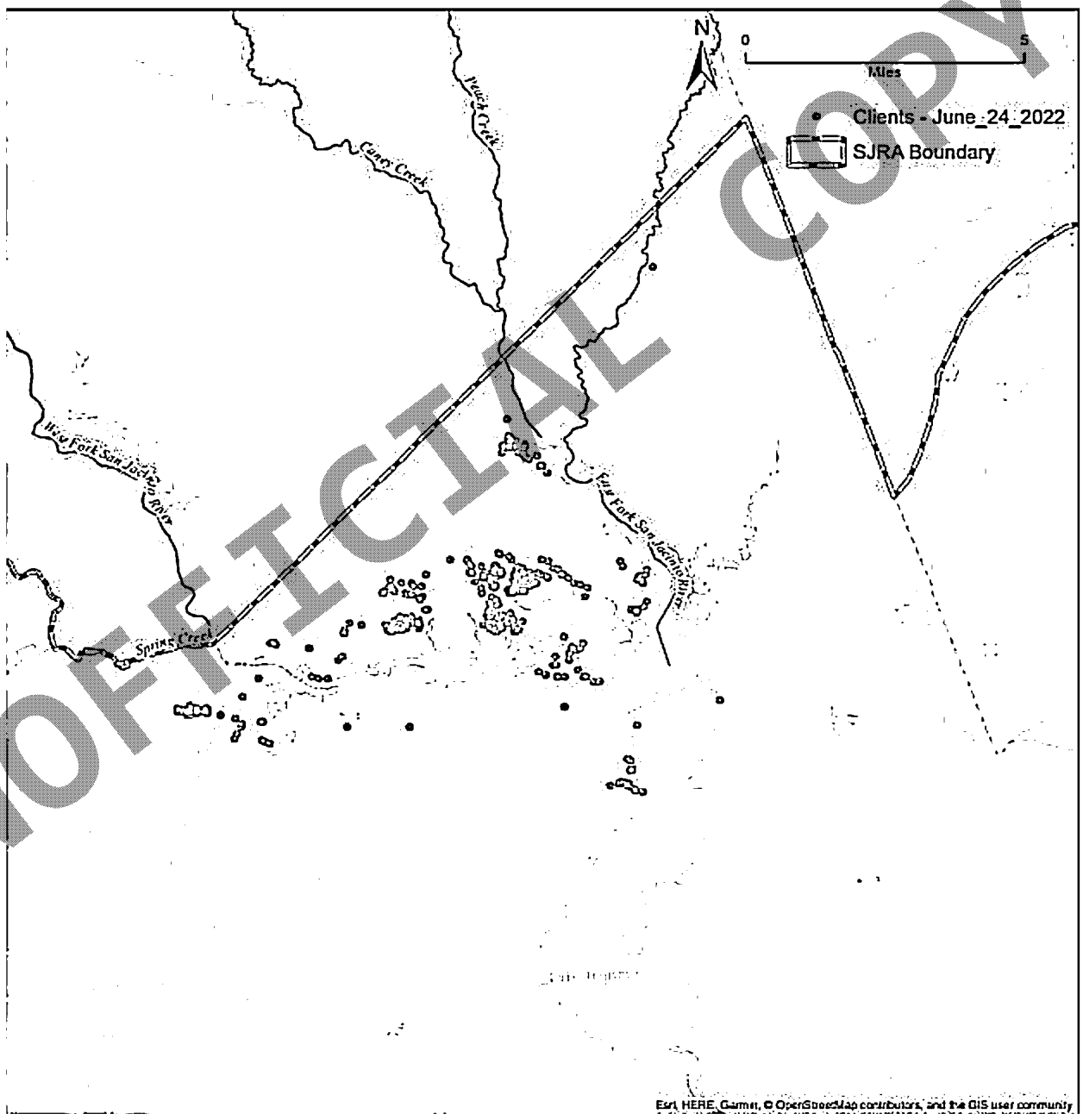

Figure 15. Location of Plaintiffs' Properties downstream of SJRA Jurisdictional Boundary

B. Comparison of Different Model Scenarios

1. Existing Conditions vs No Release (Full Capture)

The two HDR model scenarios discussed in the SJRA Plea, particularly in its Exhibit C containing Mr. Forest's report and discussion of his modeling results, were tabulated for comparison to see how much of an impact the reported releases from the Lake Conroe Dam had on flood levels throughout the area of the Plaintiffs' properties. **Appendix B** provides this tabulation, which comes from Mr. Forest's report, Table 2 Medina Plaintiffs' Properties Summary.

This tabulation shows the HDR modeled range of differences between the computed flood levels from the Existing Conditions HDR model run and its Full Capture (No Release) model run for all of the Medina Plaintiffs' Properties. As can be seen from this table, the Lake Conroe Dam release of over 79,000 cfs during Harvey caused around 2-4 feet of additional flood levels along the West Fork and less than that along other waterways, such as the East Fork and around Lake Houston. This increase in flooding is directly due to the Lake Conroe releases by SJRA during Harvey, according to HDR's modeling.

2. Existing Conditions vs No Lake Conroe Dam

Even though HDR denied having run a No Dam scenario, we found one in its modeling that was provided to us. HDR's HMS model showed a No Dam scenario whereby the model setup was modified from its Existing Conditions setup to reflect watershed conditions as if the lake and dam had not been built, as shown above. The HMS model run shows a flow hydrograph from Harvey rainfall passing by the location where the dam is now located that produces a peak flow of about 70,000 cfs, less than the over 79,000 cfs that was released by the SJRA from the dam during Harvey. This indicates that had there been no dam, the flooding downstream would have been less than it was at the Plaintiffs' properties. **Figure 16** shows a printout of the flow hydrograph from HDR's HMS modeling of Harvey with No Lake Conroe Dam.

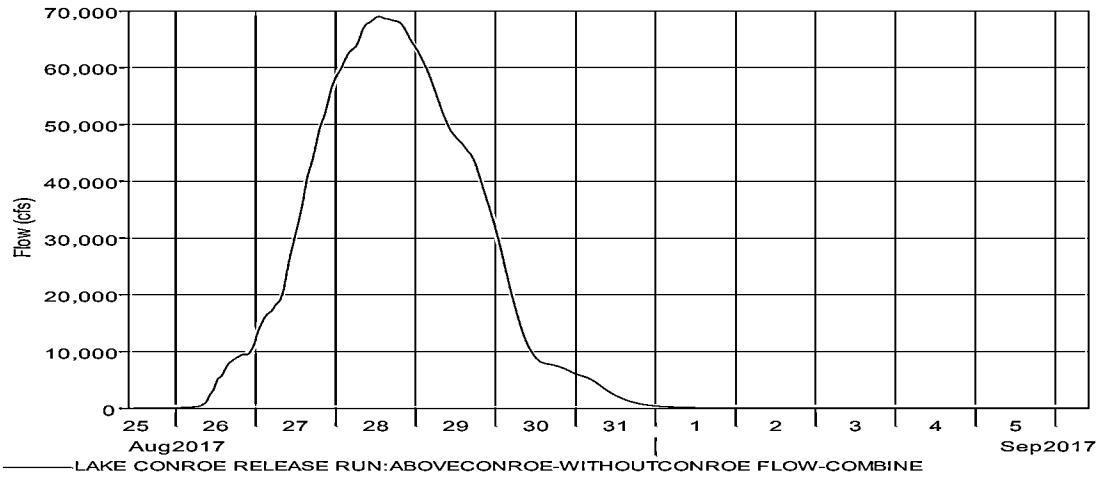

Figure 16. Flow Hydrograph at Location of Dam Site from HDR's HMS model of No Dam Scenario

Figure 17 shows the comparison between the flow hydrograph at the Lake Conroe Dam site under the Existing Scenario (in blue) and the No Dam Scenario (in orange). As you can see, the HDR modeling of the No Dam Scenario shows the peak flows of around 70,000 cfs occurring at about the same time as the reported releases from the dam during Harvey of about 80,000 cfs. This indicates that there would have been less flooding downstream under the No Dam Scenario on Plaintiffs' properties.

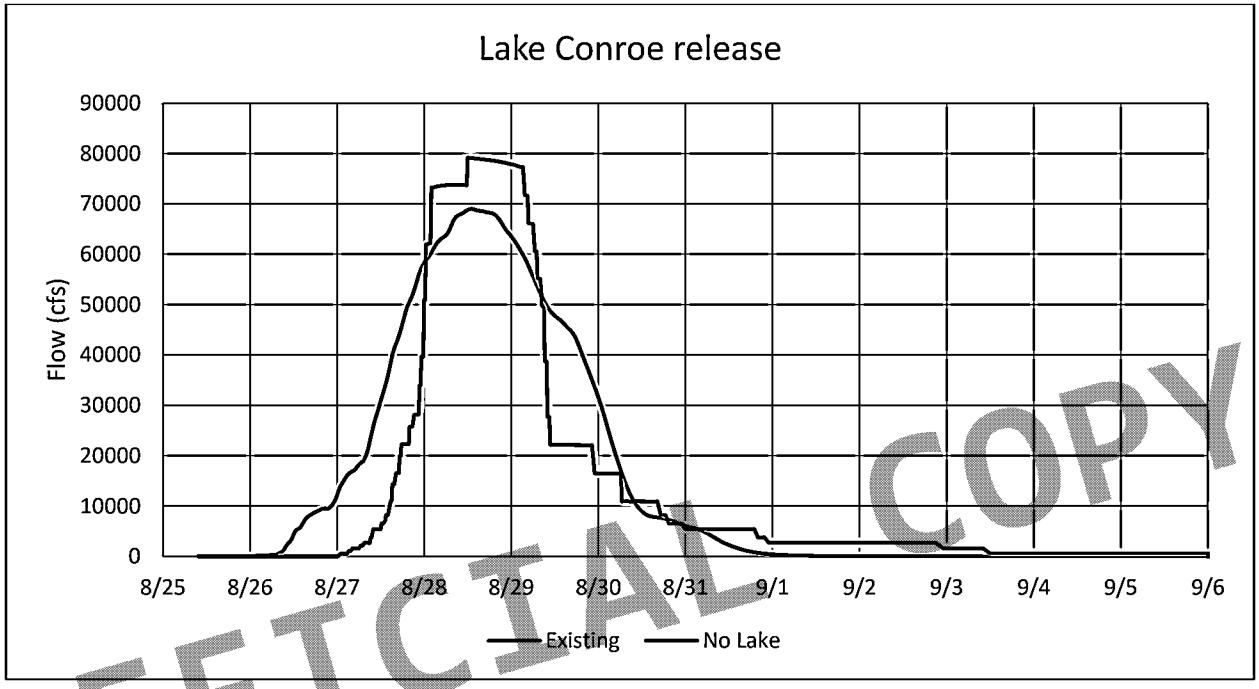

Figure 17. Flow Hydrograph Comparison at Dam Site between HDR's HMS model of No Dam Scenario (orange) and Reported Release from Dam (blue)

3. Existing Conditions vs Modified GOPs

We ran two additional scenarios using HDR's modeling to demonstrate the reduction in the releases from the dam based on modifying the GOP for the release of water from the Lake Conroe Dam in accordance with the SJRA original gate operating procedures prior to the 2010 GOP based on the FNI spreadsheet, as discussed above. The first modification (Mod X1) involved capping releases at about 60,000 cfs, while the second modification (Mod X2) involved the same cap on releases, but also not allowing the releases to exceed inflows on the receding side of the inflows. The results of these two scenarios as compared to the Existing Conditions releases are shown in Figure 14 above. These results indicate that had SJRA followed its original GOP (1973/1990), rather than its 2010/2017 GOP, there would have been less water being released from the dam and therefore less flooding downstream on Plaintiffs' properties.

C. Opinions and Conclusions

Based upon my education, experience and expertise, my review and analyses of the documents, modeling and documents described herein and my analyses set forth above, my opinions and conclusions include the following:

- The 2010/2017 GOP policy was to provide that the peak outflow (release) would not be higher than the peak inflow during the same storm event, supposedly in accordance with court rulings. Having a policy that the peak outflow from a dam will not exceed the peak inflow to a dam does not guarantee that downstream flooding will not be increased. The question is "not being increased as compared to what?" It should be as compared to natural conditions, meaning that dam operations should not cause increased flooding as compared to having no dam (natural conditions). If the peak inflow being used to compare to the peak outflow is the peak inflow with the dam in place, then the peak outflow needs to be much smaller than the peak inflow, since the peak inflow has been increased due to the existence of the dam, as recognized in the US Army Corps of Engineer's Manual discussed above. This is especially true when the peak inflow is being computed to include direct rainfall onto the lake surface, which causes spikes in the inflow rate (as shown herein) over a short period of time. These spikes can create a peak inflow that does not represent the vast majority of the inflows entering the lake, so that if those are used to measure against any peak outflows, those outflows could easily produce increased flooding downstream. In addition, the peak inflow that should be used in comparing against the peak outflow is the peak inflow under natural conditions (i.e. no dam), and not the conditions with the lake and dam. Yet, this is precisely what SJRA is doing here, using the peak inflow to the lake using lake level values (rather than under natural conditions) and using the spiked peak inflow (rather than the majority of the peak inflows from the rest of the watershed). The timing of these releases as compared to what would have happened under natural conditions is another factor that needs to be taken into consideration when developing a GOP policy.

- The peak inflow from HDR's modeling of Harvey was about 80,000 cfs, with a spike that hit about 106,000 cfs. Without using this spiked inflow rate, the peak outflow of over 79,000 cfs approximated the peak inflow, and therefore was not less than 75 % of that peak inflow, per the GOP. The original GOP for Lake Conroe Dam didn't include the rainfall onto the lake surface, in order to eliminate such spikes and to get a better estimate of the inflow volume entering the lake. SJRA's new 2010/2017 GOP included these spikes in its calculation of inflows, and used the peak spike to claim its peak inflow was about 130,000 cfs and therefore its peak outflow of about 80,000 cfs was far less than that peak inflow, about 60%. Had SJRA not used the spiked peak inflow but the peak inflow from the vast majority of the watershed, not including direct rainfall on the lake surface, that peak inflow was about 100,000 cfs, such that 60% of that would be about 60,000 cfs.

- FNI claimed that the presence of the dam and gate operations reduced the peak flow that would otherwise have occurred by about 37%, by comparing the peak inflow of about

130,000 cfs to the peak outflow of about 80,000 cfs (Exh A to Plea, Olmos para. 35). This is misleading, as what would have otherwise occurred should be referring to the natural conditions without the dam. Mr. Olmos testified that he was not aware of anyone running a No Dam scenario to determine what would have happened during Harvey without Lake Conroe Dam. HDR's No Dam scenario showed a peak flow of about 70,000 cfs at the dam.

- SJRA's gate operating procedures for Lake Conroe Dam and its water releases during Harvey caused or exacerbated the flooding, flood effects, damage and destruction of each of the Plaintiffs' properties as identified herein, based on the HDR modeling results, shown in Appendix B herein as taken from Table 2 of Mr. Forest's report, comparing the Existing Conditions Harvey scenario with the Full Capture (No release) scenario, as well as the modified runs based on the original GOP.

- SJRA's design and operation of Lake Conroe and its dam during Harvey caused or exacerbated the flooding, flood effects, damage and destruction of each of the Plaintiffs' properties as identified herein, based on the HDR modeling results, shown in Appendix B herein as taken from Table 2 of Mr. Forest's report, comparing the Existing Conditions Harvey scenario with the Full Capture (No release) scenario, as well as the modified runs based on the original GOP.

- The flooding or exacerbated flooding or flood effects, damage and destruction of each of the Plaintiffs' properties as identified herein would not have occurred under the same rainfall conditions during Harvey had the Lake Conroe Dam not been constructed (i.e. natural conditions), based on the HDR modeling of the No Dam scenario. The timing of the peak flow without the dam is the same as the timing of the release from the dam during Harvey, but was about 10,000 cfs less, meaning that the peak flows and flood levels downstream would have been less without the dam.

- The peak flood waters arrived at Plaintiffs' properties quicker and with less warning than would have occurred under natural conditions (No Dam). The No Dam Scenario showed a more gradual rise in flows being passed downstream at the dam site as compared to the reported releases from the dam during Harvey.

- The flood waters arrived at Plaintiffs' Property during Harvey with higher flow rates than would have occurred under natural conditions (No Dam). The Existing Conditions Scenario had dam releases peaking at about 80,000 cfs, whereas the No Dam Scenario had a peak flow of about 70,000 cfs. This would result in lower peak flow rates downstream of the dam in the vicinity of the Plaintiffs' properties, with flood waters at Plaintiffs' properties being deeper than they would have been under natural conditions (No Dam).

- The flooding or exacerbated flooding or flood effects, damage and destruction of each of the Plaintiffs' properties as identified herein would not have occurred under the same Harvey

rainfall conditions if SJRA had followed its original pre-2010 gate operating procedures, based on the modified runs using HDR's modeling.

- The flooding or exacerbated flooding or flood effects, damage and destruction of each of the Plaintiffs' properties as identified herein would not have occurred under the same Harvey rainfall conditions if SJRA had constructed a flood control lake as originally authorized and designed, based on HDR's Full Capture model scenario which showed the Lake Conroe Dam could have held all of the inflows with no releases and have the lake reach a level of about 213 feet, well below the design maximum level of 217 feet.

- The flooding or exacerbated flooding or flood effects, damage and destruction of virtually all of the Plaintiffs' properties as identified herein was not caused by urban runoff or insufficient urban drainage as Mr. Forest has opined. Mr. Forest identified two (2) Medina Plaintiffs' properties that he claims flooded from urban drainage (Kendrick and Davis). Notably, Kendrick owns two properties at issue in this case, and Mr. Forest's claim only pertains to one of Kendrick's properties. Every other Plaintiff that Mr. Forest identified in his Table 2 as having been impacted by the Lake Conroe Dam releases was noted as being located within the 500-year floodplain. The Davis property is immediately adjacent to the mapped 500-year floodplain of the West Fork San Jacinto River just downstream of Hwy 59/69 in an area where the mapping is approximate. Our 2018 LIDAR data for the Davis property shows it being impacted by the dam releases based on the HDR modeling.

- Mr. Forest's tabulation of the Medina Plaintiffs' properties does not include the Dean's property at 2838 Cotswold Manor Drive South, Kingwood, Tx 77339, and the Sunker's property at 1915 Forest Garden Dr., Kingwood, Tx 77345. Both of these properties lie well within the 500-year floodplain of the West Fork San Jacinto River and were impacted by the releases from the dam during Harvey.

- It is likely that the Plaintiffs' properties will continue to flood in the future as a result of the current design and operation of the Lake Conroe Dam. If future heavy rains fall in the upper San Jacinto River watershed, including above Lake Conroe, and if SJRA continues to operate its dam like it did during Harvey, then one should expect similar flooding to occur downstream.

- The Harvey rainfall that fell over the West Fork of the San Jacinto River watershed, including that which fell over the Lake Conroe watershed, was foreseeable given a similar amount of rain fell during the 1994 flood event. This Harvey flooding approximated a 500-year flood level in the Kingwood area, according to Mr. Forest, which is a foreseeable event. Areas between the 100-year floodplain and 500-year floodplain are considered to be in a "Moderate Flood Hazard Area", according to FEMA.

My name is Dr. Philip B. Bedient. My date of birth is January 13, 1948, and my address is 10014 Bayou Glen Rd., Houston, Texas 77042. I declare under penalty of perjury under the laws of the United States and the State of Texas that the foregoing information is true and correct.

Executed this 15 day of August, 2022, in Harris County, Texas.

Dr. Philip B. Bedient

EXHIBIT A

P. Bedient CV

Philip B. Bedient, Ph.D., P.E.
Curriculum Vitae

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EDUCATION:

B.S. Physics, University of Florida, Gainesville, Florida, 1969
M.S. Environmental Engineering, University of Florida, 1972
Ph.D. Environmental Engineering Sciences, University of Florida, 1975

PROFESSIONAL EXPERIENCE:

Chair – Department of Civil and Environmental Engineering, Rice University, Houston, TX – July 2019 to present
Herman Brown Professor of Engineering - Civil and Environmental Engineering - Rice University - July 2001 to present.
Professor - Environmental Engineering - Rice University - 1986 to 2001.
Professor and Chair - Department of Environmental Science and Engineering, Rice University, Houston, Texas, 1992 - 1999.
Associate Professor - Environmental Engineering – 1980 - 1986.
Assistant Professor - Environmental Engineering – 1975 - 1980.

SCIENTIFIC SOCIETIES:

American Society of Civil Engineers
American Institute of Hydrology
American Water Resources Association
Association of Environmental Engineering Professors
American Academy of Water Resources Engineers
American Geophysical Union

HONORS:

Diplomate - Water Resources Engineer, American Academy of Water Resources Engineers (2008)
C.V. Theis Award from the American Institute of Hydrology (April 2007)
Fellow – American Society of Civil Engineers (April, 2006)
Endowed Chair – Herman Brown Professor in Engineering (July, 2001)
Shell Distinguished Chair in Environmental Science (1988-93)
Phi Beta Kappa

PROFESSIONAL COMMITTEES:

Chair MAAPNEXT technical Advisory Committee to Harris County Flood Control District – Advising on the remapping of floodplains in Harris County, TX, 2020-2023

Chair, Flood Risk Management (InFRM) Academic Council that advises the USACE, USGS, and NWS on important hydrologic technical exchange. 2019 - current

Galveston Bay Park Plan – planning committee for environmental studies of the Project. 2020-2022

Expert Panel – "Impacts of Climate Change on Transportation Systems and Infrastructure in the Gulf Coast" USDOT and USGS, 2005 - 2006

TS Allison Recovery Project - Technical Advisory Committee - 2002-2003

Harris County Flood Control District - Brays Bayou Federal Project Com – 1998- 2002

UNIVERSITY COMMITTEES:

Engineering Chairs Committee
Dean Review Committee – Department of Architecture, 2020
Undergraduate Curriculum Committee, 2005-2020
Accreditation (ABET/SACS) Committee, 2005-2020
Events and Reception Committee (Chair) 2012
Mentorship Committee 2012
Space Planning Committee, 2005-2020
BSCE Advisor 2007-2020

LICENSES:

Professional Engineer, State of Texas, Environmental Engineering (45626)
Professional Hydrologist, American Institute of Hydrology

RESEARCH INTERESTS:

Flood & Surge Mitigation As the director of the Severe Storm Prediction Center (SSPEED) at Rice University (since 2007) Dr. Bedient leads a team of five universities and 15 investigators from Gulf Coast universities dedicated to improving storm prediction, education, and evacuation from disaster. The Center was approved by the Texas Legislature and has been funded at over $9.0 million for 8 years from the Houston Endowment (Hurricane Ike Lessons Learned and Future Steps). A book, "Lessons from Hurricane Ike" was published by TAMU press in June 2012. The SSPEED Center has taken a unique approach to surge mitigation by addressing in bay residual surge impacts related to hurricanes in the Gulf.

Flood Alert Systems with Radar - The development of a real-time flood ALERT system (FAS4) for Brays Bayou and the Texas Medical Center in Houston, TX has been completed. The FAS4 currently uses NEXRAD radar for application to flood prediction and real-time flood alert systems. TMC, FEMA, and TXDOT funded FAS improvements from 1998 thru 2010. Analysis of the severe storm impacts in urban watershed areas has been completed using radar rainfall data, combined with GIS techniques for digital terrain and hydraulic modeling in Houston and other coastal areas in Texas. The system worked perfectly during Harvey in Houston. In October 2020 Dr. Bedient received a grant to develop flood information response systems for four watersheds in Houston, with radar rainfall used to predict inundation at selected critical facilities.

Flood Analysis and Mapping - Monitoring and modeling of radar rainfall and associated hydrology using standard models such as HEC-HMS and HEC-RAS as well as distributed models such as VFLO (VAI). These models have been used to model watersheds all over the U.S. and in flood related legal cases. These models have been used for assessing impacts from Hurricane Harvey, the largest measured rainfall in U.S. history over a 5 day period. Advises Harris County on future mapping technologies.

COURSES and STUDENTS:

- CEVE 412 - Hydrology and Watershed Analysis
- CEVE 512 - Hydrologic Design Laboratory
- CEVE 101 - Fundamentals of Civil and Environmental Engineering
- CEVE 415/515 - Water Resources Planning and Management (50%)
- 20 Ph.D. and 70 M.S. degrees since 1975

RESEARCH STATEMENT:

Dr. Bedient continues to direct the Severe Storm Prediction, Education and Evacuation from Disasters (SSPEED) Center at Rice University as it entered its 11th year with funding exceeding $9.0 million since 2009. The SSPEED Center focuses on research and education related to protection strategies for severe storm flooding and hurricane-related surge. In 2020, SSPEED received funding from both public and private institutions to improve flood warning, to research and communicate scientific knowledge regarding the development of a resilient Gulf Coast, and to educate through conferences, workshops, civic engagements, media outreach and educational activities.

In 2020, Dr. Bedient's research team consisted of 2 senior researchers and 6 graduate students (1 at the PhD level). A number of new papers were co-authored with graduate students this year (2 papers published/1 in review) on various aspects of the SSPEED Center research including storm surge analysis in Galveston Bay, storm surge levee and gate designs, TMC flood warning system and flood mitigation, and the impact of major flooding in Houston. A number of new grants were received to address impacts from Hurricane Harvey with funding from the TMC ($96,000/yr), the Greater Houston Flood Mitigation Team ($350,000), and Texas A&M University ($160,000).

The City of Houston Health Dept (HHS) funded Dr. Bedient for major research relating to COVID ($230,000 from the COVID related Cares Act). The research involved developing advanced hydraulic models to track travel times to 39 waste water treatment plants throughout Houston. Statistical analyses were used to better understand these dynamic relationships. In 2020 Dr. Bedient received $730,000 to develop flood information response systems for four watersheds in Houston, with radar rainfall used to predict inundation at selected critical facilities.

In 2019, Dr. Bedient joined and later became chair of the Interagency Flood Risk Management (InFRM) Academic Council that advises the USACE, USGS, and NWS. The Council will receive funding from the Texas General Land Office on upcoming Harvey mitigation projects. He continued in this role in 2020.

Dr. Bedient has worked extensively in Flood Alert Systems for the past twenty years, and he continues to expand flood warning technology throughout the region. The Texas Medical Center's Flood Alert System is one of the best and most accurate in the U.S. and has resulted in over 1.9 million in funding over the last decade. Recent funding is also provided by the TX Water Development Board.

In 2018-21, the SSPEED Center and its researchers were featured in local and national media stories this year, including television, print, radio and online sources. SSPEED has also promoted our research milestones and notable events through our website, sspeed.rice.edu, and by distributing e-Newsletters. Dr. Bedient had 2500 media hits in the post Harvey era, indicating his strong desire to communicate to the public.

SURFACE WATER PROJECTS (since 2000)

"Measuring, Mapping and Managing Flood Risk: A Pilot Program in Texas" – Texas A&M University, $160,000, January 2019 – December 2020

City of Houston COVID funded "Flood Information Response System" $730,000, June to Dec 2020,

"Cypress Creek Watershed Analysis of Flooding & Storage Options" - Greater Houston Flood Mitigation Consortium, $121,912, September 2018 – April 30, 2019

"Greens Bayou Watershed Analysis and Resiliency Planning GHFMC Proposal" - Greater Houston Flood Mitigation Consortium, $233,088, August 2018 – November 2019

"Center to Rebuild Texas" TAMU and the Governor's Office. $175,000, April 2018 – July 2019.

"Analysis of Federal Project Residual Flood Areas" Greater Houston Flood Consortium, $130,000, Jan – Aug 2018.

"FAS4 - Operational Support" – Texas Medical Center, $96,000 per year, Oct 2017 – present

Flood Warning System for White Oak Bayou, funded by Kinder Inst at Rice U. $75,000 for 2017-18.

"SSPEED Center Proposal to the Houston Endowment -- Environmental Studies of Various Gal Bay Surge Mitigation Strategies, 2017-2019", Houston Endowment, $1,000,000.

Shell Center Award (Padgett and Bedient) -- $50,000 for one year. 2015-2016.

NSF PIRE award "Coastal Flood Risk Reduction Program: Integreated, Multi-scale Approaches for Understanding how to Reduce Vulnerability to Damaging Events, (2015-2020), $100,000 per year for 5 years shared with Jamie Padgett. (50%). (Dutch Exchange Program for students).

Shell Center Award "Stress Nexus of Coastlines: Population Development, Infrastructure Security, and Morpohological Dynamics of the Upper Texas Gulf Coast" (2014-2016). With others ($20,000).

"SSPEED Center Proposal to the Houston Endowment 2014-2017," Houston Endowment $3,200,000. Last year funding level of $500,000.

"SSPEED Center Proposal to the Houston Endowment Coastal Integrated", Houston Endowment, 2011-2014, $3,195,451

"FAS3- Operational Support", Texas Medical Center, 2012-2017, $96,000 per year for 5 years. Supports the operation and research related to TMC Flood Alert System Analysis

"Urban Resilience: Flooding in the Houston-Galveston Area", Kinder. 2009-2012, $240,003

"White Oak Bayou BMP Demonstration Project – Cottage Grove Subdivision", City of Houston, 2009-2013, $165,000.

"Residential Storm Surge Damage Assessment for Galveston County", Texas General Land Office (GLO), 2012-2013, $100,000

"Rice University FEMA: Food Analysis", Rice, 2011-2012, $70,000

"Amendment to Expand Development and Validation of the Online Storm Risk Calculator Tool for Public Usage", City of Houston, 2011, $388,030

"Hurricane Ike: Lessons Learned and Steps to the Future", Houston Endowment, 2009-2012, $1,250,000

"Libya AEL Training Grant", AECOM, 2008-2010. $1.7 million over 2 years.

"Texas OEM SSPEED Training" University of Texas, 2008, $90,000

"Watershed Information Sensing and Evaluation System". Houston Endowment (with UH), 2007-2010, $400,000.

"Advanced Flood Alert System for the TXDOT for Bridge Control at 288". HGAC, 2007-2011 $200,000.

"Civil and Environmental Engineering for the 21st Century". NSF Dept Reform Grant, 2005-2007, $100,000.

"CASA – Collaborative Adaptive Sensing of the Atmosphere – the Houston Testbed". NSF, 2003 – 2009, $110,000, ($90,000 for 2006-07).

"FAS2 - Operational Support", Texas Medical Center, 2003-2012, $69,000
.

"Flood Alert System (FAS2) for the Texas Medical Center and Brays Bayou". FEMA, 2002-2003, $300,000.

"Multi-Purpose Water Management Technology for the Texas Mexico Border", Advanced Technology Program, 2000-2001, $129,000.

"Analysis of Clear Creek Watershed," Galveston Bay Preservation Foundation, 1999-2000, $15,000.

"Flood Alert System - Maintenance and Support". Texas Medical Center, 1998-2002, $271,000.

GROUNDWATER PROJECTS (SINCE 1990)

"A Large-Scale Experimental Investigation of the Impact of Ethanol on Groundwater Contamination", (P.J.J. Alvarez – Co-P.I.) American Petroleum Institute, 2004-2007, $120,000.

"A Large-Scale Experimental Investigation of Impact of Ethanol on Groundwater Contamination", Gulf Coast Hazardous Substances Research Center, 2004-2005, $45,000.

"A Large-Scale Experimental Investigation of Impact of Ethanol on Groundwater Contamination", Gulf Coast Hazardous Substances Research Center, 2003-2004, $95,000.

"Chlorinated Solvent Impact and Remediation strategies in the Dry Cleaning Industry", Gulf Coast Hazardous Substances Research Center, 2000 – 2003, $149,400.

"Design Manual for the Extraction of Contaminants from Subsurface Environments", Environmental Protection Agency, 1994-2002, $4,500,000.

Shell Distinguished Chair in Environmental Science, Shell Oil Company Foundation, 1988-1993, $750,000.

LIST OF HAZARDOUS WASTE SITE PROJECTS (since 2000)

2001 The Dickson County Landfill, Dickson, TN

2002 Celanese Engineering Resins, Inc., Bishop, TX

2002 GB Biosciences, Houston, TX

2003 DOW Plaquemine, LA

2004 Ciba-Geigy, McIntosh, AL

2004 Amoco, Independence, MO

2004 Olin-Geigy, McIntosh, AL

2006 Crazy Horse Landfill, Monterey County, CA

2008 Mid-Valley Sanitary Landfill, Rialto, CA

2010 Pratt-Whitney, West Palm Beach, FL

2013 Monsanto, Mystic River, MA

2013 San Jacinto River Waste Pits, San Jacinto River, TX

2015 LCP Chemicals Site, Brunswick, GA

2015 North Carolina Steam Stations, NC

PUBLICATIONS AND PRESENTATIONS ----- (H index of 35 with 7300 citations)

A. Books or Related Chapters (since 2000)

1. **Bedient, P. B. and Huber, W. C. (2018). "Hydrology and Floodplain Analysis", 6th Ed. Pearson, January 2018, 760 pages.**

2. Fang, Z., Sebastian A., and Bedient, P.B. 2014. "*Modern Flood Prediction and Warning Systems.*" Handbook of Engineering Hydrology: Fundamentals and Applications (Chapter 21), Vol. 1, Taylor & Francis Inc. ISBN-10:1466552417.

3. Bedient, P. B., 2012 "*Lessons learned from Hurricane Ike*" Ed. Philip Bedient. College Station, TX: Texas A&M University Press, College Station, TX: 2012, 194 Pages

4. Rifai H.S., Borden R.C., Newell C.J. and Bedient P.B., " *Modeling Remediation of Chlorinated solvent plumes*" In Situ Remediation of Chlorinated solvent Plumes, Chapter 6, H.F. Stroo, C.H. Ward Editors, Springer, N.Y. 2010, 145 pp.

5. Fang, Z., Safiolea, E., Bedient, P.B. (2006) "*Enhanced Flood Alert and Control Systems for Houston.*" In Chapter 16, Coastal Hydrology and Processes, Ed. By Vijay P. Singh and Y. Jun Xu, Water Resource Publications, LLC, pp. 199-210

6. Capiro, N.L. and Bedient P.B. "*Transport of Reactive Solute in Soil and Groundwater*" The Water Encyclopedia (2005): 524-531.

7. Horsak, R.D., Bedient, P.B., Thomas, F.B., and Hamilton, C. "*Pesticides*", Environmental Forensics (2005).

8. Thompson, J.F. and Bedient, P.B. "*Urban Storm Water Design and Management*," The Engineering Handbook, Chapter 94, CRC Press, 2004, 21 pp.

B. Peer Reviewed Journal Publications (since 2000)

1. Garcia, M.; Juan, A.; Bedient, P. Integrating Reservoir Operations and Flood Modeling with HEC-RAS 2D. Water 2020, 12, 2259.

2. Fagnant, C., Gori, A., Sebastian, A. et al. Characterizing spatiotemporal trends in extreme precipitation in Southeast TX. Nat Hazards (2020). https://doi.org/10.1007/s11069-020-04235-x

3. Ebad Sichani, M., Anarde, K. A., Capshaw, K. M., Padgett, J. E., Meidl, R. A., Hassanzadeh, P., Loch-Temzelides, T.P., Bedient, P. B. (2020). Hurricane risk assessment of petroleum infrastructure in a changing climate. Frontiers in Built Environment, 6 doi: 10.3389/fbuil.2020.00104

4. Gori, A., Gidaris, I., Elliott, J., Padgett, J., Loughran, K., Bedient, P., Panakkal, P., and Juan, A. "Accessibility and Recovery Assessment of Houston's Roadway Network due to Fluvial Flooding during Hurricane Harvey." Natural Hazards Review, Vol. 21, Issue 2 (2019/May). DOI:

doi:10.1061/(ASCE)NH.1527-6996.0000355

5. Gori, A., Blessing, R., Juan, A., Brody, S., & Bedient, P. "Characterizing urbanization impacts on floodplain through integrated land use, hydrologic, and hydraulic modeling." Journal of Hydrology, 568(2019/January): 82-95. DOI: 10.1016/j.jhydrol.2018.10.053

6. Bernier, C., Kameshwar, S., Elliott, J. R., Padgett, J. E., & Bedient, P. B. (2018). Mitigation strategies to protect petrochemical infrastructure and nearby communities during storm surge. Natural Hazards Review, 19(4) doi:10.1061/(ASCE)NH.1527-6996.0000309

7. Bass, B., Torres, J. M., Irza, J. N., Proft, J., Sebastian, A., Dawson, C., & Bedient, P. (2018). Surge dynamics across a complex bay coastline, Galveston bay, TX. Coastal Engineering, 138, 165-183. doi:10.1016/j.coastaleng.2018.04.019

8. Bass, B., & Bedient, P. (2018). Surrogate modeling of joint flood risk across coastal watersheds. Journal of Hydrology, 558, 159-173. doi:10.1016/j.jhydrol.2018.01.014

9. Anarde, K. A., Kameshwar, S., Irza, J. N., Nittrouer, J. A., Lorenzo-Trueba, J., Padgett, J. E., . . . Bedient, P. B. (2018). Impacts of hurricane storm surge on infrastructure vulnerability for an evolving coastal landscape. Natural Hazards Review, 19(1) doi:10.1061/(ASCE)NH.1527-6996.0000265

10. Brody, S. D., Sebastian, A., Blessing, R., & Bedient, P. B. (2018). Case study results from southeast Houston, Texas: Identifying the impacts of residential location on flood risk and loss. Journal of Flood Risk Management, 11, S110-S120. doi:10.1111/jfr3.12184

11. Bernier, C., Elliott, J. R., Padgett, J. E., Kellerman, F., & Bedient, P. B. (2017). Evolution of social vulnerability and risks of chemical spills during storm surge along the Houston Ship Channel. Natural Hazards Review, 18(4) doi:10.1061/(ASCE)NH.1527-6996.0000252

12. Torres, J.M., Bass, B., Irza, J.N., Proft, J., Sebastian, A., Dawson, C., and Bedient, P (2017). Modeling the Hydrodynamic Performance of a Conceptual Storm Surge Barrier System for the Galveston Bay Region. J. of Waterway, Port, Coastal, and Ocean Engineering. DOI: 10.1061/(ASCE)WW.1943-5460.0000389.

13. Bass, B., Juan, A., Gori, A., Fang, Z., and Bedient, P. (2016). 2015 Memorial Day Flood Impacts for Changing Watershed Conditions in Houston, TX. Natural Hazards Review. DOI: 10.1061/(ASCE)NH.1527-6996.0000241.

14. Juan, A., Hughes, C., Fang, Z., and Bedient, P., 2016. Hydrologic Performance of Watershed-scale Low Impact Development (LID) in a High Intensity Rainfall Region. Journal of Irrigation and Drainage Engineering, doi: 10.1061/(ASCE) IR.1943-4774.0001141.

15. Torres, J., Bass, B., Irza, N., Fang, Z., Proft, J., Dawson, C., Kiani, M., and Bedient, P (2015). Characterizing the hydraulic interactions of hurricane storm surge and rainfall-runoff for the Houston-Galveston region. Coastal Engineering 106, 7-19. DOI: http://dx.doi.org/10.1016/j.coastaleng.2015.09.004.

16. Juan, A, Fang, Z., and Bedient, P.B. "Developing a Radar-Based Flood Alert System for Sugar Land, Texas." Journal of Hydrologic Engineering (2015).

17. Brody, S.D., Sebastian, A., Blessing, R., & Bedient, P.B. (2015). Case-study results from southeast Houston, Texas: Identifying the impacts of residential location on flood risk and loss. Journal of Flood Risk Management, (accepted for publication). doi: 10.1111/jfr3.12184

18. Fang, N., Dolan G., Sebastian, A., & Bedient, P.B. (2014). Case Study of Flood Mitigation and Hazard Management at the Texas Medical Center in the Wake of Tropical Storm Allison in 2001. ASCE Natural Hazards Review, 15(3). doi: 10.1061/(ASCE)NH.1527-6996.0000139.

19. Christian, J, Fang, Z., Torres, J., Deitz, R. and Bedient, P.B. "Modeling the Hydraulic Effectiveness of a Proposed Storm Surge Barrier System for the Houston Ship Channel during Hurricane Events." Natural Hazards Review 16, no. 1 (2014): 04014015

20. Burleson, Daniel W., Hanadi S. Rifai, Jennifer K. Proft, Clint N. Dawson, and Philip B. Bedient. "Vulnerability of an industrial corridor in Texas to storm surge." Natural Hazards 77, no. 2 (2015): 1183-1203.

21. Sebastian, A., Proft, J., Dawson, C., & Bedient, P.B. (2014). Characterizing hurricane storm surge behavior in Galveston Bay using the SWAN+ADCIRC model. Coastal Engineering, 88, 171-181. doi: http://dx.doi.org/10.1016/j.coastaleng.2014.03.002.

22. Brody, S.D., Blessing, R., Sebastian, A., & Bedient, P.B. (2014). Examining the impact of land use/land cover characteristics on flood losses. Journal of Environmental Planning and Management, 57(8), 1252-1265. doi: 10.1080/09640568.2013.802228.

23. Brody, S.D., Blessing, R., Sebastian, A., and Bedient, P.B. (2013). "Delineating the Reality of Flood Risk and Loss in Southeast, TX." *ASCE* Natural Hazards Review, 14, 89-97.doi: 10.1061/(ASCE) NH.1527-6996.0000091.

24. Fang, Z., Sebastian A., and Bedient, P.B. 2014. "Modern Flood Prediction and Warning Systems." Handbook of Engineering Hydrology: Fundamentals and Applications (Chapter 21), Vol. 1, Taylor & Francis Inc. ISBN-10:1466552417.

25. Teague, A., J. Christian, and P. Bedient. (2013) "Use of Radar Rainfall in an Application of Distributed Hydrologic Modeling for Cypress Creek Watershed, Texas". Journal of Hydrologic Engineering. DOI: 10.1061/(ASCE) HE.1943-5584.000056.

26. Doubleday, G., Sebastian, A., Luttenschlager, T., and Bedient, P.B. (2013). "Modeling Hydrologic Benefits of Low Impact Development: A Distributed Hydrologic Model of The Woodlands, TX." Journal of American Water Resources, 1-13. doi: 10.1111/jawr.12095.

27. Christian, J., A. Teague, L. Dueñas-Osario, Z. Fang, and P. Bedient, (2012). "Uncertainty in Floodplain Delineation: Expression of Flood Hazard and Risk in a Gulf Coastal Watershed." Journal of Hydrological Processes, doi: 10.1002/hyp.9360.

28. Ray, T., Stepinski, E., Sebastian, A., Bedient, P.B. (2011)"Dynamic Modeling of Storm Surge and Inland Flooding in Texas Coastal Floodplain" ", Journal of Hydraulic Engineering, ASCE, Vol. 137, No.10, October 2011, ISSN 0733-9429/2011/10-1103-1110

29. Fang, Z., Bedient, P. B., and Buzcu-Guven, B. (2011). "Long-Term Performance of a Flood Alert System and Upgrade to FAS3: A Houston Texas Case Study". Journal of Hydrologic Engineering, ASCE Vol. 16, No. 10, October 1, 2011, ISSN 1084-0699/2011/10-818-828.

30. Teague, A., Bedient, P. and Guven, B. (2010). "Targeted Application of Seasonal Load Duration Curves using Multivariate Analysis in Two Watersheds Flowing into Lake Houston" (JAWRA-10-0003-P.R1). Journal of American Water Resources Association. Accepted.

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32. Fang, Z., Bedient, P. B., Benavides J.A, and Zimmer A. L. (2008). "Enhanced Radar-based Flood Alert System and Floodplain Map Library". Journal of Hydrologic Engineering, ASCE, Vol. 13, No. 10, October 1, 2008, ISSN 1084-0699/2008/10-926-938.

33. Gomez, D. E., De Blanc, P. C., Rixey, W., Bedient, P.B., Alvarez, P. J.J. (2008), "Evaluation of Benzene Plume Elongation Mechanisms Exerted by Ethanol Using RT3D with a General Substrate Interaction Module" Water Resource Research Journal, Vol. 44, May.

34. Rifai, H.S., Borden, R. C., Newell, C. J., and Bedient, P.B. "Modeling Dissolved Chlorinated Solvents in Groundwater and Their Remediation," in SERDP monograph on Remediation of Dissolved Phase Chlorinated Solvents in Groundwater, (accepted) 2007.

35. Bedient, P. B., Holder, A., and Thompson, J. F., and Fang, Z. (2007). "Modeling of Storm water Response under Large Tailwater Conditions – Case Study for the Texas Medical Center". Journal of Hydrologic Engineering, Vol. 12, No. 3, May 1, 2007.

36. Capiro, N.L., Stafford, B.P., Rixey, W.G., Alvarez, P.J.J. and Bedient, P.B. "Fuel-Grade Ethanol Transport at the Water Table Interface in a Pilot-Scale Experimental Tank" Water Research, 41(3), pp. 656-654, 2007.

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38. Characklis, G.W., Griffin, R.C., and Bedient, P.B. "Measuring Long-term Benefits of Salinity Reduction" Journal of Agricultural and Resource Economics, 30 (1) (2005): 69-93.

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42. Thompson, J.F. and Bedient, P.B. "Urban Storm Water Design and Management" The Engineering Handbook, Chapter 94, CRC Press, 2004, 21 pp.

43. Capiro, N.L. and Bedient P.B. "Transport of Reactive Solute in Soil and Groundwater" The Encyclopedia of Water, John Wiley and Sons, Inc., New York, NY, USA pp. 524-531, 2005.

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47. Bedient, P.B., Vieux, B.E., Vieux, J.E., Koehler, E.R., and H.L. Rietz "Mitigating Flood Impacts of Tropical Storm Allison" accepted by Bulletin of American Meteorological Society, 2002.

48. El-Beshry, M., Gierke, J.S., and P.B. Bedient "Practical Modeling of SVE Performance at a Jet-Fuel Spill Site" ASCE Journal of Environmental Engineering pp. 630-638, (127) 7, July 2001.

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51. Bedient, P.B., Hoblit, B.C., Gladwell, D.C., and B.E. Vieux "NEXRAD Radar for Flood Prediction in Houston" ASCE Journal of Hydrologic Engineering, 5(3), pp. 269-277, July 2000.

52. Hamed, M.M., Nelson, P.D., and P.B. Bedient "A Distributed Site Model for Non-equilibrium Dissolution of Multicomponent Residually Trapped NAPL" Environmental Modeling and Software, (15), pp. 443-450, September 2000.

53. Holder, A.W., Bedient, P.B., and C.N. Dawson "FLOTRAN, a Three-dimensional Ground Water Model, with Comparisons to Analytical Solutions and Other Models" Advances in Water Resources, pp. 517-530. 2000.

54. Rifai, H.S., Bedient, P.B., and G.L. Shorr "Monitoring Hazardous Waste Sites: Characterization and Remediation Considerations" Journal of Environmental Monitoring, 2(3), pp. 199-212, June 2000.

55. Hoblit, B.C., Baxter, E.V., Holder, A.W., and P.B. Bedient "Predicting With Precision" ASCE Civil Engineering Magazine, 69(11), pp. 40-43, November 1999.

56. Bedient, P.B., Holder, A.W., Enfield, C.G., and A.L. Wood "Enhanced Remediation Demonstrations at Hill Air Force Base: Introduction" Innovative Subsurface Remediation: Field Testing of Physical, Chemical, and Characterization Technologies, Mark L. Brusseau, et al., eds., pp. 36-48, American Chemical Society, Washington, DC, 1999.

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58. Characklis, G.W., Griffin, R.C., and P.B. Bedient "Improving the Ability of a Water Market to Efficiently Manage Drought" Water Resources Research, (35) 3, 823-831, March 1999.

59. Vieux, B.E. and P.B. Bedient "Estimation of Rainfall for Flood Prediction from WSR-88D Reflectivity: A Case Study, 17-18 October 1994" Weather and Forecasting, 1998 American Meteorological Society, 13:2, 407-415, June 1998.

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64. Hamed, M.M., Bedient, P.B., and C.N. Dawson "Probabilistic Modeling of Aquifer Heterogeneity Using Reliability Methods" Advances in Water Resources, 19(5), 277-295, 1996.

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80. Wheeler, M.F., Dawson, C.N., and P.B. Bedient "Numerical Simulation of Microbial Biodegradation of Hydrocarbons in Ground Water" Proceedings of the NWWA/IGWMC Conference on Solving Ground Water Problems with Models, Denver, CO, February 10-12, Vol. 1, pp. 92-109 (1987).

81. Chiang, C.Y. and P.B. Bedient "Simplified Model for a Surcharged Stormwater System" Proceedings of the Third Int'l Conf. on Urban Storm Drainage, Goteborg, Sweden, pp. 387-396 (1985).

82. Wang, T.H., Curran, C.M., Bedient, P.B., and M.B. Tomson "Ground Water Contamination at Conroe Creosote Waste Disposal Site" Proceedings of the Second Int'l Conf. on Ground Water Quality Research, OSU University Printing Services, Stillwater, OK, pp. 50-52 (1985).

83. Borden, R.C., Bedient, P.B., and T. Bouvette "Modeling Ground Water Transport at Conroe Creosote Waste Site" Proceedings of the Second Int'l Conf. on Ground Water Quality Research, OSU University Printing Services, Stillwater, OK, p. 88-90 (1985).

84. Todd, D.A. and P.B. Bedient "Use of Qual-II to Model Stream Protection Alternatives" Proceedings of the ASCE 1984 National Conference on Environmental Engineering, Los Angeles, CA, June 1984, pp. 60-65 (1984).

Invited Lectures (Recent since 2000)

1. Study Abroad Program SSPEED (Rice and LSU) in the Rotterdam and London, June 2019.

2. Technical Exchange with the Dutch Researchers in Amsterdam in 2015, 2017, 2019.

3. "Overview of SSPEED Center", TU Delft Netherlands, March 12-15, 2014 (International exchange with SSPEED Center).

4. "Low Impact Development (LID) in Houston" LID Workshop, Houston, Texas. April 3, 2014, (hosted and coordinated)

5. "Low Impact Development Modeling in Houston" (LID) Conference. Dallas, Texas, May 1-4,2014.

6. "White Oak Bayou Study in Houston with VFLO" Southwest Stream Restoration Conference, San Antonio, Texas, May 27-28, 2014.

7. EWRI World Environment & Water Resources Congress 2014, Portland, Oregon, June 2-6, 2014.

8. "Houston-Galveston Area Protection System (HGAPS)" Workshop, Houston and Galveston, Texas, October 15-16, 2014.

9. Shell Center for Sustainability, "How Sustainable is the Texas Coast?" Houston, Texas, October 29, 2014

10. The Resilience and Adaptation to Climate Risks Workshop: NASA Johnson Space Center and the Houston/Galveston Area, March 8, 2012, Houston, Texas

11. Bedient, P.B., SSPEED Conference. Chair and Organizer, "*Hurricane Ike, Revisited,*" September 14, 2009, Houston, Texas.

12. Bedient, P.B., SSPEED Conference. Chair and Organizer, "*Severe Storm Prediction and Global Climate Impact in the Gulf Coast,*" Sponsored by American Institute of Hydrology. October 29-31, 2008, Houston, Texas. (Attended by over 150 guests and speakers).

13. Bedient, P.B., SSPEED Conference. Chair and Organizer, "*Severe Storm Prediction and Global Climate Impact in the Gulf Coast,*" Sponsored by American Institute of Hydrology. October 29-31, 2008, Houston, Texas. (Attended by over 150 guests and speakers).

14. Bedient, P.B., Robinson, and H., Fang, Z. (2008). "Distributed Hydrologic Model Development in the Topographically Challenging Yuna River Watershed, Dominican Republic". Meeting in Dominican Republic before the President October 20, 2008.

15. Bedient, P.B. (June, 2008) Plan for the Dominican Republic Flood Study, before the Ministers of Education, Environment, and Economic Development.

16. Bedient, P.B. "Advanced Flood Alert Systems in Texas" International Disaster Response Conference, Daves, Switzerland, August 28, 2006.

17. Bedient, P.B. "IP2 Flood Alert System for Houston" CASA Meeting NSF Review, UMASS. April, 2006.

18. Bedient, P.B. "Severe Storm Impacts in the Gulf Coast" Severe Storm Impacts and Disaster Response in Gulf Coast, Houston, Rice University, March 15-16, 2006.

19. Bedient, P.B. "Living with Severe Storms in the Gulf Coast- Scientia Lecture" Rice University, Houston, TX. (September 2005).

20. Bedient, P.B., Fang, Z., Safiolea, E., and B.E. Vieux "Enhanced Flood Alert System for Houston" 2005 National Hydrologic Council Conference: Flood Warning Systems, Technologies and Preparedness, Sacramento, California. (May 16-20)

21. Fang, Z. and Bedient, P.B. "Enhanced Flood Alert and Control Systems for Houston" Proceedings of the 25th American Institute of Hydrology Conference: Challenges of Coastal Hydrology and Water Quality. Baton Rouge, Louisiana, May 21-24, 2006.

22. Fang, Z., Bedient, P.B., and R. Hovinga "Prediction of Severe Storm Flood Levels for Houston Using Hurricane Induced Storm Surge Models in a GIS Frame" Proceedings of AWRA 2006 Spring Specialty Conference: GIS and Water Resources IV. Houston, Texas, May 8-10, 2006.

23. Bedient, P.B. "Impacts of Climate Change on Transportation Systems and Infrastructure" Gulf Coast Study, Lafayette, LA. (May 2005)

24. Capiro, N.L., Da Silva, M.L.B., Stafford, B.P., Alvarez, P.J.J., and P.B. Bedient "Changes in Microbial Diversity Resulting from a Fuel-Grade Ethanol Spill" Eighth International Symposium on In Situ and On-Site Bioremediation, Baltimore, MD. (June 2005).

25. Safiolea, E. and P. B. Bedient "Assessment of the Relative Hydrologic Effect of Land Use Change and Subsidence Using Distributed Modeling" EWRI Watershed Management Conference, Williamsburg, VA. (July 9-22, 2005)

26. Capiro, N.L., Stafford, B., He, X., Rixey, W.G., and P.B. Bedient "A Large-Scale Experimental Investigation of Ethanol Impacts on Groundwater Contamination" Presentation at the Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds; Monterey, CA; May 2004.

27. Capiro, N.L., Da Silva, M.L.B., Stafford, B.P., Alvarez, P.J.J., and P.B. Bedient "Changes in Microbial Diversity Resulting from a Fuel-Grade Ethanol Spill" Accepted for Presentation at The Eighth International Symposium on In Situ and On-Site Bioremediation; Baltimore, MD. June 2005.

28. Safiolea, E. and P.B. Bedient "Analysis of Altered Drainage Patterns and Subsidence Impact Using a Distributed Hydrologic Model" AWRA Annual Water Resources Conference in Orlando FL, November 2004.

29. Safiolea, E. and Philip B. Bedient " Assessment of the Relative Hydrologic Effect of Land Use Change and Subsidence using Distributed Modeling" EWRI Watershed Management Conference in Williamsburg VA, Jul19-22, 2005.

30. Bedient, P.B. and J.A. Benavides "Use of QPE and QPF for Flood Alert (FAS2) in the Houston, TX Test Bed" CASA NSF ERC Conference, " Estes Park, CO, October, 2004.

31. Capiro, N.L., Adamson, D.T., McDade, J.M., Hughes, J.B., and P.B. Bedient "Spatial Variability of Dechlorination Activity Within a PCE DNAPL Source Zone" Presentation The 7th International Symposium In Situ and On-Site Bioremediation; Orlando, FL; June 2003

32. Benavides, J.A. and P.B. Bedient "Improving the Lead-Time and Accuracy of a Flood Alert System in an Urban Watershed" 2003 AWRA Annual Conference, San Diego, California, November 2003.

33. Whitko, A.N. Bedient, P.B., and S. Johnson "Sustainable Flood Control Strategies in the Woodlands – Thirty Years Later" 2003 AWRA Annual Conference, San Diego, California, November 2003.

34. Safiolea E., Hovinga, R., and P.B. Bedient " Impact of Development Patterns on Flooding in Northwest Houston using LIDAR Data" 2003 AWRA Annual Conference, San Diego, California, November 2003

35. Benavides, J.A. and P.B. Bedient "Improving the Performance of a Flood Alert System Designed for a Rapidly Responding Urban Watershed" 2003 Conference on Flood Warning Systems Technologies and Preparedness, Dallas, Texas. October 2003.

36. Bedient, P.B., Holder, A., and Baxter Vieux "A Radar-Based Flood Alert System (FAS) Designed for Houston, TX" *International Conference on Urban Storm Drainage*, Portland, OR, September 2002.

37. Holder, A., Stewart, E., and P.B. Bedient "Modeling an Urban Drainage System with Large Tailwater Effects under Extreme Rainfall Conditions" *International Conference on Urban Storm Drainage*, Portland, OR, September 2002.

38. Glenn, S., Bedient, P.B., and B. Vieux "Analysis of Recharge in Ground Water Using NEXRAD in a GIS Format" *AWRA Summer Specialty Conference*, Keystone, CO, July, 2002.

39. Bedient, P.B. "Flood ALERT System (FAS) for Brays Bayou and the TMC" T.S. Allison: A Brays Bayou Event, Rice University Conference Presentation, and November 13, 2001.

40. Bedient, P.B. "Flood ALERT System for the Texas Medical Center" Hurricanes and Industry, Houston Conference Presentation, November 7, 2001.

41. Bedient, P.B. and J.A. Benavides "Analyzing Flood Control Alternatives for the Clear Creek Watershed in a Geographic Information Systems Framework" presented at ASCE's EWRI Spring 2001 World Water & Environmental Resources Congress Conference.

42. Hoblit, B.C., Bedient, P.B., B.E. Vieux, and A. Holder "Urban Hydrologic Forecasting: Application Issues Using WSR-88D Radar" *Proceedings American Society of Civil Engineers Water Research, Planning and Management 2000 Conference,* Minneapolis, MN, August 2000.

EXHIBIT B
LIST OF LAST 4 YEARS OF TESTIMONY

List of Testimony in the last 4 years

1. *ALL IN PROPERTIES, LLC v. DFP PROPERTIES 2, LLC* – Defendant, Denton, TX; Civil No. 4:20-CV-875-SD; U.S. Dist. Ct. Eastern Dist. of TX, Sherman Division (2022)

2. *Hampton, et al v. Metropolitan Water Reclamation District of Greater Chicago* – Plaintiffs, west of Chicago, IL, No. 2011 CH 25822; Circuit Ct. of Cook County, IL Chancery Division (2022) Dunbar Harder PLLC

3. *Alexander, et al v. The Woodlands Land Development Company, L.P. et al* – Plaintiffs, The Woodlands, TX; Cause No. 2018-36108; Dist. Ct. Harris County, TX, 215th Judicial Dist. (2021) Abraham Watkins

4. *In re: UPSTREAM ADDICKS AND BARKER (Texas) FLOOD-CONTROL RESERVOIRS* – Plaintiffs, Houston, TX; Sub-Master Docket No. 17-9001L; U.S. Court of Federal Claims (2022) Burns Charest

5. *Argos Ports (Houston) LLC v. Kirby Inland Marine, LP, et al* – Defendant, Houston, TX; Civil No. 4:18-CV-00327; U.S. District Ct. Southern Dist. of TX, Houston Division (2022)

6. *Salcetti v. AIG Property Casualty Company* – Defendant, Houston, TX; Civil No. 4:19-CV-01184; U.S. District Ct. Southern Dist. of TX, Houston Division (2018)

7. *City of Walker, et al v. State of Louisiana, et al* – Plaintiffs, Louisiana, Cause No. 654,278; 19th Judicial District Court for East Baton Rouge Parish (2022) Weller, Green, Toups and Terrell LLP

EXHIBIT C
LIST OF MEDINA PLAINTIFFS
(Table 2 from Forest report)

Table 2 – Medina Plaintiff Property Summary

Ref #	Address	Plaintiff	Profile No.	Station on Profile	Approximate Adjacent Grade	Finished Floor Elevation Provided by Plaintiff	August 2017 Maximum WSE Existing Condition	August 2017 Maximum WSE No Release from Conroe	Only Conroe Release	Depth in August 2017	Depth with No Conroe Release	Comments
0	20406 Lanchire Dr, Humble, TX, 77338, USA	Dearson and Paula S. Beeman	10	18	70.2	Not Avail	71.0	66.6	Property Not Impacted	0.7		Property within the FEMA 500-year flood zone.
1	20339 Fieldtree Dr, Humble, TX, 77338, USA	Todd Allen	10	2916	69.6	Not Avail	70.5	66.5	Property Not Impacted	0.9		Property within the FEMA 500-year flood zone.
2	20530 Fieldtree Dr, Humble, TX, 77338, USA	Robert E. Burkhalter	10	1614	64.4	Not Avail	70.5	66.2	Property Not Impacted	6.1	1.8	Property located partially with in the FEMA 100-year floodplain of the West Fork San Jacinto River
3	20449 Fieldtree Dr, Humble, TX, 77338, USA	Armando Chavez	10	2321	67.1	Not Avail	70.5	66.2	Property Not Impacted	3.4	-0.8	This is part of the same attached housing development as indicated FID: 2, 5, 7. Property with in the FEMA 500-year flood zone.
4	11226 Ashwood Dr, Humble, TX, 77338, USA	Ricky Smart	6	5283	62.3	Not Avail	65.0	62.9	Property Not Impacted	2.7	0.6	Property within the FEMA 500-year flood zone.
5	20445 Fieldtree Dr, Humble, TX, 77338, USA	Joseph C. Mire	10	2353	67.1	Not Avail	70.5	66.2	Property Not Impacted	3.4	-0.9	This is part of the same attached housing development as indicated FID: 2, 5, 7. Property with in the FEMA 500-year flood zone.
6	11211 Ashwood Dr, Humble, TX, 77338, USA	Diana Marie Watson	6	5631	63.2	Not Avail	65.1	63.1	Property Not Impacted	1.8	-0.1	Property within the FEMA 500-year flood zone.
7	20451 Fieldtree Dr, Humble, TX, 77338, USA	Hong Tran	10	2280	67.0	Not Avail	70.5	66.2	Property Not Impacted	3.5	-0.8	This is part of the same attached housing development as indicated FID: 2, 5, 7. Same as FID 11. Property within the FEMA 500-year flood zone.
8	20459 Fieldtree Dr, Humble, TX, 77338, USA	Billy W. and Shirley L. Skaggs	10	2196	66.3		70.3	66.2	Property Not Impacted	4.0	-0.3	Property within the FEMA 500-year flood zone.
9	3233 Burning Tree Rd, Elgwood, TX, 77338, USA	Steven L and Patricia W. Bacon	21A	412	57.3	60.6	64.1	63.1	56.4	8.6	5.8	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
10	3032 S Cotswold Manor Dr, Elgwood, TX, 77338, USA	Syed Shah	9B	2657	57.7		60.7	58.2	Property Not Impacted	3.0	0.5	Property located partially with in the FEMA 100-year floodplain of the West Fork San Jacinto River
11	1211 Cornsell Way, Elgwood, TX, 77338, USA	Eric White	9B	779	57.6		60.5	58.0	Property Not Impacted	2.9	0.4	Property located partially with in the FEMA 100-year floodplain of the West Fork San Jacinto River
12	4707 Breezy Point Dr, Elgwood, TX, 77345, USA	Brian White	17B	6801	53.1	Not Avail	58.2	55.8	Property Not Impacted	5.1	2.7	Property within the FEMA 500-year flood zone.
13	3815 Kings Crossing Dr, #116, Elgwood, TX, 77345, USA	Eric White	5B	5876	63.4		56.4	56.0	Property Not Impacted	-7.0	-8.4	Property within the FEMA 500-year flood zone.

14	30 Fisher Cir, Huntsville, TX, 77320, USA	Joseph B. and Linda S. Barbarino	30	15859	58.9		74.6	74.6	Property Not Impacted	5.5	5.5	Property located partially in the FEMA 100-year floodplain of the East Fork San Jacinto River
15	18815 Elmwood Ave, Humble, TX, 77338, USA	Judy R. and William J. Bailey	6	6072	62.5		65.9	63.2	Property Not Impacted	1.6		
16	1011 Pecos Rd, Humble, TX, 77338, USA	Vickie Sullivan	31A	766	57.3		66.4	63.8	56.9	6.3	6.3	Property located in the FEMA floodplain and FEMA regulatory floodway of the West Fork San Jacinto River
17	4831 FM 1960 Rd E, Humble, TX, 77346, USA	Kathryn Trautman	41	8855	52.7		61.0	58.3	Property Not Impacted	1.3	-1.4	Property within the FEMA 500-year flood zone.
18	38 Dixie Side Ct, Kingwood, TX, 77339, USA	Ernest and Beverly Hunter	35A	8878	55.7		58.1	54.0	Property Not Impacted	3.8	0.8	Property within the FEMA 500-year flood zone.
19	4908 Woodstream Village Dr, Kingwood, TX, 77345, USA	Ross Taylor	35A	3858	61.9		61.0	63.0	Property Not Impacted	-1.9	-2.0	Property within the FEMA 500-year flood zone.
20	3318 Spruce Grove Dr, Kingwood, TX, 77339, USA	Peter and Patricia Clarke	9C	3134	58.4		63.3	58.8	Property Not Impacted	2.8	0.5	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
21	7 Kingwood Villas Ct, Kingwood, TX, 77339, USA	Jack and Karen Absher	17B	16204	55.3		62.9	57.7	Property Not Impacted	5.0	2.6	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
22	5306 Mayfair Way, Kingwood, TX, 77339, USA	Steven and Kathryn McCloy	6B	8548	57.4		62.5	58.1	Property Not Impacted	3.8	0.7	Property located in the FEMA 500-year floodplain
23	1523 Bahamian Dr, Kingwood, TX, 77339, USA	Kevin and Karen Pope	30	16053	51.5	53.5	64.5	63.3	56.6	11.6	8.8	Property located in the FEMA floodplain and FEMA regulatory floodway of the West Fork San Jacinto River
24	31 Greens Edge Dr, Kingwood, TX, 77339, USA	John and Rachel Kha	35A	3300	54.7		58.7	54.8	Property Not Impacted	4.0	1.7	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
25	3106 Soft Rain Ct, Kingwood, TX, 77345, USA	Bryan and Amanda Castleberry	35A	5953	61.1		61.9	63.0	Property Not Impacted	0.8	0.7	Property within the FEMA 500-year flood zone.
26	4514 Mulberry Park Ln, Kingwood, TX, 77345, USA	Andrea and Maria Abdala	33	3442	63.1		65.8	63.7	Property Not Impacted	1.5	1.4	Property within the FEMA 500-year flood zone.
27	1915 Nicholson Dr, Kingwood, TX, 77339, USA	Andrea and Michael Sussna	9A	9350	48.3		62.8	60.1	Property Not Impacted	1.6	-1.8	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
28	4430 Bellagrove Ct, Kingwood, TX, 77345, USA	Thornton and Barbara Hearne	5C	937	54.1	Not Avail	58.2	55.9	Property Not Impacted	4.0	1.8	Property within the FEMA 500-year flood zone.
29	1310 Trailwood Village Dr, Kingwood, TX, 77339, USA	Alka and Kevin Hanna	9C	3570	57.5	Not Avail	61.8	58.3	Property Not Impacted	4.8	1.8	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
30	3154 Pleasant Creek Dr, Kingwood, TX, 77345, USA	Kelley and John Jordan	6B	3093	51.1		58.0	55.8	Property Not Impacted	5.7	3.3	Property within the FEMA 500-year flood zone.

34	29150 Aspen Mountain Trl, Kingwood, TX, 77345, USA	Christopher and Leslie Kerbaa	48	5502	55.3		58.4	55.6	Property Not Impacted	3.3	0.7	Property located partially within the FEMA 500-year Floodplain of the West Fork San Jacinto River
35	2015 Maple Bend Dr, Kingwood, TX, 77345, USA	Alan and Sharon Lovelace	58A	6774	61.5	Not Avail	61.5	62.0	Property Not Impacted	-0.4	-0.5	Property within the FEMA 500-year flood zone.
36	20635 Aquacadia Point Dr, Humble, TX, 77346, USA	David and Brenda Andrews	168	2651	58.7	Not Avail	56.0	54.8	Property Not Impacted	4.3	2.5	Property within the FEMA 500-year flood zone.
37	5606 Island Pere Ct, Kingwood, TX, 77345, USA	Ralph and Judy Spears	30A	7114	52.3	Not Avail	56.1	54.8	Property Not Impacted	3.3	1.3	Property located partially within the FEMA 500-year Floodplain of the West Fork San Jacinto River
38	6946 Shoreview Ln, Humble, TX, 77346, USA	Rusty and Vicki Carpenter	16	3421	53.6	48.50	52.7	53.4	Property Not Impacted	2.8	0.8	Property located partially within the FEMA 500-year Floodplain of the West Fork San Jacinto River
39	4824 Scenic Woods Trl, Kingwood, TX, 77345, USA	Barbara and Richard Matakas	33	3708	58.3	Not Avail	61.8	61.7	Property Not Impacted	3.7	3.6	Property located partially within the FEMA 500-year Floodplain of the West Fork San Jacinto River
40	20207 Aquacadia Place Dr, Humble, TX, 77346, USA	Jeff and Veronica Norris	168A	473	52.9	Not Avail	56.3	54.8	Property Not Impacted	2.3	0.5	Property within the FEMA 500-year flood zone.
41	1300 N Houston Ave, Humble, TX, 77338, USA	Terri Davis	4		68.1	Not Avail			Property Not Impacted	-68.1		Source of flooding from urban area.
42	19111 Vintage View Ln, Humble, TX, 77346, USA	Evelyn Gilder	34	8758	53.6		53.7	53.8	Property Not Impacted	2.8	0.8	Property located partially within the FEMA 500-year floodplain
43	6221 Lakeshore Villa Dr, Humble, TX, 77346, USA	Lori and Frank McDonald	168	8536	53.0	Not Avail	55.4	53.8	Property Not Impacted	2.8	0.8	Property within the FEMA 500-year flood zone.
44	4050 Dunham Rd, Kingwood, TX, 77345, USA	Northshire Investments Humble, Inc	33	8399	48.1		48.7	61.6	Property Not Impacted	13.4	13.5	Property located in the FEMA 100-year Floodplain of Caney Creek
45	10015 Cardamon Dr, Humble, TX, 77338, USA	Jessica and Clyde Duncan	305	8300	64.5		70.5	66.2	Property Not Impacted	6.0	1.7	Property within the FEMA 500-year flood zone.
46	9713 Cardamon Dr, Humble, TX, 77338, USA	Sharon Kelly	305	59	66.9		70.9	66.5	Property Not Impacted	6.0	-0.4	Property within the FEMA 500-year flood zone.
47	2303 Forest Garden Dr, Kingwood, TX, 77345, USA	Cecilia Carranza and Tina Cardenas-Lewis	68	2310	52.9		58.8	55.7	Property Not Impacted	5.8	2.8	Property located partially within the FEMA 500-year floodplain
48	10310 Dorothea Dr, Humble, TX, 77338, USA	Olga and Edward Strong	305	8170	65.3	Not Avail	70.5	66.2	Property Not Impacted	5.3	1.0	Same as FID 45. Property within the FEMA 500-year flood zone.
49	4050 Dunham Rd, Kingwood, TX, 77345, USA	Sharon Kelly	33	8399	48.1		48.7	61.6	Property Not Impacted	13.4	13.5	Same as FID 43. Property located in the FEMA 100-year Floodplain of Caney Creek
50	21518 Lagoon Ln, Huffman, TX, 77336, USA	John and Joan Dutton	54	6122	47.4		52.9	53.6	Property Not Impacted	6.5	5.8	Property located partially in Regulatory Flood in the FEMA 100-year Floodplain of the West Fork San Jacinto River

48	10350 Deerchase Dr, Humble, TX, 77338, USA	Mary Bass	2D	8170	65.1	Not Avail	70.5	66.2	Property Not Impacted	5.1	0.9	Same as RD 45. Property within the FEMA 500-year floodzone.
49	21803 Sweet Bay Rd, Kingwood, TX, 77339, USA	Jack Saint John	9A	9012	56.9	56	61.6	58.6	Property Not Impacted	5.7	3.0	Property located within the FEMA 100-year floodplain of the West Fork San Jacinto River
50	91 Live Asbury Pl, Kingwood, TX, 77345, USA	Shawn Kelly								0.0	0.0	Address not valid.
51	20458 Fieldrest Dr, Humble, TX, 77338, USA	Dana Kempler	2D	3260	67.0		70.5	66.2	Property Not Impacted	3.5	-0.8	Same as FED 7. Property within the FEMA 500-year floodzone.
52	20009 Fieldrest Dr, Humble, TX, 77338, USA	Rod Trask	2D	3264	64.5	Not Avail	70.5	67.0	Property Not Impacted	6.0	0.5	Property within the FEMA 500-year floodzone.
53	1920 W Lake Houston Pkwy, Kingwood, TX, 77339, USA	Mayer Austin	15A	1850	51.7		58.1	56.0	Property Not Impacted	6.3	3.8	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
54	2326 Bent Mark Trl, Kingwood, TX, 77339, USA	Robert L. and Kimberly S. Beasley	17D	8019	51.9	Not Avail	58.5	56.2	Property Not Impacted	5.5	3.3	Property within the FEMA 500-year floodzone.
55	2810 Hobson Ct, Kingwood, TX, 77345, USA	Nicholas L. Sinclair	5B	5154	55.3	Not Avail	58.4	55.8	Property Not Impacted	3.1	0.5	Same as FED 56. Property within the FEMA 500-year floodzone.
56	2810 Hobson Ct, Kingwood, TX, 77345, USA	Peggy J. Glass	5B	5154	55.3		58.4	55.8	Property Not Impacted	3.1	0.5	Same as FED 55. Property within the FEMA 500-year floodzone.
57	4535 Chuckcross Ct, Kingwood, TX, 77345, USA	Ronald Charles and Helena Crescenzo	5B	4470	54.0	Not Avail	58.1	55.8	Property Not Impacted	4.1	1.8	Property within the FEMA 500-year floodzone.
58	34 Kings River Ct, Humble, TX, 77346, USA	Clifton B. Jr. and Deborah H. Currie	15A3	1697	53.5	54.3	57.0	55.1	Property Not Impacted	4.5	2.6	Property located partially within the FEMA 100-year floodplain
59	2613 Fern Branch Dr, 0 14th, Kingwood, TX, 77339, USA	Shannon C. Crawford	17D	8195	55.5		58.8	56.5	Property Not Impacted	3.3	1.0	Property located partially within the FEMA 500-year floodplain
60	23318 Annandale Place Dr, Humble, TX, 77346, USA	Richard M. and Brenda Engel	15A3	135	50.4	Not Avail	55.6	53.0	Property Not Impacted	5.3	3.5	Property located partially within the FEMA 100-year floodplain
61	5514 Beaver Lodge Dr, Kingwood, TX, 77345, USA	Andrew W. and Marlee A. Ferguson	5D	3874	53.9		56.7	54.8	Property Not Impacted	2.8	0.9	Property within the FEMA 500-year floodzone.
62	4007 Royal Point Ct, Kingwood, TX, 77345, USA	Jose S. and Julie B. Guevara	18C	853	51.5	Not Avail	55.4	51.8	Property Not Impacted	3.9	1.8	Property located in the FEMA 100-year floodplain of the East Fork San Jacinto River
63	5410 Stratford Way, Kingwood, TX, 77339, USA	Kenneth B. and Mary J. Dominique	9A	3315	57.4	Not Avail	63.5	58.0	Property Not Impacted	6.1	0.6	Property located partially within the FEMA 500-year floodplain
64	3107 Silverberry Trl, Kingwood, TX, 77345, USA	Stephen L. and Glenn R. Goodwin	15A	4165	52.4	Not Avail	61.3	63.0	Property Not Impacted	2.7	2.6	Property located partially within the FEMA 100-year floodplain
65	3403 W Crescent Manor Dr, Kingwood, TX, 77339, USA	Jose S. and Julie B. Guevara	5B	737	53.3	Not Avail	63.4	58.0	Property Not Impacted	5.3	4.8	Property within the FEMA 500-year floodzone.

66	20440 US-59, Humble, TX, 77338, USA	Maria Gabriela Perez	4A	2318	64.5	65	67.1	64.8	Property Not Impacted	2.3	0.3	Same as #65 & 67. Property located partially in the FEMA 100-year floodplain of the West Fork San Jacinto River
67	20440 US-59, Humble, TX, 77338, USA	Deerbrook Family Dentistry, P.C.	4A	2318	64.5		67.1	64.8	Property Not Impacted	2.3	0.3	Same address as #65. Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
68	3020 S Cromwell Manor Dr, Kingwood, TX, 77339, USA	Brian E. and Beverly A. Groves	5B	3891	57.4	54.38	60.7	58.3	Property Not Impacted	3.3	0.3	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
69	3003 Golden Pond Dr, Kingwood, TX, 77345, USA	John G. and Kathryn Heard	6A	1458	51.3	Not Avail	56.3	54.8	Property Not Impacted	4.5	2.5	Property located in the FEMA 500-year floodplain
70	21003 Aransoka Point Dr, Humble, TX, 77346, USA	Elpida Bachalis Greypark	EA3	483	58.3	Not Avail	56.3	54.5	Property Not Impacted	5.0	3.3	Property located in the FEMA 500-year floodplain
71	6 Silverlake Dr, Kingwood, TX, 77339, USA	Joyce S. Gould	5A	2526	58.0	57.64-59.46	63.4	57.9	Property Not Impacted	2.4	-0.8	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
72	6618 Christian Ct, Kingwood, TX, 77345, USA	Sandra L. Ingram	5B	3879	51.6	Not Avail	58.1	55.8	Property Not Impacted	5.7	3.3	Property located in the FEMA 500-year floodplain
73	20113 Townsen Blvd, Humble, TX, 77338, USA	Carmelita Hoppes	4	6300	61.8		65.5	63.8	Property Not Impacted	3.3	0.3	Property located partially in the FEMA 100-year floodplain of the West Fork San Jacinto River
74	4506 Glenwell Ct, Kingwood, TX, 77345, USA	Rebecca W. Johnson	5B	5363	51.9	Not Avail	58.4	55.9	Property Not Impacted	4.5	2.0	Property located in the FEMA 500-year floodplain
75	6114 S Royal Palm Dr, Kingwood, TX, 77345, USA	Richard B. and Karen M. Bagley	5BA	5555	54.0	Not Avail	55.5	54.0	Property Not Impacted	1.5	0.0	Property located in the FEMA 500-year floodplain
76	1318 Blackgum Way, Kingwood, TX, 77339, USA	Grace James Thompson and Alton Margaret Keller	5A	2403	57.3	Not Avail	60.3	58.0	Property Not Impacted	3.0	0.3	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
77	8113 Amber Cove Dr, Humble, TX, 77346, USA	Mary Lynn Koenig	16B	70	54.0	Not Avail	55.4	53.8	Property Not Impacted	1.4	-0.3	Property located partially within the FEMA 100-year floodplain
78	21003 Aransoka Point Dr, Humble, TX, 77346, USA	John J. and Gail Lawsonuri	EA3	515	51.8	Not Avail	56.4	54.6	Property Not Impacted	4.5	2.8	Property located in the FEMA 500-year floodplain
79	9 Oaks Ct, Kingwood, TX, 77339, USA	Louise T. Mann	15B	6504	51.7	Not Avail	59.0	56.6	Property Not Impacted	6.3	3.3	Property located partially within the FEMA 100-year floodplain
80	55 Dogwood Ln, Perrey, TX, 77365, USA	Bill Thatcher	15B	3511	51.7	Not Avail	63.4	63.3	Property Not Impacted	11.7	11.6	Property located in the FEMA floodplain and FEMA regulatory floodway of Caney Creek
81	55 Dogwood Ln, Perrey, TX, 77365, USA	Bell Leach	15B	3511	51.7	Not Avail	63.4	63.3	Property Not Impacted	11.7	11.6	Same address as #80. Property located in the FEMA floodplain and FEMA regulatory floodway of Caney Creek
82	7418 Elgin River Ct, Humble, TX, 77346, USA	Raymond and Holly Urrie	EA3	3325	51.8	Not Avail	57.1	55.3	Property Not Impacted	4.5	2.5	Property located in the FEMA 500-year floodplain

B4	21122 Avocado Place Dr, Humble, TX, 77346, USA	Matthew and DeSarah Prucka	ESA3	126	59.3	54.13	55.7	54.0	Property Not Impacted	5.4	3.7	Property located partially within the FEMA 500-year floodplain
B4	2034 W Lake Crescent Dr, Kingwood, TX, 77339, USA	John F. and Linda C. Pearce	STA	589	58.0	57.01	61.1	57.9	Property Not Impacted	4.3	1.3	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
B5	3 Kings Creek Dr, Kingwood, TX, 77339, USA	Julia Ann Pool	STA	2170	57.4	59	61.4	57.9	Property Not Impacted	3.0	0.5	Property located in the FEMA 500-year floodplain
B5	2510 Willow Wood Trl, Kingwood, TX, 77345, USA	Dana M. and Shaun Patlorka	SEA	4875	59.5	59.8	61.5	63.0	Property Not Impacted	2.5	2.5	Property located partially within the FEMA 500-year floodplain
B7	4803 Canford Ct, Kingwood, TX, 77345, USA	Stacy Kacey	SE	4809	55.5	51	58.1	55.9	Property Not Impacted	2.9	0.8	Property located in the FEMA 500-year floodplain
B8	1305 Bittern Rd, Humble, TX, 77338, USA	Hubert Roberts	E	5402	59.3	Middle Above [location unclear]	65.0	63.8	Property Not Impacted	5.7	2.6	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
B9	10003 Birchbend Ct, Humble, TX, 77338, USA	Daniel D. and Deandra Thacker	2B	185	65.4	Not Found	70.5	66.5	Property Not Impacted	5.1	0.1	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
B9	2915 Aspen Mountain Trl, Kingwood, TX, 77345, USA	James Steven and Lisa Carol Thomas	SE	5518	56.9		58.4	55.8	Property Not Impacted	2.3	-0.3	Property located partially in the FEMA 500-year floodplain
B1	1910 Forest Garden Dr, Kingwood, TX, 77345, USA	Charles W. and Karen Sandford	SE	1490	53.8	Not Found	57.4	55.2	Property Not Impacted	3.5	1.4	Property located in the FEMA 500-year floodplain
B2	2515 Willow Wood Trl, Kingwood, TX, 77345, USA	David and Jennifer Sparks	SEA	5226	61.3	Not Found	61.5	63.0	Property Not Impacted	-0.1	-0.3	Property located in the FEMA 500-year floodplain
B3	22003 Trail Tree Ln, Kingwood, TX, 77339, USA	Frank and Elizabeth	STA	814	57.8		64.4	63.8	Property Not Impacted	6.5	5.9	Property located partially in the FEMA 500-year floodplain of the West Fork San Jacinto River
B4	2803 N Shoreline Ln, Kingwood, TX, 77345, USA	Andrew T. and Mary P. Timura	SE	4841	54.6	Not Found	58.4	55.8	Property Not Impacted	3.8	1.3	Property located in the FEMA 500-year floodplain
B5	4810 Stonecrop Ct, Kingwood, TX, 77345, USA	Aric Arrington	SEA	6493	61.8		61.5	63.0	Property Not Impacted	-0.3	1.2	Property located partially in the FEMA 500-year floodplain
B6	2303 Forest Garden Dr, Kingwood, TX, 77345, USA	Robert C. and Sheryl L. Young	SA	5827	55.3	Not Found	58.3	55.8	Property Not Impacted	2.9	0.5	Property located in the FEMA 500-year floodplain
B7	2814 Apple Forest Ct, Kingwood, TX, 77345, USA	Macsaris and Arkady Medina	SEA	4165	61.3		61.5	63.0	Property Not Impacted	0.2	0.7	Property located in the FEMA 500-year floodplain
B8	3102 S Carnoustie Manor Dr, Kingwood, TX, 77339, USA	Ryan and Kelly McWhorter	SE	3357	57.7	Not Found	60.6	58.2	Property Not Impacted	2.9	0.5	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
B9	2870 S Carnoustie Manor Dr, Kingwood, TX, 77339, USA	Mitch R. Le	SA	4677	58.0	Not Found	61.0	58.5	Property Not Impacted	3.0	0.5	Same as FID 300. Property located partially within the FEMA 500-year floodplain

900	3820 S Cromwell Manor Dr, Kingwood, TX, 77339, USA	Shang Anita Tao	9A	4977	58.0		62.0	58.5	Property Not Impacted	3.0	0.5	Same as FID 901. Property located partially within the FEMA 100-year floodplain
901	3830 Starlight Way, Kingwood, TX, 77339, USA.	Jennifer Lougeland	9A	3518	57.1	Not Avail	62.5	58.0	Property Not Impacted	3.3	0.7	Property located partially in the FEMA 100-year floodplain
902	3844 S Cromwell Manor Dr, Kingwood, TX, 77339, USA.	Michael H. Murray	9B	3475	57.5	58.7, top bottom floor; 58.2 garage, 57 foot lowest adjacent grade	62.6	58.2	Property Not Impacted	3.8	0.7	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
903	3844 S Cromwell Manor Dr, Kingwood, TX, 77339, USA.	Sherri Rockey-Murray	9B	n/a	57.5	58.7, top bottom floor; 58.2 garage, 57 foot lowest adjacent grade	62.6	58.2	Property Not Impacted	3.8	0.7	Same address as 902. Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River.
904	8730 Timberlane Dr, Kingwood, TX, 77339, USA.	Edward L. Hewitt Jr. and Mary Sue Hewitt	10	15048	58.3	66.3	63.9	63.0	Slab	13.6	9.7	Property located in the FEMA floodplain and FEMA regulatory floodway of the West Fork San Jacinto River
905	3 Old Sand Pine Pointe Dr, Kingwood, TX, 77345, USA.	Alan H. Brighton II	6A	4402	52.4	Not Avail	57.4	55.3	Property Not Impacted	5.0	2.9	Same as FID 906. Property located in the FEMA 500-year floodplain
906	3 Old Sand Pine Pointe Dr, Kingwood, TX, 77345, USA.	Ingrid E. Fedor	6A	4402	52.4	Not Avail	57.4	55.3	Property Not Impacted	5.0	2.9	Same as FID 905. Property located in the FEMA 500-year floodplain
907	2307 Bens Mere Trl, Kingwood, TX, 77339, USA.	William R. and Deborah E. Cordill	17B	8151	53.0	64 [approx]	58.7	54.3	Property Not Impacted	5.7	1.3	Property located in the FEMA 500-year floodplain
908	4306 Hidden Elm Ct, Kingwood, TX, 77339, USA.	Charles E. and Katherine Argento	17B	8517	52.4		58.9	54.5	Property Not Impacted	6.5	4.8	Property located in the FEMA 500-year floodplain
909	311 Silverberry Trl, Kingwood, TX, 77345, USA.	Jeff and Anne Easley	18A	4355	63.9	64 to 70	63.3	63.0	Property Not Impacted	1.3	1.0	Property located in the FEMA 500-year floodplain
910	1926 Forest Gardens Dr, Kingwood, TX, 77345, USA.	Kristofer D. and Melissa Buchan	9B	1950	53.0	Not Avail	57.7	55.5	Property Not Impacted	5.7	3.5	Property located in the FEMA 500-year floodplain
911	3106 Bluff Creek Dr, Kingwood, TX, 77345, USA.	John and Laurie D. Faulkinberry	9B	515	54.4	Not Avail	57.3	55.0	Property Not Impacted	2.9	0.6	Property located in the FEMA 500-year floodplain
912	1911 Forest Gardens Dr, Kingwood, TX, 77345, USA.	Brandon and Diana Burgess	9B	1875	52.8	Not Avail	57.4	55.2	Property Not Impacted	3.6	1.4	Property located in the FEMA 500-year floodplain
913	1910 Forest Gardens Dr, Kingwood, TX, 77345, USA.	Kurt W. and Debbie L. Huseman	9B	1852	52.9	Not Avail	57.3	55.1	Property Not Impacted	4.4	2.2	Property located in the FEMA 500-year floodplain
914	2718 N Summerford Ln, Kingwood, TX, 77345, USA.	Barbara and John R. Freeman	9B	4896	55.3	Not Avail	58.3	55.8	Property Not Impacted	3.8	0.5	Property located in the FEMA 500-year floodplain
915	22 New Green Ct, Kingwood, TX, 77339, USA.	William E. and Jennifer Wood Lange	15A	3631	52.4	Not Avail	58.0	54.7	Property Not Impacted	6.6	4.3	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
916	3815 Elegy Crossing Dr, #117, Kingwood, TX, 77339, USA.	William E. and Jennifer Wood Lange	9B	5876	65.4	Not Avail	58.4	54.0	Property Not Impacted	-7.0	-8.4	Same as FID 82. Property located in the FEMA 500-year floodplain

317	2811 Elegant Crossing Dr, Kingwood, TX, 77345, USA	William E. and Jennifer Wood Lange	SC	833	54.6	Not Avail	58.5	56.0	Property Not Impacted	3.5	1.4	Same as FID 118, 119 and 120. Property located in the FEMA 500-year floodplain
318	2811 Elegant Crossing Dr, Kingwood, TX, 77345, USA	William E. and Jennifer Wood Lange	SC	833	54.6	Second Floor	58.5	56.0	Property Not Impacted	3.5	1.4	Same as FID 117, 119 and 120. Property located in the FEMA 500-year floodplain
319	2811 Elegant Crossing Dr, Kingwood, TX, 77345, USA	William E. and Jennifer Wood Lange	SC	833	54.6	Third Floor	58.5	56.0	Property Not Impacted	3.5	1.4	Same as FID 117, 118 and 120. Property located in the FEMA 500-year floodplain
320	1919 Forest Gardens Dr, Kingwood, TX, 77345, USA	David L. and Sally C. Miller	SF	1918	53.3	57.9 (estimated)	57.6	55.5	Property Not Impacted	4.3	2.2	Property located in the FEMA 500-year floodplain
321	2818 N Stricklend Ln, Kingwood, TX, 77345, USA	Bernard F. and Cecilia M. Ryan	SF	4224	55.0	56.7 feet residential and 55.0 feet garage slab above mean sea level	58.4	55.8	Property Not Impacted	3.4	0.8	Property located in the FEMA 500-year floodplain
322	15402 Texas Laurel Trl, Humble, TX, 77345, USA	Jesse M. Stegall	1SA	4825	53.8	Not Avail	57.5	55.4	Property Not Impacted	4.7	2.6	Same as FID 324. Property located in the FEMA 500-year floodplain
323	26 Forest Green Trl, Kingwood, TX, 77339, USA	William J. and Christine D. Kepler	1SA	3829	54.0	58.0, 54.3 garage	58.8	56.6	Property Not Impacted	4.8	2.6	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
324	15402 Texas Laurel Trl, Humble, TX, 77345, USA	Danny C. Stegall	1SA	4825	53.8		57.5	55.4	Property Not Impacted	4.7	2.6	Same as FID 322. Property located in the FEMA 500-year floodplain
325	10 New Greens Cir, Kingwood, TX, 77339, USA	Richard C. and Trina Barker	1SA	3979	55.8	45 (estimated)	59.0	56.7	Property Not Impacted	3.3	0.9	Property located in the FEMA 500-year floodplain
326	22 Kingwood Greens Dr, Kingwood, TX, 77339, USA	Mark D. and Tracey C. Temple	1SA	3366	55.0	57.3	58.7	56.6	Property Not Impacted	3.7	1.6	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
327	26 Forest Green Trl, Kingwood, TX, 77339, USA	Todd B. and Kimberly A. Sorenson	1SA	3562	53.3	54 feet above mean sea level and sugar garage is 53 feet above mean sea level	58.8	56.5	Property Not Impacted	5.5	3.3	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
328	4115 S Royal Palm Dr, Kingwood, TX, 77345, USA	James A. and Elva L. Davert	1SA	6772	58.7	Not Avail	55.4	53.3	Property Not Impacted	2.7	2.2	Property located in the FEMA 500-year floodplain
329	34 Kingwood Greens Dr, Kingwood, TX, 77339, USA	Douglas M. and Mary S. Woodall	1SA	3701	53.4	56.4	58.8	56.5	Property Not Impacted	5.4	4.8	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
330	2811 Elegant Crossing Dr, Kingwood, TX, 77345, USA	James R. and Lindsay W. Revell	SC	833	54.6	6315 First Floor #231 Second Floor	58.5	56.0	Property Not Impacted	3.5	1.4	Same as FID 117, 118 and 119. Property located in the FEMA 500-year floodplain
331	2814 N Stricklend Ln, Kingwood, TX, 77345, USA	Paul W. and Diana E. Barker	SF	4807	54.3		58.4	55.8	Property Not Impacted	4.1	1.5	Property located in the FEMA 500-year floodplain
332	7511 Elegant River Dr, Humble, TX, 77345, USA	Jamie D. and Nicole S. Payne	1SA	4258	53.5	Not Avail	57.1	55.2	Property Not Impacted	3.6	1.7	Property located partially within the FEMA 500-year floodplain

323	5203 Palisade Falls Trl, Kingwood, TX, 77345, USA	William and Marisa Buchan	1B	3184	53.8	Not Avail	55.6	54.7	Property Not Impacted	2.8	0.9	Property located in the FEMA 500-year floodplain
324	31 Kingwood Greens Dr, Kingwood, TX, 77339, USA	Toby A. and Meg A. Porter	15A	2520	54.9	Bottom Floor - 55.8 Garage - 54.48. Lowest machinery - 54.55 Adjacent grade - 56.34 to 54.64	58.8	56.5	Property Not Impacted	4.7	2.4	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
325	26 Shoreline Dr, Kingwood, TX, 77339, USA	Nathan and Genevieve Kreeger	17A	1463	55.3	56.95, 55.79 garage	60.4	57.8	Property Not Impacted	5.3	2.7	Property located in the FEMA 100-year floodplain
326	26 Kingwood Greens Dr, Kingwood, TX, 77339, USA	John C. and Rachel C. Nicholson	15A	3459	54.5	55.9	58.7	56.5	Property Not Impacted	4.3	2.0	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
327	2214 Kings Trl, Kingwood, TX, 77339, USA	Bradley D. and Lori-Lynn Forsberg	17B	7850	53.0		58.4	56.0	Property Not Impacted	5.4	3.0	Property located in the FEMA 500-year floodplain
328	51 Greens Edge Dr, Kingwood, TX, 77339, USA	Richard B. and Janet G. Wilson	15A	3502	54.4	57.3	58.8	56.5	Property Not Impacted	4.4	2.1	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
329	3006 Golden Pond Dr, Kingwood, TX, 77345, USA	Dr. Marianne W. Baker	5A	1366	51.5	53 (approx)	58.8	54.8	Property Not Impacted	4.3	2.3	Property located in the FEMA 500-year floodplain
340	3 Twin Greens Ct, Kingwood, TX, 77339, USA	Duncan B. and Kelly A. Rhodes	15A	3005	55.5	Not Avail	58.6	56.4	Property Not Impacted	3.1	0.9	Property located in the FEMA 500-year floodplain
341	20503 Forest Stream Dr, Humble, TX, 77346, USA	Tobie L. Brown	16B	1676	53.3	55 Feet 7 Inches	55.4	53.8	Property Not Impacted	2.1	0.5	Same as FID 342. Property located in the FEMA 500-year floodplain
342	3714 W Lake Houston Pkwy, Kingwood, TX, 77339, USA	MOB Kingwood Commons, LLC	5C	6060	55.5	Not Avail	58.5	56.5	Property Not Impacted	3.0	0.7	This is a commercial building/mobile/manufactured home park on Google Earth. Property located in the FEMA 500-year floodplain
343	20503 Forest Stream Dr, Humble, TX, 77346, USA	Janet Dorr	16B	1676	53.3	55 Feet 7 Inches	55.4	53.8	Property Not Impacted	2.1	0.5	Same as FID 341. Property located in the FEMA 500-year floodplain
344	19015 Aquatic Dr, Humble, TX, 77346, USA	Carlene and Cynthia Boecker	1A	2562	49.7	51.2, 51.6 garage	53.7	51.6	Property Not Impacted	4.0	2.7	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
345	3714 W Lake Houston Pkwy, Kingwood, TX, 77339, USA	Village Green Kingwood Commons, LLC	5C	6060	55.5		58.5	56.5	Property Not Impacted	3.0	0.7	Same address as 342 - This address is a multi-family unit area. Property located in the FEMA 500-year floodplain
346	1303 Kensington Way, Kingwood, TX, 77339, USA	Darian Beckett	5A	1875	53.4	53 (approx)	61.6	58.0	Property Not Impacted	5.3	-0.4	Same as FID 348. Property located in the FEMA 500-year floodplain
347	19027 Aquatic Dr, Humble, TX, 77346, USA	Bruce Jr. and Cynthia G. Brown	1A	3303	50.4	Not Avail	53.7	51.6	Property Not Impacted	3.3	2.0	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River

548	19007 Aquatic Dr, Humble, TX, 77346, USA	James W. and Kristen B. Caldwell	34	3710	52.4	Not Avail	53.7	53.8	Property not impacted	1.3	0.0	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
549	1307 Kensington Way, Kingwood, TX, 77339, USA	Ameer Tekbani	9A	3675	58.4		60.6	58.0	Property not impacted	2.6	-0.4	Same address as 546. Property located in the FEMA 500-year floodplain
550	19114 Aquatic Dr, Humble, TX, 77346, USA	Anibal and Hilda De Jesus	34	3830	58.0	58.6, 58.9 garage	53.7	53.8	Property not impacted	2.7	1.4	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
551	18610 Rustic Cir, Humble, TX, 77346, USA	Michael F. and Sadiye L. Campanis	34	3857	53.1	Not Avail	53.7	53.8	Property not impacted	3.4	2.3	Property located in the FEMA 500-year floodplain
552	18818 Rusty Anchor Ct, Humble, TX, 77346, USA	Ronald and Pearlie S. Moore	34	4501	52.0		53.7	53.8	Property not impacted	1.7	0.4	Property partially located in the FEMA 500-year floodplain
553	19022 Vintage View Ln, Humble, TX, 77346, USA	Michael W. and Lydia Chamberlain	34	3787	50.0	51.3, 51.5 garage	53.7	53.8	Property not impacted	3.7	2.4	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
554	20706 Kings Crown Ct, Humble, TX, 77346, USA	Ricardo and Joanna Campeano	16B	3801	51.3	51.9, 52.7 garage	54.7	54.8	Property not impacted	4.5	2.6	Property partially located in the FEMA 500-year floodplain
555	18819 Aquatic Dr, Humble, TX, 77346, USA	Gregory S. and Amy L. Kendrick	34	3579	49.8	51.23	53.7	53.8	Property not impacted	3.9	2.6	Property located partially in the FEMA 500-year floodplain and regulatory Flr of the West Fork San Jacinto River
556	19011 Aquatic Dr, Humble, TX, 77346, USA	Vance Ewalder	34	3836	51.6	51.65	53.7	53.8	Property not impacted	1.8	-0.3	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
557	18842 Cross Country Dr, Humble, TX, 77346, USA	Vicki Russell Williams & Hardware	34	3851	51.8	52.1 Home, 52.8 Garage	53.7	53.8	Property not impacted	1.9	0.5	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
558	18834 Cross Country Dr, Humble, TX, 77346, USA	Richard and Vicki Enger	34	3875	49.3	52nd top of bonus floor	53.7	53.8	Property not impacted	4.5	3.3	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
559	19011 Aquatic Dr, Humble, TX, 77346, USA	Manfred and Ursula Quensel	34	3870	52.0	Not Avail	53.7	53.8	Property not impacted	0.7	-0.5	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
560	18503 Walden Forest Dr, Humble, TX, 77346, USA	Gregory S. and Amy L. Kendrick			43.3				Property not impacted			Virtual drainage
561	18118 Meadow Rose Ct, Humble, TX, 77346, USA	Eric L. Meredith	16B	3525	53.3	Not Avail	57.6	55.5	Property not impacted	4.8	2.3	Property located in the FEMA 500-year floodplain
562	1815 Stratford Way, Kingwood, TX, 77339, USA	Paul and Marsha Montgomery	9A	3216	57.3	Not Avail	60.5	58.0	Property not impacted	3.3	0.7	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River
563	19126 Aquatic Dr, Humble, TX, 77346, USA	Asher Sachs	34	3805	51.0	51.8	53.7	53.8	Property not impacted	2.7	1.4	Property located partially within the FEMA 500-year floodplain of the West Fork San Jacinto River

364	5814 Vantage View Ln, Humble, TX, 77346, USA	Sunil and Shalini Thakur	1A	3404	47.8	Not Avail	52.7	51.6	Property not impacted	5.8	4.8	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
365	5319 Chelsea Way, Kingwood, TX, 77339, USA	Michael A. and Ginger R. Burney	9A	3365	57.4		61.5	58.0	Property not impacted	3.8	0.6	Property located in the FEMA 500-year floodplain
366	1818 Stretford Way, Kingwood, TX, 77339, USA	Eric and Lisa Vogt	9A	3368	57.4	67.5 feet estimated (no survey)	61.5	58.0	Property not impacted	3.8	0.6	Property located partially within the FEMA 100-year floodplain
367	1733 N Houston Ave, Humble, TX, 77338, USA	Texas Live Media, LLC	4A	1574	64.3	Not Avail	66.9	64.2	Property not impacted	2.8	0.8	Property located in the FEMA 500-year floodplain
368	5206 Rapid Brook Ct, Kingwood, TX, 77345, USA	John M. and Carolyn F. Daniel	10A	17	51.6		56.5	54.6	Property not impacted	5.0	3.0	Property located in the FEMA 500-year floodplain
369	25 Club Dale Ct, Kingwood, TX, 77339, USA	Robert E. and Sherry K. Miles	15A	4479	54.3	55.8	59.4	57.1	Property not impacted	5.8	2.8	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
370	26 Deer Green Ct, Kingwood, TX, 77339, USA	Charles A. and Maureen S. Casey	15A	3862	53.0	56.5	58.9	56.6	Property not impacted	5.9	3.6	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
371	1215 Ballycastle Way, Kingwood, TX, 77339, USA	Barry E. and Becky A. Shepherd	9A	3378	57.5	Not Avail	61.6	58.1	Property not impacted	3.8	0.6	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
372	1311 Chelsea Way, Kingwood, TX, 77339, USA	Rodney M. and Nancy L. Neal	9A	3408	58.3	Not Avail	61.5	58.0	Property not impacted	3.4	-0.3	Property located in the FEMA 100-year floodplain of the West Fork San Jacinto River
373	5130 Cotswold Manor Loop S, Kingwood, TX, 77339, USA	Jack L. and Linda S. Nowlin	9B	983	57.0	Not Avail	61.5	58.1	Property not impacted	3.3	0.8	Property located partially within the FEMA 100-year floodplain of the West Fork San Jacinto River
374	26 Greens Edge Dr, Kingwood, TX, 77339, USA	Charles H.F. and Diane S. Whitney	15A	3047	54.0	56.7	58.6	56.8	Property not impacted	4.6	2.4	Property located partially in the FEMA 100-year floodplain of the West Fork San Jacinto River
375	4614 Breezy Point Dr, Kingwood, TX, 77345	Greg and Angela Curtis	17B	6178	54.1		58.0	55.7	Property not impacted	3.7	1.4	Property located in the FEMA 500-year floodplain
376	4506 Magnolia Cove Dr, Kingwood, Texas, 77345	Enrique Mesa	15A	3118	51.5	Not Avail	57.9	55.7	Property not impacted	6.4	4.2	Property located partially in the FEMA 100-year floodplain
377	20433 Townsen Blvd, Humble, Texas, 77338	Ruben Roberts	4	6309	61.6		65.3	63.0	Property not impacted	4.5	1.2	Samaritan RO 72. Property located partially in the FEMA 100-year floodplain of the West Fork San Jacinto River
378	4607 Golden Pond Dr, Kingwood, Texas, 77345	Joseph B. Mary Robin	6B	4110	53.8	Not Avail	58.3	55.8	Property not impacted	5.5	3.0	Property located in the FEMA 500-year floodplain
379	1505 Willow Wood Trl, Kingwood, Texas, 77345	Robert B. Claudia McNamara	15A	3407	51.5	Not Avail	61.9	61.0	Property not impacted	2.5	2.5	Property located partially in the FEMA 100-year floodplain

580	5218 Chelsea Way, Kingwood, Texas, 77339	David & Danyale Bailey	9A	2346	57.5	Not Avail	61.5	58.0	Property Not Impacted	3.0	0.5	Property located in the FEMA 500-year floodplain
581	5310 Cotswold Manor Loop S, Kingwood, Texas, 77339	Dan & Roxanne Hill	9B	342	57.5	Not Avail	61.1	57.9	Property Not Impacted	3.6	0.4	Property located in the FEMA 500-year floodplain
582	4510 Glenneville Ct, Kingwood, Texas, 77345	Jesse Martin	5B	4925	53.6	Not Avail	58.4	55.9	Property Not Impacted	4.8	2.4	Property located in the FEMA 500-year floodplain
583	3106 W Lake Crescent Dr, Kingwood, Texas, 77339	Charles & Kyle Campbell	17A	338	57.6	Not Avail	61.1	57.9	Property Not Impacted	3.5	0.3	Property located partially in the FEMA 500-year floodplain
584	4508 Magnolia Cove Dr, Kingwood, Texas, 77345	The Cycle Way	15A	[illegible]	51.5		57.8	55.7	Property Not Impacted	6.4	4.2	Same FID as 176, 185. Property located partially in the FEMA 500-year floodplain
585	4508 Magnolia Cove Dr, Kingwood, Texas, 77345	Kingwood Chiropractic Clinic	15A	[illegible]	51.5		57.8	55.7	Property Not Impacted	6.4	4.2	Same FID as 176, 184. Property located partially in the FEMA 500-year floodplain
586	20457 Fieldtree Dr, Humble, Texas, 77338	Hang Tran	2D	2337	66.1	Not Avail	70.5	66.2	Property Not Impacted	4.3	0.8	Property located in the FEMA 500-year floodplain
587	20106 Rustic Bridge Ln, Kingwood, Texas, 77339	Steve Rozum	11A	652	61.5	60.7	66.1	63.3	Property Not Impacted	5.3	2.8	Property located partially in the FEMA 500-year floodplain
588	20106-A Rustic Bridge Ln, Kingwood, Texas, 77339	Steve Rozum	11A	652	61.5	60.7	66.1	63.3	Property Not Impacted	5.3	2.8	Address slightly different from FID 187 but with same owner. Google marks it at same place.
589	4034 Dunnam Rd, Kingwood, Texas, 77345	Shawn Kelly	11	8369	41.5		49.7	53.6	Property Not Impacted	10.1	11.5	Property located in the FEMA 100-year Floodplain
590	2626 Kings Trl, Kingwood, Texas, 77339	Thomas Lee	17B	8564	51.0	56.3	56.7	56.2	Property Not Impacted	5.7	3.2	Property located partially in the FEMA 500-year floodplain
591	40 Greens Edge Dr, Kingwood, Texas, 77339	Douglas & Helen Williams	15A	2561	54.0		58.7	56.6	Property Not Impacted	4.6	2.8	Property located partially in the FEMA 500-year floodplain
592	13305 Ticonderoga Rd, Houston, Texas, 77044	Howard Diggs		-	-				-	-	In Buffalo Bayou Watershed Outside of influence of SIR	Outside influence SIR
593	2803 Kings Crossing Dr, Kingwood, Texas, 77345	Sandra Ballard	5C	813	54.7	Not Avail	58.5	56.0	Property Not Impacted	3.3	1.4	Same as 187. Property located in the FEMA 500-year Floodplain
594	6216 Fairway Manor Ln, Spring, Texas, 77373	Trevor Jensen	12	10658	77.7		79.7	78.6	Property Not Impacted	2.0	0.9	On Cypress Creek. In FEMA 500-yr Floodplain.
595	4910 Middle Falls Dr, Kingwood, Texas, 77345	Amber Hersch	4B	6976	51.8		57.1	55.1	Property Not Impacted	5.3	3.3	[illegible] Falls SIR. Property located in the FEMA 500-year Floodplain
596	21806 Cranglen Ct, Spring, Texas, 77373	Denise Neal	12	10725	77.8		79.7	78.6	Property Not Impacted	1.9	0.8	On Cypress Creek. Property located in the FEMA 500-year Floodplain
597	2119 Indian Shores Rd, Crosby, Texas, 77532	Melvin Gresham and Maria [illegible]	15	16258	61.8		53.6	53.3	-7.6	-8.3	-8.6	Residence not inundated. Boathouse, docks and other structures may have been. Property located partially in the FEMA 500-year Floodplain

298	14923 Sunset Bay Ct. Humble, Texas, 77396	Rosilee Edmond		-	59.3				-	-		Flooding source from urban area. Lake Houston unaffected
299	15611 Cypress Dr, Conroe, Texas, 77384	John Taylor	34	27663	147.6		148.4	NA	Property not impacted	1.8		On Island Fork SFR. Property located in the FEMA 500-year floodplain and regulatory FW.
300	13523 Log Dr, Spring, Texas, 77373	Adam Archie	33	2996	75.4		80.5	78.7	Property not impacted	5.8	4.8	On Tributary to Cypress Creek. Property partially located in the FEMA 500-year floodplain and regulatory FW.
301	24554 Butterfly Ln, Porter, Texas, 77365	Fernando Munoz	26	18431	74.7		80.8	75.4	76.8	6.8	0.7	On West Fork SFR. In FEMA 500-yr floodplain.
	27354 Shady Hills Meadow Ln, Spring, Texas, 77386	Robert Lowry	39	16966	81.5		81.3	87.3	Property not impacted	-0.3	-0.3	On Spring Creek. Property partially located in the FEMA 500-year floodplain
303	301 Magnolia Ln, Conroe, TX	Richard Guajardo	33	3160	137.5		138.5	136.0	137.0	2.0	-1.5	On West Fork SFR. In FEMA 500-yr floodplain.
304	8130 Amber Cove, Humble, TX 77346	Dana Moore	35	10595	58.5	52.8	55.3	57.8	Property not impacted	3.8	2.3	Property partially located in the FEMA 500-year floodplain
305	4513 Glenwell Cir, Kingwood, TX. 77345	Jack and Gayle Morrison	51	4957	55.0	Not Avail	58.4	55.9	Property not impacted	3.4	0.9	Property located in the FEMA 500-year floodplain
306	7537 Kings River Dr, Kingwood, TX. 77345	Troy and Amy Ahrens	18	4058	53.4	Not Avail	57.3	55.1	Property not impacted	4.7	2.7	Property partially located in the FEMA 500-year floodplain
307	5615 Scenic Shore Dr, Kingwood, TX. 77345	Albert and Melissa Dion	50A	7375	53.3		56.3	54.5	Property not impacted	4.0	2.3	Property located in the FEMA 500-year floodplain
308	15911 Aquatic Dr, Humble, TX	Darrell Trautman, Manfred & Claire Guenzel	34	20245	51.9		53.7	51.8	Property not impacted	2.8	1.5	Property partially located in the FEMA 500-year floodplain
309		JMC Development	3A	13152	70.0		71.0	67.3	Property not impacted	1.0	-2.7	Property partially located in the FEMA 500-year floodplain
310	Saratoga Homes											