Brookshire-Katy Drainage District (BKDD)

MASTER DRAINAGE PLAN – PHASE I – EXISTING CONDITIONS

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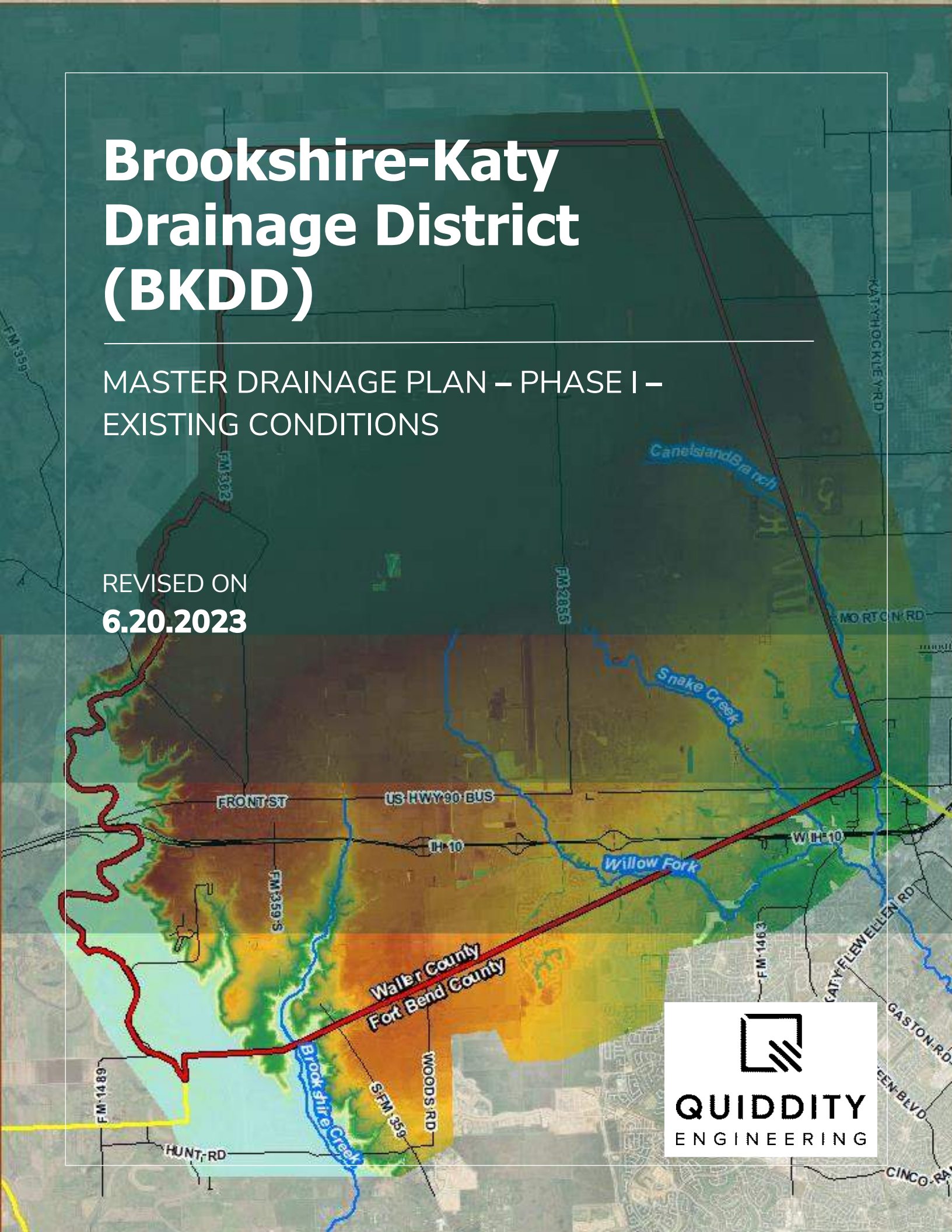

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MASTER DRAINAGE PLAN – PHASE I – EXISTING CONDITIONS
FOR BROOKSHIRE-KATY DRAINAGE DISTRICT
WALLER COUNTY, TEXAS

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FOR BROOKSHIRE-KATY DRAINAGE DISTRICT
WALLER COUNTY, TEXAS

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EXECUTIVE SUMMARY

The purpose of the Phase I Master Drainage Plan is to evaluate the existing conditions for the major waterways within the Brookshire-Katy Drainage District (BKDD) and establish the existing floodplain, which is currently not mapped by FEMA.

This study models the major streams within BKDD using the National Oceanic and Atmospheric Administration (NOAA) Atlas-14 rainfall data and 1D/2D hydrologic and hydraulic models for the following main waterways:

- Brookshire Creek
- Willow Fork
- Snake Creek
- Cane Island Branch

A major part of this analysis is to build or modify hydrologic and hydraulic models for the four streams identified within BKDD and the contributing subbasins to those streams which cover most of the District's area. It did not include detailed analysis of smaller tributaries and Bessie's Creek on the western edge of BKDD. In scoping this project, the streams previously mentioned within BKDD were prioritized due to rapid development occurring within these watersheds, so other areas of the District were not included within this Phase 1 scope.

To build detailed hydrologic and hydraulic models for this project, previous models in this area were collected and vetted for accuracy. Four hydraulic models were used as base models to build the BKDD existing conditions model:

- Fort Bend County's Bessie's Creek model (2021) which contains Brookshire Creek.
- Fort Bend County's Willow Fork model (2021) which contains Willow Fork, Snake Creek, and Cane Island Branch.
- Sunterra Drainage Impact Analysis model (2021), which contains regional detention ponds and recent development along Cane Island Branch developed by Quiddity Engineering.
- The City of Katy study (2020) containing three additional regional detention ponds along Cane Island Branch prepared by Costello, Inc.

The Costello study and Sunterra models both contain as-built data that was not included in the Willow Fork study. Additional details are described within Section 1.4. The models utilize Fort Bend and Harris County drainage methodologies and were analyzed for the Atlas-14 2-, 10-, and 100-year storm events.

Since the area is significantly flat with undersized stream channels and overland flow, 1D/2D hydraulic modeling was used to provide more detailed results for the channels and overland flow patterns. See **Section 1.5** for more information on modeling methodology.

The hydraulic model was calibrated by comparing the modeled results for the Hurricane Harvey storm event to existing stream gauge measurements from Hurricane Harvey, and then revising parameters within the hydraulic geometry to yield results that approximate the peak water surface elevations from the stream gauges. The model was calibrated to the Hurricane Harvey

storm event stream gauge data, which peaked between August 27 and August 28, 2017. The calibration model was created using 2017 conditions land use conditions and Hurricane Harvey rainfall data. The calibrated Hurricane Harvey model parameters were used to update the existing conditions models for the four watersheds analyzed. See **Section 3.4** for more detailed information on calibration.

In addition to providing the models, this analysis provides floodplain results data and other data for the BKDD Geographic Information System (GIS) website. Floodplain results are intended to assist in future development in the District. Other spatial data provided includes locations of modeled bridge and culvert crossings, streams, ponds, and land use.

The second phase will include analyzing future development and proposed conditions within the District to develop a list of potential drainage improvements and projects including ultimate channel ROW, regional detention, and culvert crossings. Project areas will be determined based on development patterns, current flooding issues, and health and safety concerns. The goal of these improvements would be to improve conveyance and flood hazard conditions within the District.

1.0 INTRODUCTION

1.1 PROJECT PURPOSE

The primary goal of Phase I Master Drainage Plan for Brookshire-Katy Drainage District (BKDD) is to evaluate the existing conditions for the major waterways within the BKDD and establish the existing floodplain, which is currently not mapped by FEMA. This study models the major streams within BKDD using 1D/2D hydraulic modeling to provide preliminary updated "Existing Conditions" hydrologic and hydraulic models. This analysis was completed using the National Oceanic and Atmospheric Administration (NOAA) Atlas-14 rainfall data and new hydrologic and hydraulic models of the drainage District. The waterways modeled include Brookshire Creek, Willow Fork, Snake Creek, Cane Island Branch, and the areas that contribute runoff to those waterways. This study will aid in long-term planning and future development within BKDD.

1.2 PROJECT LIMITS

The project limits include approximately 107 square miles in BKDD within Waller County with small areas overlapping both Fort Bend County and Harris County. The study includes approximately 28 miles of stream:

- 6.4 miles along Brookshire Creek
- 9.1 miles along Willow Fork
- 4.5 miles along Snake Creek
- 7.8 miles along Cane Island Branch

See **Exhibit 1 – Vicinity Map**. The limits of hydraulic modeling contain the watersheds for each of the streams and extend beyond the BKDD boundary so that the downstream conditions do not cause adverse impacts on the modeling results, and in order to produce more accurate data.

1.3 PROJECT OBJECTIVES

The objectives of this analysis are to:

- Create new preliminary updated hydrology and 1D/2D hydraulic models to determine the existing conditions for BKDD.
- Produce updated preliminary floodplain maps and data with Atlas-14 rainfall data for the 2-, 10-, and 100-year storm events.
- Determine sheet-flow patterns draining to Brookshire Creek, Willow Fork, Snake Creek, and Cane Island Branch.

These preliminary updated models can be used to assess future development and planning for BKDD. Bessie's Creek and West Fork were not analyzed as the scope was focused on the majority of the District currently experiencing development. These areas will be analyzed under a future scope of work.

1.4 PREVIOUS STUDIES

The project area is partially overlapped by several recent studies conducted on behalf of Fort Bend County Drainage District (FBCDD) and private developers. Four of these studies were utilized as baseline data for this study to facilitate model development in the upper extents of Drainage District:

- Willow Fork Study (2021, Pape-Dawson Engineers and Freese and Nichols, Inc.): Willow Fork, Snake Creek, and Cane Island Branch were studied as part of the Phase I Master Drainage Plan for Fort Bend County. All three streams from this model were utilized in the BKDD model, but the downstream ends of the streams outside of BKDD were removed. The geometry was revised by adding existing bridge and culvert crossings, revising cross sections and lateral weirs, and adding more detailed sheetflow modeling.
- Bessie's Creek Study (2021, Freese and Nichols, Inc.): Bessie's Creek, Brookshire Creek, and Orchard Creek were studied as part of another separate Master Drainage Plan for Fort Bend County. Only Brookshire Creek was utilized from this model in the BKDD model, and the upstream end of the creek was extended north to end upstream of US-90.
- Sunterra Study (2021, Quiddity Engineering, LLC): A small part of upper Cane Island Branch was studied as part of the Drainage Impact Analysis (DIA) for the Dollins/Freeman Tract. This development proposes regional detention facilities as part of the overall residential development. The proposed conditions (as of November 2021) from this DIA became the existing conditions from Schlipf Road to Clay Road along Cane Island Branch.
- Pitts Road East Study (2020, Costello, Inc.): This study analyzes the proposed regional detention pond expansion at the intersection of Pitts Road and Morton Road on Cane Island Branch. The proposed expansion has since been constructed. Geometric data for the three regional detention ponds in the proposed hydraulic model are used in the BKDD existing conditions model. The hydrologic model for Costello is not used as a base model for the BKDD model, and only the pond data in the hydraulic model was utilized for the BKDD model.

Hydrologic and hydraulic modeling data was incorporated from two developments within the project area – Sunterra and Katy Lakes. Not all developments in the area were modeled, but these two were included because these developments include regional detention facilities, which impact the hydraulic modeling for the District.

1.5 METHODOLOGY

The base models for this analysis were created by combining components of the previous studies mentioned in **Section 1.4**. The two Fort Bend County studies (Willow Fork and Bessie's Creek studies) extend much further south than the limits of BKDD, so the portions of Willow Fork and Brookshire Creek outside of BKDD were excluded from the model. Snake Creek and Cane Island Branch are fully contained within BKDD and so fully modeled, while the Willow Fork modeling ends downstream of Kingsland Boulevard, and the Brookshire Creek modeling ends 2000 feet downstream of Hunt Road. Streams besides Brookshire Creek, Willow Fork, Snake Creek, and Cane Island Branch were not modeled.

The prior proposed conditions of the Sunterra model (south of Beckendorff Road) are now built, but this data was not included in the Willow Fork study because it was not built yet at the time of that study. Therefore, the Sunterra model contains the most recent existing conditions data for the Sunterra project area. The Sunterra hydrologic and hydraulic data was used in the models rather than the Willow Fork data in the Sunterra project area. Additionally, the Cane Island Branch geometry was revised to include the now existing regional detention ponds modeled in the Costello model.

Two sets of hydrologic and hydraulic models were built – the Hurricane Harvey models and the Existing Conditions models. The Hurricane Harvey models were built using 2017 Hurricane Harvey rainfall data to calibrate the hydraulic results to the 2017 Hurricane Harvey high-water mark data. The high-water mark data was obtained from the Harris County Flood Warning System (HCFWS). The Hurricane Harvey models did not include any developments built after 2017 in the hydrology calculations or hydraulic geometry. After the Hurricane Harvey hydraulic model was calibrated to align with the Hurricane Harvey high-water mark data, the Hurricane Harvey model was used as the base model for building the Existing Conditions model, which includes developments and structures added after 2017. The rainfall data utilizes the BKDD Atlas-14 rainfall data for the Existing Conditions model.

The resulting hydrographs from the HEC-HMS model are input into the HEC-RAS model as either point source flows within the 2D mesh or as uniform lateral inflows in the 1D geometry. The area upstream of the streams' headwaters is a single 2D mesh, and the areas between each 1D stream are a separate 2D mesh. This set-up aids in evaluating the flow patterns of different storm events accurately.

The hydrographs input in the 2D mesh are input in the lower one third of the contributing subbasin to avoid double accounting for routing time. This is because the hydrologic model already transforms the hydrograph based on the time it takes to drain through the subbasin, so the resulting hydrograph is the flow that would occur at the downstream end of the subbasin. See **Exhibits 9-13** for the HEC-RAS schematic.

1.6 DATUM

This study utilizes 2018 Upper Coast LiDAR and 2019 Hurricane LiDAR data (obtained from TNRIS) to map the existing flow patterns and floodplain. All elevations in this report are referenced to North American Vertical Datum (NAVD) 1988, and all shapefiles are referenced to the North American Datum (NAD) 1983 State Plane Texas South Central horizontal coordinate system.

Survey data or approved As-Builts were obtained to model major bridge crossings that were not included in the effective base models (see **Exhibit 4**). Atlas-14 rainfall data obtained from the BKDD reference manual was used in the hydrologic models – see **Table 3** for the rainfall depths used in this analysis.

2.0 HYDROLOGIC ANALYSIS

2.1 BACKGROUND

2.1.1 Topography

The project area is in the southeast corner of Waller County and is bounded by Harris County to the east and Fort Bend County to the south. The project area includes undeveloped grassland and forest, as well as some medium intensity development focused along US-90 and I-10 and towards the southeast of the project area. The terrain is generally flat (<0.1% grade) over the project area and drains from northwest to southeast towards the coast. Existing natural ground elevations range from approximately 195 feet in the north to 112 feet at the southwestern corner.

Large areas of the District are used for rice farming and other portions in the past were used for rice farming as well. The land used for rice farming has many small berms and swales throughout the area that were intended for ponding and draining water, and in higher level storms these features are overtopped. The flows generally follow the rural roads as high points, with overtopping in some areas. See **Exhibit 2 – Elevation Map**.

2.1.2 Land Use

Most of the project area is undeveloped land that was previously used for rice farming. There is also a small amount of medium density development around US-90 and I-10 towards the south of BKDD. The former rice fields contain terraced areas bounded by berms. The agricultural areas also contain a network of small channels with culverts going underneath the berms. In larger storm events, the berms and roadside ditches are overtopped by the sheet flow.

2.1.3 FEMA Effective Floodplain

The project area is located within the effective FEMA FIRM panels as noted in **Table 1**. Additionally, the effective FEMA floodplain mapping is depicted in **Exhibit 3 – Effective Floodplain Map**. The project area contains areas mapped within the effective Zone A (unstudied 100-year without Base Flood Elevations defined), AE (100-year with Base Flood Elevations defined), and shaded Zone X (500-year) floodplains. See **Appendix 1** for the effective FIRM panels.

Table 1 - FEMA FIRM Panels in Project Area

FEMA FIRM Panel	Effective Date
48473C0275E	2/18/2009
48473C0300E	2/18/2009
48157C0025L	4/2/2014
48157C0020L	4/2/2014
48157C0050L	4/2/2014
48157C0040L	4/2/2014
48157C0080M	1/29/2021
48157C0085M	1/29/2021
48157C0105L	4/2/2014

2.1.4 Survey

Field topographic survey was collected in December 2022 and January 2023. The field topographic survey was collected at eight bridge and culvert crossings that were not included in the base models along the main streams in the project area. See **Table 2** below and **Exhibit 4 – Surveyed Structures**.

Table 2 – Surveyed Structures

Crossing	Structure Type	Creek
Highway 90	Bridge	Brookshire Creek
I-10	Bridge	Brookshire Creek
Waller Avenue (FM 359)	Bridge	Brookshire Creek
Cardiff Road	Culvert	Willow Fork
Highway 90	Bridge	Willow Fork
Unnamed Culvert North	Culvert	Snake Creek
Unnamed Culvert South	Culvert	Snake Creek
Cane Island Parkway	Bridge	Snake Creek

Low water crossings and farm road crossings that were not expected to significantly impact riverine flow were omitted from the survey data and the crossings were approximated in the model. All survey data was referenced to the North American Vertical Datum (NAVD) 1988 and the horizontal datum was referenced to the NAD 1983 State Plane Texas South Central horizontal coordinate system for consistency with the LiDAR datasets.

2.2 METHODOLOGY

2.2.1 Modeling Software

The Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) v.4.3 was used to develop hydrographs for the Hurricane Harvey and Existing Conditions models. The standard methodologies used in the hydrologic model for the Phase I Master Drainage Plan for BKDD match the previous studies conducted in this area and include the Green and Ampt loss method, the Clark Unit Hydrograph transform method, and Modified Puls routing method.

2.2.2 Design Storm Rainfall and Distribution

The Existing Conditions model used NOAA Atlas-14 rainfall data acquired from BKDD Rules and Regulations 22-01 adopted February 22, 2022, for three storm events: the 2-, 10-, and 100-year events. The rainfall data used can be found in **Table 3** below.

Table 3 – BKDD Atlas-14 Rainfall Data

Duration	Depth (in)		
	2-year Event	10-year Event	100-year Event
5 Minutes	0.59	0.84	1.26
15 Minutes	1.19	1.69	2.5
1 Hour	2.26	3.22	4.8
2 Hours	2.83	4.19	6.91
3 Hours	3.17	4.82	8.47
6 Hours	3.77	5.97	11.2
12 Hours	4.4	7.2	13.8
1 Day	5.09	8.55	16.5

2.2.3 Subbasin Delineation

The effective subbasins were obtained from the Willow Fork, Bessie's Creek, and Sunterra studies. For the Hurricane Harvey model, the subbasins match those in the effective models. For the Existing Conditions model, several subbasins were revised to reflect new developments based on aerial imagery and LiDAR flown in 2018 and 2019. See **Table 4** below for a summary of the revised (Existing) subbasins. See **Exhibit 5 – Hurricane Harvey Model Subbasins** and **Exhibit 6 – Existing Conditions Subbasins** for a visual of the two sets of subbasins.

Table 4 – Effective and Existing Subbasins and Data

Effective Subbasins	Existing Subbasins	Change
Brook_05	Brook_05	Land use updated for new development
Brook_06	Brook_06_R	Subbasin delineation and land use updated for new development
Brook_07	Brook_07_R	Subbasin delineation and land use updated for new development
CIB_01	CIB_01_R	Subbasin delineation and land use updated for new development
	320AC_R	Subbasin delineation and land use updated for new development
CIB_03	CIB_03_R	Subbasin delineation and land use updated for new development
CIB_04	T100D2_1_R	Subbasin delineation and land use updated for Sunterra
	T100D2_2_R	Subbasin delineation and land use updated for Sunterra
CIB_05	CIB_05_R	Subbasin delineation and land use updated for new development
	T100D2_3_R	Subbasin delineation and land use updated for Sunterra
CIB_06	CIB_06_R	Subbasin delineation and land use updated for new development
CIB_07	CIB_07_R	Subbasin delineation and land use updated for new development
SC_07	SC_07_R	Subbasin delineation and land use updated for new development
	T100D1_1_R	Subbasin delineation and land use updated for Sunterra
	T100D1_2_R	Subbasin delineation and land use updated for Sunterra
SC_10	SC_10_R	Subbasin delineation and land use updated for new development
WF_06	WF_06	Land use updated for new development
WF_07	WF_07	Land use updated for new development
WF_08	WF_08	Land use updated for new development

2.2.4 Infiltration Losses

The Green and Ampt method was used to calculate infiltration losses in the hydrologic model. The initial content, saturated content, suction, and conductivity loss parameters were maintained to match the base models. For Brookshire Creek, the base model (v.4.3) utilized Fort Bend County canopy and loss parameters, while the Willow Fork, Snake Creek, and Cane Island Branch base model (v. 4.3) utilized Harris County canopy and loss parameters. The Sunterra model (v.3.3), which covers part of Cane Island Branch and is the most up-to-date base model for that area, utilized the loss parameters from the Barker Reservoir model, made effective in June 2007. In importing the Sunterra subbasins to the BKDD model built in version 4.3, the Sunterra subbasins were revised to use the Harris County loss parameters to match the Willow Fork model. This is because version 4.3 requires the user input additional parameters versus what is required in version 3.3, so what was present in the version 3.3 base model was not sufficient for the model to run in version 4.3.

The percent impervious cover was recalculated for only the subbasins where the land use or delineation changed based on updated aerial imagery or LiDAR delineation. The percent impervious cover was calculated based on the most recent aerial imagery of those areas using impervious values from the *Harris County Flood Control District (HCFCD) 2019 Atlas-14 Policy Criteria and Procedures Manual (PCPM)*. The percent impervious cover values were not recalculated for subbasins where the land use or drainage area boundaries did not change since the base models were done so recently in 2021. See **Table 5** for the impervious cover values used in calculations. See **Appendix 3** for the effective and revised impervious cover calculations. See **Tables 6, 7, and 8** below for the Harris County, Fort Bend County, and the Harris County Flood Control District (HCFCD) 2009 Model and Map Management (M3) System effective loss parameters.

Table 5 – Harris County Impervious Cover Values

Land use	Percent Impervious
Undeveloped	0
Residential Rural Lot (>5 ac)	5
Residential Large Lot New (>1/2 ac)	25
Residential Large Lot Old (>1/4 ac)	25
Residential Small Lot (<1/4 ac)	40
Schools	40
Developed Green Areas	15
Light Industrial/Commercial	65
High Density Industrial/Commercial	85
Isolated Transportation	80
Water	100

Table 6 – Harris County Simple Canopy and Green and Ampt Loss Parameters

Zone	Initial Canopy Storage (%)	Max Canopy Storage (in)	Crop Coefficient	Initial Content (in)	Saturated Content	Suction (in)	Conductivity (in/hr)
Willow Fork	0	0.5	1	0.048	0.46	4.33	0.079

Table 7 – Fort Bend County Simple Canopy and Green and Ampt Loss Parameters

Zone	Initial Canopy Storage (%)	Max Canopy Storage (in)	Crop Coefficient	Initial Content (in)	Saturated Content	Suction (in)	Conductivity (in/hr)
Zone 1	0	0.5	1	0.048	0.46	4.33	0.079

Table 8 – 2009 HCFCD M3 Green and Ampt Loss Parameters

Suction (in)	Conductivity (in/hr)
6.182	0.062

2.2.5 Transform Methods

For consistency with the three hydrologic base models, the Clark Unit Hydrograph method was used as the transform method for the BKDD hydrologic model. For subbasins that did not change from the effective models, the transform parameters were not revised. For subbasins that had delineation or land use changes, the Basin Development Factor (BDF) method was used to determine the Clark Unit Hydrograph parameters. This methodology was also used for the effective models. See **Appendix 3** for the effective and revised BDF calculations and **Exhibits 7 and 8** for the Hurricane Harvey model (2017) and existing BDF land use.

2.2.6 Flow Routing

The routing methodology utilized in each of the base models was maintained in the BKDD hydrologic model. The Brookshire Creek base model did not utilize routing. The base model for Willow Fork, Snake Creek, and Cane Island Branch utilized Muskingum routing, and the Sunterra base model utilized Modified Puls routing. Because the results from each subbasin were input directly into the 1D/2D hydraulic model, routing downstream of subbasins had no result on the hydrograph being input into HEC-RAS. This is why the routing was not revised from the effective model. See **Appendix 3** for the effective supporting calculations for the routing parameters.

2.3 HYDROLOGIC RESULTS

The hydrologic results for the existing 2-, 10-, and 100-year Atlas-14 storm events are provided in **Appendix 4**. Results from the analysis were used as flow inputs for the hydraulic modeling described in **Section 3.0**.

3.0 HYDRAULIC ANALYSIS

3.1 BACKGROUND

Unsteady flow 1D/2D hydraulic modeling was performed using HEC-RAS v.6.2 to model the existing floodplain throughout BKDD. The model was developed using 2018 Upper Coast LiDAR and 2019 Hurricane LiDAR. The 1D components of the Hurricane Harvey model were built via a combination of pieces of the four base models. The 2D components were rebuilt for this study. Survey was used to incorporate additional bridge and culvert structures that were not present in the effective models.

3.2 METHODOLOGY

1D/2D modeling was used in this study due to the flat terrain and limited existing channel capacity within the project area. Using point source flows in a 2D hydraulic model is an effective way to model sheet flow over flat areas, which occurs in the rice fields and agricultural lands in the northern and central areas of BKDD.

As previously mentioned, the project area contains four major streams – Brookshire Creek, Willow Fork, Snake Creek, and Cane Island Branch. To accurately model the riverine flows and bridge and culvert structures, 1D flow modeling is needed for detailed accuracy of the channel terrain alongside the 2D modeling for the flat overbank terrain. Therefore, 1D/2D modeling most accurately captures the variability in the patterns of overland flow (2D modeling) along with the riverine flow (1D modeling).

3.3 GEOMETRY DEVELOPMENT

3.3.1 1D Geometry

The 1D geometry, including reaches, cross sections, and lateral structures, was imported from the four base models for this project area. The 1D geometry for reaches other than the four studied streams (Brookshire, Willow Fork, Snake, and Cane Island Branch) are outside of the project area extents and were not included. The upstream end of the reach for Brookshire Creek was extended from downstream of Twinwood Parkway to the intersection of 1st Street and Stalknecht Road. Bridge and culvert structures that were not present in the effective models were added – see **Tables 9** and **10** below. The additional structures added to the Existing Conditions model were not yet built in 2017.

Table 9 – Structures Added to Hurricane Harvey Model 1D Geometry

Stream	Bridge	Source
Brookshire Creek	Highway 90	Survey
Brookshire Creek	I-10	Survey
Brookshire Creek	Waller Ave/FM 359	Survey
Willow Fork	Cardiff Rd	Survey
Willow Fork	Highway 90	Survey
Willow Fork	Kingsland Blvd	Plans/as-builts
Willow Fork	Private Drive	Approximated
Snake Creek	Schlipf Rd	Approximated
Unnamed Culvert North	Culvert	Snake Creek
Unnamed Culvert South	Culvert	Snake Creek
Snake Creek	Century Plant Bridge	Approximated
Snake Creek	Tubular Steel Private Rd	Approximated
Snake Creek	Tubular Steel Railroad	Approximated
Snake Creek	Cane Island Pkwy	Survey

Table 10 – Additional Structures Added to Existing Conditions 1D Geometry

Stream	Bridge	Source
Brookshire	Twinwood Pkwy	Plans/as-builts
Willow Fork	TX Heritage Pkwy	Plans/as-builts
Willow Fork	Cane Island Pkwy	Plans/as-builts

The Manning's roughness coefficients (n values) for the 1D cross sections matches the effective models except in locations where bridge structures were added. The Manning's n values adjacent to added structures were revised to reflect the observed conditions based on photos and aerial imagery. The effective Manning's n values and the revised values are both based on the *Harris County Flood Control District (HCFCD) 2019 Atlas-14 Policy Criteria and Procedures Manual (PCPM)*. These values can be found in **Table 11** below.

Table 11 – 1D Manning's n Values

Land use	Manning's n
Channel	
Grass-Lined	0.04
Riprap-Lined	0.04
Articulated Concrete Block - Grassed	0.04
Articulated Concrete Block - Bare	0.03
Concrete-Lined	0.015
Natural or Overgrown Channels	0.05-0.08
Overbanks	
Some flow	0.08-0.15
Ineffective Flow Areas	0.99
Conduit	
Concrete Pipe	0.013
Concrete Box	0.013
Corrugated Metal Pipe	0.024

Lateral structures were set at the edge of the 1D cross sections along stream banks to connect the 1D reaches to the 2D flow areas. To connect the outfalls of Snake Creek and Cane Island Branch to Willow Fork, a storage area was added at the downstream end of both Snake Creek and Cane Island Branch. The storage areas were connected to the most downstream cross section of the outfalling reach and have storage area-2D (SA-2D) connections on either side to connect them to the 2D flow areas and a lateral structure on the downstream end to connect them to Willow Fork downstream. See **Table 12** below for the lateral structure coefficients, obtained from HCFCD's "*Two-Dimensional Modeling Guidelines*" dated July 2018.

Table 12 – Lateral Weir Coefficients

Item Being Modeled with Lateral Structure	Description	Range of Weir Coefficients
Levee/roadway: 3 feet or higher above natural ground	Broad crested weir shape, flow over levee/road acts like weir flow	1.5 to 2.6 (2.0 default)
Levee/roadway: 1 to 3 feet above natural ground	Broad crested weir shape, flow over levee/road acts like weir flow, but becomes submerged easily	1.0 to 2.0
Natural high ground barrier: 1 to 3 feet high	Does not really act like a weir, but water must flow over high ground to get into a 2D flow area	0.5 to 1.0
Non-elevated overbank terrain, lateral structure not elevated above ground	Overland flow escaping the main channel	0.2 to 0.5

The downstream boundary conditions for Brookshire Creek and Willow Fork are both normal depths, which is consistent with the effective base models. The normal depth value was obtained by measuring the slope at the reach outfall using the terrain data. The Manning's n values were obtained from the effective models and were maintained in this model, except in the location of new structures.

3.3.2 2D Geometry

The 2D geometry was rebuilt and includes seven 2D flow areas. The 2D areas were subdivided into seven pieces to avoid runtime errors in the model, which occur if a 2D area extends to both sides of a 1D reach. There is a single 2D flow area upstream of the headwaters of the four reaches analyzed and at least one flow area on either side of each reach. Additionally, there are eleven storage areas (SAs), one at the upstream end of each reach (four total), one at the junction of the reaches that flow into one another (two total), three to represent the Katy Detention Ponds on Cane Island Branch, and two to represent the Sunterra development. The storage areas at the upstream end of each reach are added to funnel flow from the upstream 2D flow areas into the 1D reach. SA-2D connections connect the 2D flow areas and storage areas, and lateral structures connect the 2D flow areas and storage areas to the 1D reaches.

Boundary condition lines with hydrographs from the upstream drainage areas in HEC-HMS were added to the 2D geometry near the downstream end of the subsequent hydrologic subbasins. The Manning's n values were assigned using 2018 Houston-Galveston Area Council (HGAC) land use data and the associated manning's values. See the 2D Manning's n values in **Table 13** below and **Exhibit 9 – 2018 HGAC Land Cover for 2D Mapping**.

Table 13 – 2D Manning's n Values based on 2018 HGAC Land Cover Values

Land use	Manning's n
Cultivated Crops	0.17
Deciduous Forest	0.25
Developed - High Intensity	0.03
Developed - Low Intensity	0.16
Developed - Medium Intensity	0.18
Developed - Open Space	0.06
Evergreen Forest	0.25
Grassland-Herbaceous	0.22
Open Water	0.02
Pasture-Hay	0.22
Unclassified	0.06

Boundary condition lines were also added along the perimeter of the area of analysis using normal depth slopes as the boundary conditions here. The normal depth slope was calculated based on the slope of the LiDAR data available at each location which allows sheetflow to leave the system and not impound along the perimeter lines. See **Exhibits 10-14 – HEC-RAS Schematics**.

3.3.3 Flow Input

The resultant hydrographs from the hydrologic model were input into the hydraulic model as either point source flows within the 2D mesh or as uniform lateral inflows in the 1D geometry. Flows in the upstream 2D areas were applied as a flow hydrograph input at a boundary condition line approximately at the lower third of the drainage area. Boundary condition lines were drawn near the outfall location of the contributing subbasin to not double account for routing flow through the subbasin. For subbasins that directly contribute flow into a channel, the flow is input as a uniform lateral hydrograph, lateral hydrograph, or simple flow hydrograph at a cross section based on how the drainage areas drain into the channel sections. See **Tables 14 and 15** below for a breakdown of the hydraulic boundary conditions and the subbasin that corresponds with each flow input for the 1D and 2D flow areas.

Table 14 – Subbasin and Corresponding HEC-RAS Flow Input Location (1D Area)

Stream	Reach	XS	Boundary Condition	Contributing Subbasin
Brookshire Creek	Reach 1	34313	Flow Hydrograph	N/A – Minimum Flow Input
Brookshire Creek	Reach 1	33828	Uniform Lateral Inflow	Brook_07
Brookshire Creek	Reach 1	26364	Uniform Lateral Inflow	Brook_06
Brookshire Creek	Reach 1	16733	Uniform Lateral Inflow	Brook_05
Brookshire Creek	Reach 1	11050	Lateral Inflow Hydrograph	Brook_04
Brookshire Creek	Reach 1	11002	Uniform Lateral Inflow	Brook_04
Brookshire Creek	Reach 1	9931	Uniform Lateral Inflow	Brook_03
Brookshire Creek	Reach 1	7790	Uniform Lateral Inflow	N/A – Minimum Flow Input
Brookshire Creek	Reach 1	5737	Normal Depth	N/A – Normal Depth
Cane Island Branch	Upper	136379	Uniform Lateral Inflow	CIB_02A
Cane Island Branch	Upper	131417	Uniform Lateral Inflow	N/A – Minimum Flow Input
Cane Island Branch	Upper	125620	Uniform Lateral Inflow	Sunterra Flow Input for SAs 1-1 and 1-2
Cane Island Branch	Upper	121554	Uniform Lateral Inflow	T100D2_3
Cane Island Branch	Upper	119780	Uniform Lateral Inflow	Sunterra Flow Input for SAs 2, 3, and 320-ac Ponds
Cane Island Branch	Upper	119494	Uniform Lateral Inflow	CIB_05
Cane Island Branch	Upper	111211	Uniform Lateral Inflow	CIB_06
Cane Island Branch	Upper	110710	Lateral Inflow Hydrograph	CIB_06
Cane Island Branch	Upper	103864	Uniform Lateral Inflow	CIB_07
Cane Island Branch	Upper	103199	Lateral Inflow Hydrograph	CIB_07
Cane Island Branch	Upper	100965	Uniform Lateral Inflow	CIB_08
Cane Island Branch	Upper	97429	Uniform Lateral Inflow	CIB_09
Cane Island Branch	Upper	93996	Uniform Lateral Inflow	N/A – Minimum Flow Input
Snake Creek	Reach-1	120371	Flow Hydrograph	N/A – Minimum Flow Input
Snake Creek	Reach-1	119641	Uniform Lateral Inflow	SC_08
Snake Creek	Reach-1	105360	Uniform Lateral Inflow	SC_10
Snake Creek	Reach-1	100617	Uniform Lateral Inflow	SC_11
Snake Creek	Reach-1	98608	Lateral Inflow Hydrograph	SC_11
Willow Fork	Reach 1	136840	Uniform Lateral Inflow	WF_04
Willow Fork	Reach 1	127252	Lateral Inflow Hydrograph	WF_05
Willow Fork	Reach 1	124171	Lateral Inflow Hydrograph	WF_05
Willow Fork	Reach 1	123687	Uniform Lateral Inflow	WF_06
Willow Fork	Reach 1	118955	Uniform Lateral Inflow	WF_07
Willow Fork	Reach 1	113755	Uniform Lateral Inflow	WF_10
Willow Fork	Reach 1	105521	Lateral Inflow Hydrograph	WF_09
Willow Fork	Reach 1	92056	Lateral Inflow Hydrograph	WF_11
Willow Fork	Reach 1	89712	Normal Depth	N/A – Normal Depth

Table 15 – Subbasin and Corresponding HEC-RAS Flow Input Location (2D Area)

2D Flow Area	Boundary Condition	Contributing Subbasin
Area 1	Flow Hydrograph	WF_01
Area 1	Flow Hydrograph	CIB_02B
Area 1	Flow Hydrograph	SC_04
Area 1	Flow Hydrograph	WF_03a
Area 1	Flow Hydrograph	Brook_08c
Area 1	Flow Hydrograph	Brook_08b
Area 1	Flow Hydrograph	Brook_08a
Area 1	Flow Hydrograph	SC_06a
Area 1	Flow Hydrograph	SC_03
Area 1	Flow Hydrograph	SC_05
Area 1	Flow Hydrograph	SC_02
Area 1	Flow Hydrograph	SC_01
Area 1	Flow Hydrograph	WF_02
Area 1	Normal Depth	N/A
Area 2	Flow Hydrograph	Brook1_Trib1_01
Area 2	Normal Depth	N/A
Area 3	Flow Hydrograph	WF_03b
Area 3	Flow Hydrograph	WF_08
Area 3	Normal Depth	N/A
Area 3	Normal Depth	N/A
Area 4	Flow Hydrograph	SC_09
Area 5	Flow Hydrograph	SC_06b
Area 5	Flow Hydrograph	SC_07
Area 6	Flow Hydrograph	CIB_01
Area 6	Normal Depth	N/A
Area 7	Flow Hydrograph	CIB_03
CaneIsland Upstr	Lateral Inflow Hydrograph	N/A – Minimum Flow Input

3.3.4 Model Stabilization

To stabilize the model at the start of the storm events, low-flow hydrographs and minimum flows were inserted at key locations in the 1D geometry to prevent the streams from becoming dry and causing the model to become unstable. The low flows are not expected to impact the model results and solely serve the purpose of model stabilization and startup.

3.4 CALIBRATION

Two sets of models were built for this analysis – one set has 2017 Conditions "Hurricane Harvey" geometry and meteorological data, and the other set has current day "Existing Conditions" geometry and current Atlas-14 meteorological data. While the Existing Conditions model was the desired product, the Hurricane Harvey model was developed to be run with the Hurricane Harvey rainfall event data so that the resulting water surface elevations (WSE)s in the streams could be compared to the stream gauge data at the same time in the same rainfall event. The hydraulic model could then be calibrated to produce results that approximate the stream gauge data observed during Hurricane Harvey. This process ensures that the results of the model are reflective of historical conditions in a rainfall event. The calibrated 2017 model was used as a base to build the Existing Conditions model.

The Hurricane Harvey hydrologic and hydraulic models use the four effective models (Bessie's Creek, Willow Fork, Sunterra, and Costello) as the base models. The Hurricane Harvey hydrologic model uses Hurricane Harvey rainfall data from Willow Fork Master Drainage Plan for Fort Bend County. The Willow Fork hydrologic model included Hurricane Harvey precipitation data for 31 gauges within the project area. For subbasins that did not include an independent rain gauge in the Willow Fork study, rainfall depths were associated with the nearest Willow Fork subbasin and gauge.

The Hurricane Harvey gauge data was obtained from Fort Bend County Drainage District modeling data from the Willow Fork Master Drainage Plan. See **Appendix 2** for the Hurricane Harvey gauge data.

The corresponding hydraulic model includes only structures built in 2017 and before and utilizes the flow results from the Hurricane Harvey HEC-HMS model.

3.4.1 Stream Gauges

There are several gauges in the vicinity of BKDD that were reviewed for suitability to be used for calibration to the 2017 Hurricane Harvey storm. However, several limitations in the gauge data restricted our ability to calibrate each reach. Calibration is an extra step to verify and refine hydraulic results where possible but is not a mandatory step to yield accurate results. Therefore, the results for the two reaches that were not able to be calibrated are still regarded as accurate.

Snake Creek:

Snake Creek does not have a gauge. So, without high-water mark data, calibration was not possible.

Brookshire Creek:

The Brookshire Creek gauge (Station 2510) was not installed until 2020, so calibration was not possible.

Willow Fork:

The Willow Fork gauge (Station 2060) high-water mark data ends at 8:37pm on 8/27/2017 and resumes on 9/7/2017, therefore excluding the peak of the Hurricane Harvey storm event. The model was calibrated to approximate a high-water mark data point collected before the data ends but still during the height of the storm event.

Cane Island Branch:

Cane Island Branch has two gauges (Stations 2050 and 2040), and both gauges collected the full data from the Hurricane Harvey storm event. Thus, Cane Island Branch was calibrated to approximate the peak observed high-water mark at each gauge location.

Northern Sheet Flow Area:

The Station 2090 gauge is on a roadside ditch off Morrison Road, which is at the very top of the watershed. The WSE measured at this gauge is below the level that would indicate flooding risk in the Hurricane Harvey storm event, so this gauge is not utilized for calibration.

In summary, due to the availability and applicability of gauge data, only Willow Fork and Cane Island Branch are calibrated. See **Exhibit 15** to see the layout of the gauge locations and **Table 16** for a summary of the gauge data on each creek.

Table 16 – Stream Gauge Data

Stream	Brookshire Creek	Willow Fork	Snake Creek	Cane Island Branch	Roadside Ditch
Gauge Station	2510	2060	-	2040, 2050	2090
Calibration Data Available for Hurricane Harvey Storm Event	N	Y*	N	Y	Y**

* Willow Fork has data for the time prior to the peak of the Harvey storm event, but data ends before the peak. Thus, Willow Fork is calibrated to a data point before the peak of the storm.

** The roadside ditch gauge station did not measure WSEs that indicate flooding is likely, so this gauge is not deemed necessary for calibration.

3.4.2 Calibration Methodology

The method of calibration used in this analysis is to revise the 1D Manning's n values of the stream until the resulting WSE from the model matches the WSE reflected in the gauge data. The 1D Manning's n is only changed within the allowable values provided by the HCFCD PCPM shown in **Table 11**. Generally, increasing the Manning's n value causes the flow velocity to decrease, resulting in WSE increases, while decreasing the Manning's n value causes the flow velocity to increase, resulting in WSE decreases.

If changing the 1D Manning's n value did not create the desired effect, then other parameters were revised. These include the 2D Manning's n values locally, revising the ineffective areas, revising the pressure coefficients for bridge crossings, and changing lateral weir coefficients.

For the Cane Island Branch, the time-stage curve of the gauge data was selected as the data to measure against for calibration, which is standard. For Willow Fork, the peak high-water mark was not recorded, so the time-stage curve of the last available WSE was selected for comparison. This data occurs several hours before the storm peaks.

Results of the calibration efforts varied, and in general, the modeled results from the Hurricane Harvey 2017 storm event were measured to within approximately 0.6' (7" +/-), which is considered reasonable for this size of analysis with limited gauge data.

3.4.3 Calibration Process

Calibration, while not typically analyzed when creating a Master Drainage Plan, does provide for a greater level of accuracy. The Master Drainage Plan models were calibrated when possible to improve their accuracy when compared to historical data.

Willow Fork:

The resulting WSEs from the Hurricane Harvey hydraulic model were compared to the high-water mark reading at Station 2060 (Willow Fork at Pederson Road) at 8:37 pm on 8/27/2017. This time was selected because it is the last time that data was collected before the data collection stopped, thus it is the closest data point to the peak WSE. It is assumed that the peak WSE would have occurred late on 8/27 or early on 8/28 based on the peak WSEs of nearby streams. The hydraulic model outputs data on a 15-minute interval, so the nearest modeled result occurs at 8:30 pm on 8/27/2017. The initial resulting WSE was below the recorded gauge WSE, and calibration adjustments of the 1D Manning's roughness values were done. See **Table 17** below for a summary of the final calibration results.

Table 17 – Willow Fork Calibration at Pederson Road – RS 113908

Gauge WSE (ft)	Modeled WSE (ft)
148.39	148.43

Cane Island Branch:

There are two gauges on Cane Island Branch, so the stream was calibrated to match the recorded WSEs at two locations: Highway 90 and Clay Road. The resulting WSEs from the 2017 hydraulic model were compared to high-water mark data at Sta 2040 (Highway 90) at 1:08 am on 8/28/2017 and Sta 2050 (Clay Road) at 11:45 am on 8/27/2017. These times were selected because they correspond to the peak recorded WSE for each location. The recorded data was compared to the max WSE at the corresponding location in the hydraulic model, which occurs at 8am on 8/28/2018 at Sta 2040 (Highway 90), and 4am on 8/28/2017 at Sta 2050 (Clay Road). The

recorded data and the modeled data peak within 7 hours of each other at Highway 90 and within 4 hours of each other at Clay Road.

The initial resulting WSEs at both locations were below the recorded gauge WSEs, but adjustments to the 1D Manning's roughness values did not yield enough increase in the peak WSE to match the recorded data. Therefore, other parameters were revised to yield a peak WSE in the model that produced a reasonable time-stage curve to approximate the results of the gauge. These parameter adjustments included the local 2D Manning's roughness values, 1D ineffective areas around the bridge cross sections, pressure coefficients for bridge crossings, and lateral structure coefficients locally. The final calibration results at both gauge locations are shown in **Tables 18 and 19** below.

Table 18 – Cane Island Branch Calibration at HWY 90 – RS 97429

Gauge WSE (ft)	Modeled WSE (ft)
139.34	138.8

Table 19 – Cane Island Branch Calibration at Clay Rd – RS 117680

Gauge WSE (ft)	Modeled WSE (ft)
157.55	157.06

3.4.4 Existing Conditions Model

The Hurricane Harvey hydrologic model was used as the base model for the Existing Conditions model. **Table 3** shows the subbasins that were revised based on new drainage patterns and land use due to new developments. These Hurricane Harvey subbasins were updated to match the current conditions for the Existing Conditions model. The BKDD Atlas-14 2-, 10-, and 100-year storm events were analyzed.

The calibrated Hurricane Harvey hydraulic model was similarly used as the base model for the Existing Conditions hydraulic model. The Hurricane Harvey 2D Manning's n values were revised in the same areas that the subbasin parameters were revised to account for new developments. The 1D reaches were revised to add the structures that were built after 2017 (see **Table 9**). The Manning's n values and other parameters that were calibrated in the Hurricane Harvey model were maintained for the Existing Conditions model.

3.5 HYDRAULIC RESULTS

The 1D/2D unsteady HEC-RAS model was used to calculate the WSEs and extents of the existing floodplain throughout BKDD for the 2-, 10-, and 100-year storms. **Exhibits 16, 17, and 18** show the resulting floodplains for these storm events, and the resulting hydraulics tables can be found in **Appendix 6**.

3.5.1 Areas of Interest

Northern Sheet Flow Area:

Due to the methodology of the 2D overland flow modeling, which inputs the hydrographs at the downstream end of each subbasin, there is an area at the northern end of the watershed where no flow is applied and therefore, there is no floodplain inundation. This area is north of FM 529 and west of Pattison Road.

Flow travels from northwest to southeast with the general slope of the land. Most of this area is undeveloped farmland, and a significant amount of that was previously used for rice farming. The berms used to terrace the rice fields or for other farming purposes are tall in some areas. Therefore, runoff is blocked or redirected by these berms. Breaklines were used to model the ridges of these berms and of the rural roads in this area. Most of the flow input in this 2D area travels into the 2D areas bounding the streams or directly into the streams.

Brookshire Creek:

At the upstream end of Brookshire Creek, there is ponding in the 100-year event north of Westbound Highway 90 due to the approximate 4-foot berm that the roadway presents. The road does not overtop in the 100-year event, so flow is funneled directly into Brookshire Creek. As a result of the restriction of flow behind Highway 90, the floodplain extents are very minor just downstream of the highway. The 100-year floodplain extents stay within the channel banks for 3,000 feet downstream of I-10. The floodplain expands further into the overbanks as more area contributes runoff to the creek. At the downstream end of the analysis, the Brookshire Creek floodplain expands far to the west in low-lying areas which would also contain the Bessie's Creek floodplain. Bessie's Creek was not modeled as part of this study.

Willow Fork:

The Willow Fork reach starts just south of Morton Road where the 100-year runoff ponds upstream of the roadway, with some flow overtopping Morton Road to the east of the Willow Fork crossing. In the 100-year event, the entire area 5,000 feet on either side of the stream is inundated. This area is terraced farmland that was previously used as rice fields. Most of the area between Stalknecht Road and FM 2855 drains towards Willow Fork north of Highway 90 and ponds north of the highway before being funneled into the channel. Part of the 100-year runoff overtops FM 2855 just upstream of Highway 90 and drains east towards the Snake Creek crossing. Some 100-year runoff also overtops Highway 90 just east of the Willow Fork crossing.

The flow that makes it across Highway 90 also ponds behind I-10, inundating the Igloo Factory Store and Medline Industries buildings. Flow crosses I-10 by funneling into an approximately 20 feet wide structure west of Igloo Road, or into the Willow Fork crossing. Flow does not overtop I-10 in the 100-year storm in this area. Some flow also drains east towards Snake Creek.

About 9,000 feet downstream of I-10, the Willow Fork channel widens out and the 100-year floodplain in the overbanks contracts as the stream winds through single-family neighborhoods.

Snake Creek and Cane Island Branch flow into Willow Fork within 5,500 feet of each other, and the model ends just downstream of the Cane Island Branch outfall into Willow Fork.

Snake Creek:

The headwaters of Snake Creek, like Willow Fork, are downstream of Morton Road. 100-year runoff slightly overtops Morton Road 300 feet to the west and overtops 800 feet to the east of Snake Creek. The area surrounding the northern part of the reach is undeveloped grassland that does not appear to have been used for rice farming previously, and there is shallow ponding throughout the area.

The ponding depths increase upstream of Highway 90 and I-10 where the excess runoff from Willow Fork reaches Snake Creek. Snake Creek flow travels from north to south, and the Willow Fork excess flow travels east to intersect the Snake Creek runoff. Some of the Willow Fork 100-year excess runoff overtops Highway 90 west of Tubular Drive; the rest of the flow continues east to meet the Snake Creek flow north of Highway 90, bounded to the east by Cane Island Parkway. Here, the 100-year flow overtops Cane Island Parkway to flow east, overtops Highway 90 to flow south, or is conveyed south by the Highway 90 bridge crossing.

More Willow Fork excess flow joins the Snake Creek flow north of I-10, but no flow overtops I-10 in the 100-year storm event and all runoff is funneled through the I-10 crossing or the FM 1463 underpass underneath I-10 1,600 feet to the east of the Snake Creek crossing. The stream ties into Willow Fork 450 feet downstream of I-10.

Cane Island Branch:

Cane Island Branch begins downstream of Beckendorff Road. The northern portion of Cane Island Branch appears to previously have been rice farms, and the 100-year ponding depth to the west of the channel increases from around 0.5 feet at Beckendorff Road to around 1.5 feet at Stockdick Road, which overtops significantly. 100-year runoff from the west of the channel and just north of Stockdick Road overtops the channel and continues flowing east to be captured by the swales surrounding the Sunterra development. Most of the overland flow draining to Cane Island Branch comes from the west, as flow moves from northwest to southeast in this area. Cane Island Branch drains from north to south, intercepting this flow.

Between the Sunterra development and Morton Road, 100-year runoff is mostly contained within the banks of Cane Island Branch. Downstream of Morton Road, the 100-year overland flow enters from the west and travels through low points in the residential developments to Cane Island Branch. It should be noted that there are many new neighborhoods along Cane Island Branch, and the 2018 Upper Coast LiDAR used for floodplain mapping does not reflect all of these new developments.

Highway 90 has minor overtopping in the 100-year event about 1500 feet to the west of the Cane Island Branch crossing. Upstream of I-10, 100-year excess runoff from the Snake Creek crossing joins the Cane Island Branch runoff to pond upstream of the I-10 crossing with no flow

overtopping I-10 at this crossing. The 100-year ponding extents are not as wide at the upstream end of the Cane Island Branch Crossings as at the Willow Fork and Snake Creek crossings.

3.5.2 Results Compared to Previous Studies

The resulting water surface elevations and flows at significant locations were compared to the most recent studies in this area, which also served as the base models for this project: Bessie's Creek, Willow Fork, and Sunterra. Because the Costello model was a smaller localized model rather than a regional-level model like the other three base models, the BKDD results were not compared to the Costello results. See **Appendix 7** for WSE and flow comparison data for each storm event and floodplain extents comparisons.

4.0 SUMMARY AND CONCLUSIONS

1. This study's models were built using data from three effective models: the Bessie's Creek, Willow Fork, and Sunterra studies. Hydrologic parameters were maintained from the effective models except where subbasin delineation or land use changed, in which case the parameters were then recalculated using the same methodology as the effective models.

2. The existing subbasins were verified and revised using 2018 Upper Coast LiDAR and 2019 Hurricane LIDAR.

3. Infiltration losses were calculated using the Green and Ampt method, and the corresponding parameters from Harris County, Fort Bend County, and M3 (2007) were used.

4. The hydrograph transform was calculated using the Clark Unit Hydrograph method, and the Basin Development Factor method was used to calculate the TC and R values.

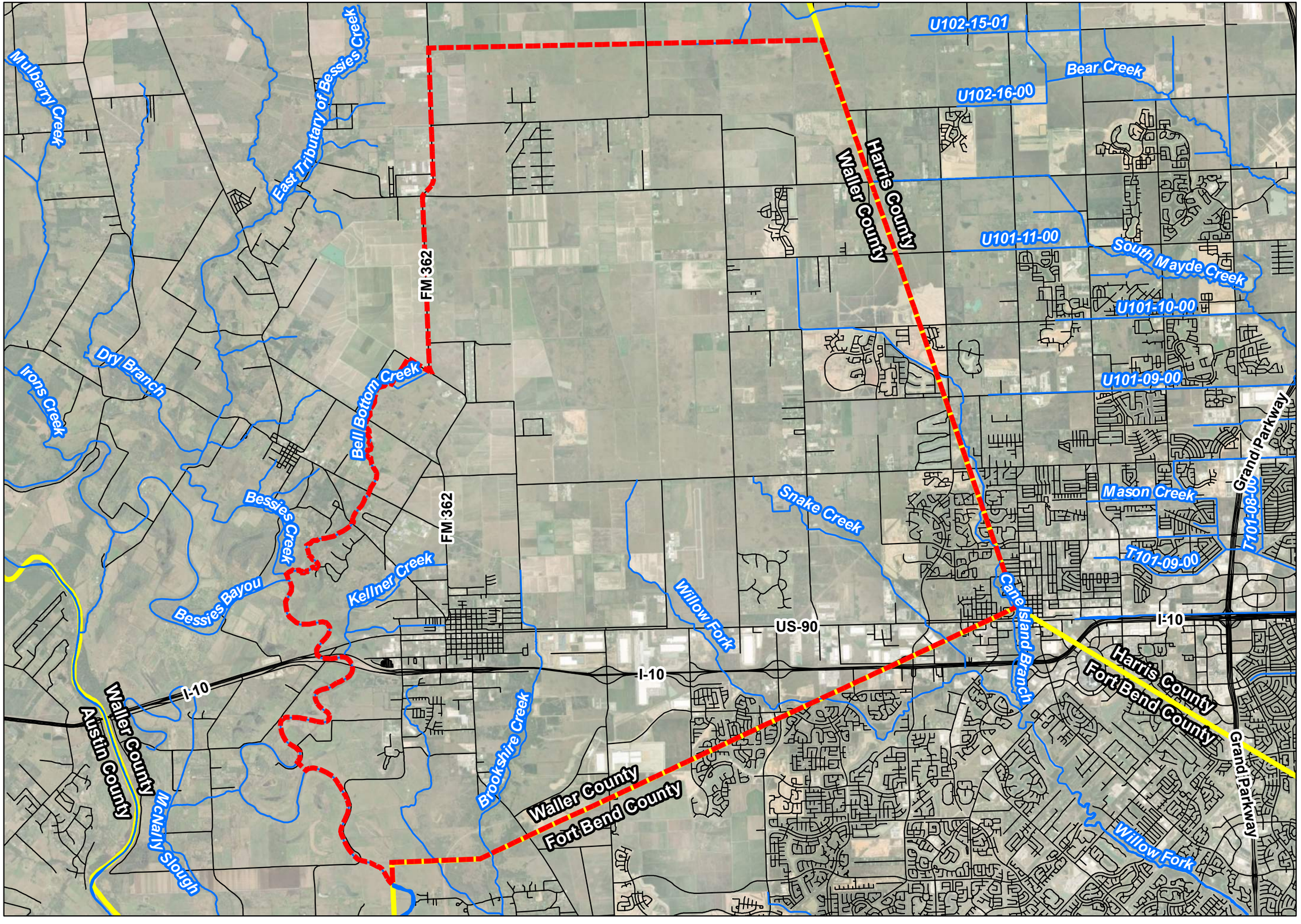
5. Hydrologic and hydraulic modeling was conducted using HEC-HMS v.4.3 and HEC-RAS v.6.2. Unsteady 1D/2D modeling was used in this project based on the complex overland flow patterns in this area, including rice fields, other agricultural lands, developed areas, and waterways. 2D modeling was used to capture the multidirectional flow patterns outside of the major channels, and 1D modeling was used for the channel flow, which only flows in one direction, downstream.

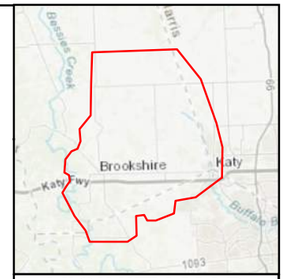
6. The hydraulic model was calibrated using Hurricane Harvey 2017 rainfall and results prior to setting up the Hurricane Harvey model. This model represents 2017 conditions and matches the base models. The 1D Manning's roughness values and lateral weir coefficients were revised to approximate the WSE results from the Hurricane Harvey gauge data for each of the streams that had a usable gauge. The Willow Fork and Cane Island Branch reaches were calibrated. The 1D Manning's roughness values and lateral weir coefficients were adjusted for calibration and then utilized in the Existing Conditions model.

7. The Brookshire Creek and Snake Creek reaches were not calibrated because these streams did not have gauges during the Hurricane Harvey storm event. Calibration is an extra step to verify and refine hydraulic results where possible but is not a mandatory step to yield accurate results. Therefore, the results for the two reaches that were not able to be calibrated are still regarded as accurate.

8. The BKDD 2-, 10-, and 100-year Atlas-14 storm events were analyzed. The rainfall depths were obtained from the BKDD design guidelines.

9. All approaches follow BKDD, Harris County, and Fort Bend County methodologies.





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries
- Roads

EXHIBIT 1 - VICINITY MAP

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 6,500
1 INCH : 6,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

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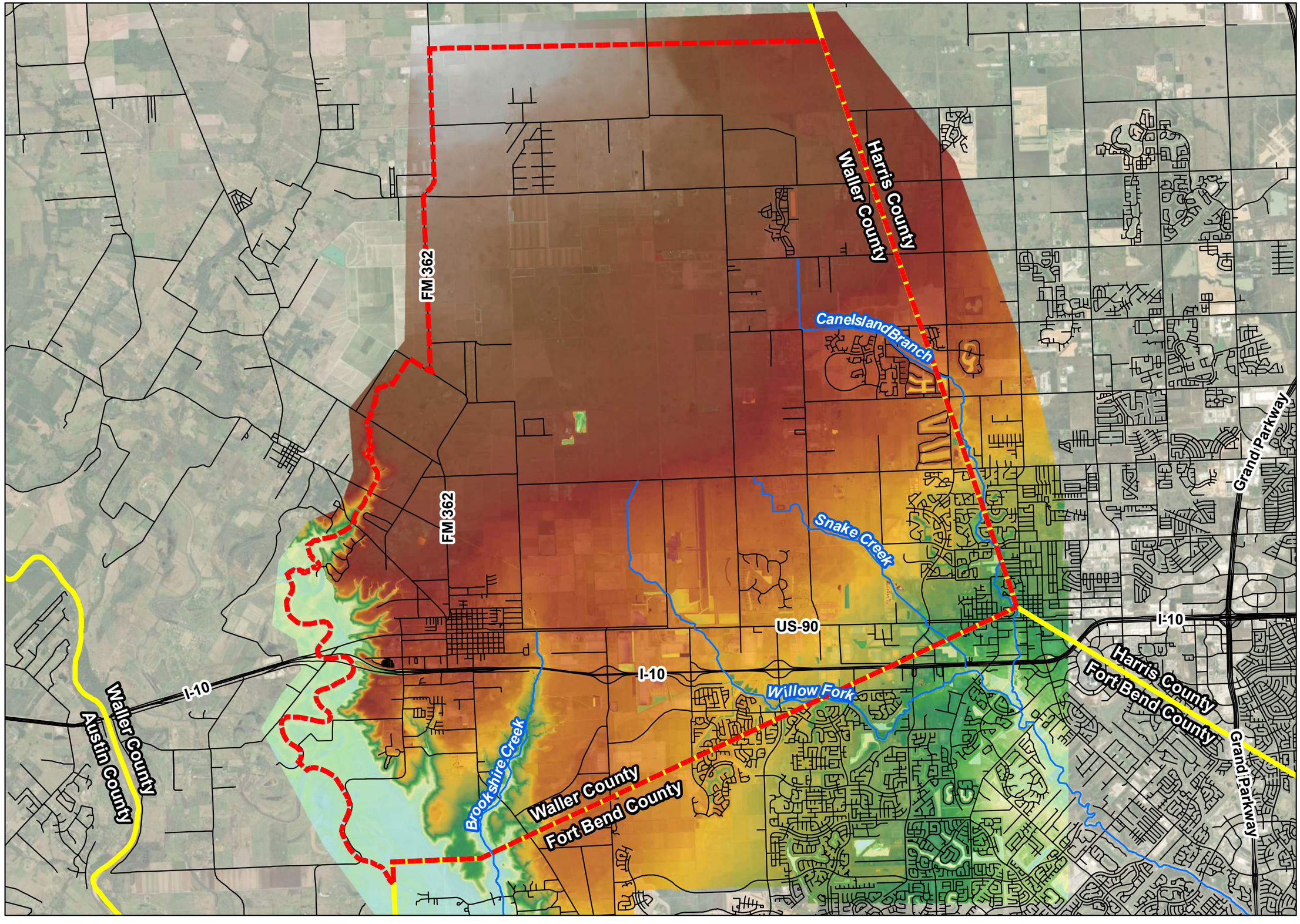


VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries

Mapping Surface (Feet)

- High : 210
- Low : 90

- Roads

Mapping surface is a combination of 2018 Upper Coast LiDAR and 2019 Hurricane LiDAR (NAVD 88) obtained from TNRIS.

EXHIBIT 2 - ELEVATION MAP

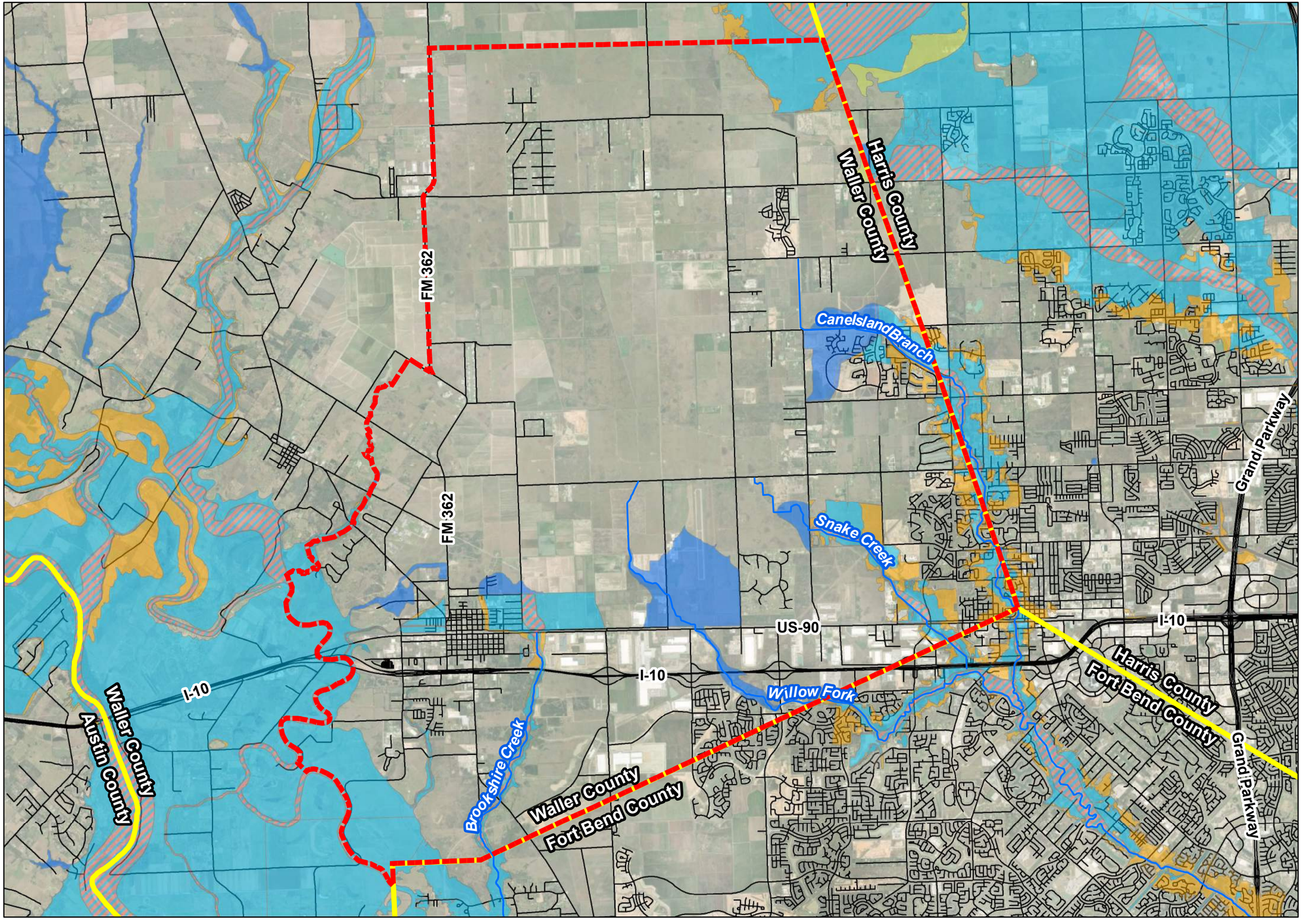
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

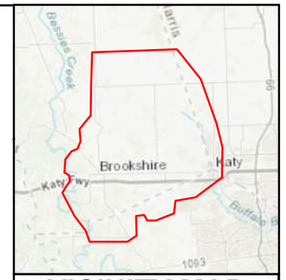
N W E S

0 6,500
1 INCH : 6,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R0902\R0902-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\Ex 2 - Elevation Map.mxd Project Number: 11608-0018-03 Date: 2/27/2023 User Name: jwt





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries

FEMA Effective Floodplain

- Zone A (100-year)
- Zone AE (100-year)
- Floodway
- Zone AO (100-Year)
- Zone X (500-year)
- Roads

EXHIBIT 3 - FEMA EFFECTIVE FLOODPLAIN

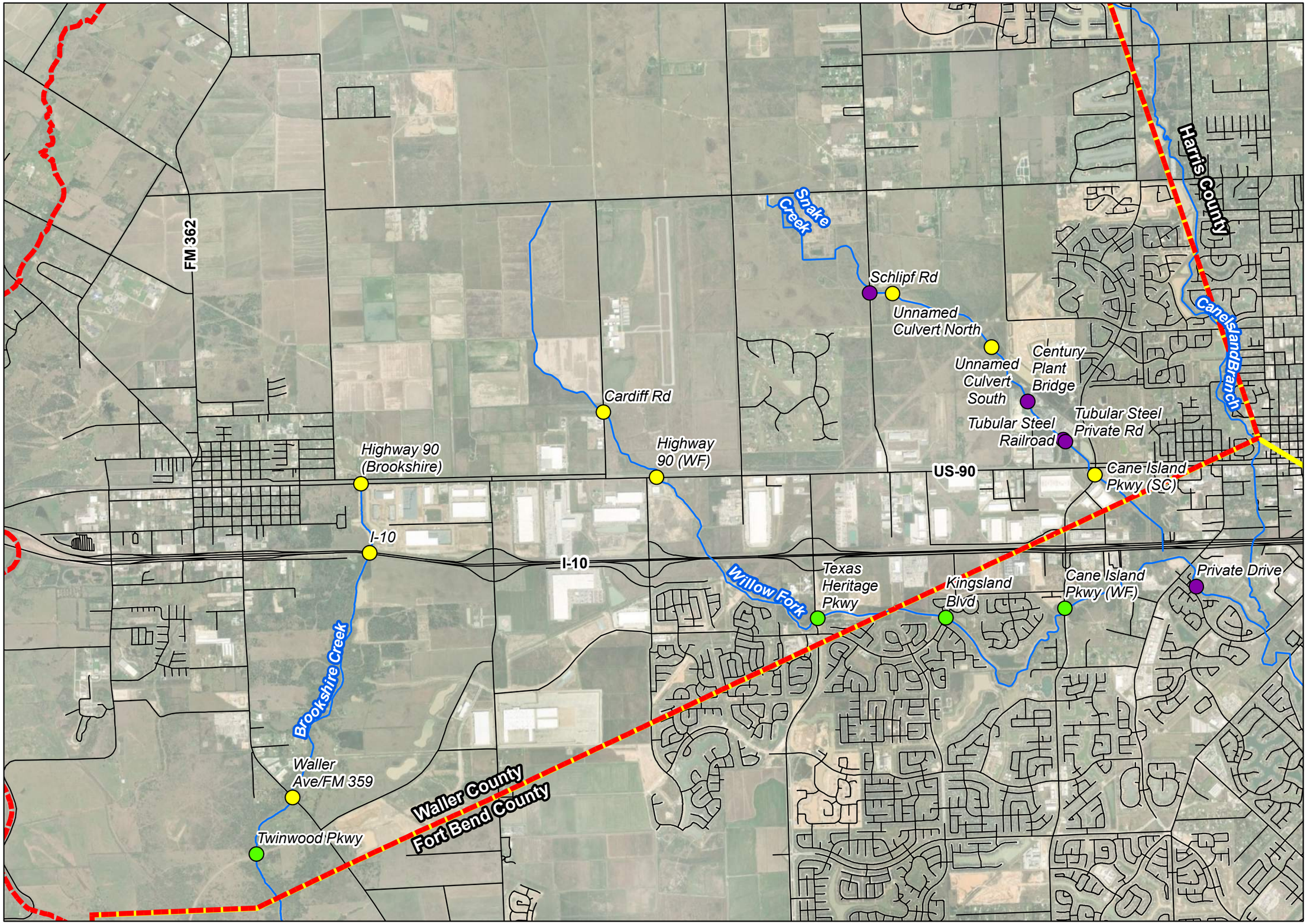
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 6,500
1 INCH : 6,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R0002\R0002-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\Ex 3 - Effective Floodplain Map.mxd Project Number: 11605-0018-03 Date: 2/27/2023 User Name: jw1



VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Surveyed Crossings
- Plans Obtained for Crossings
- Crossings Approximated in Model
- Streams
- BKDD Boundary
- County Boundaries
- Roads

EXHIBIT 4 - SURVEYED STRUCTURES MAP

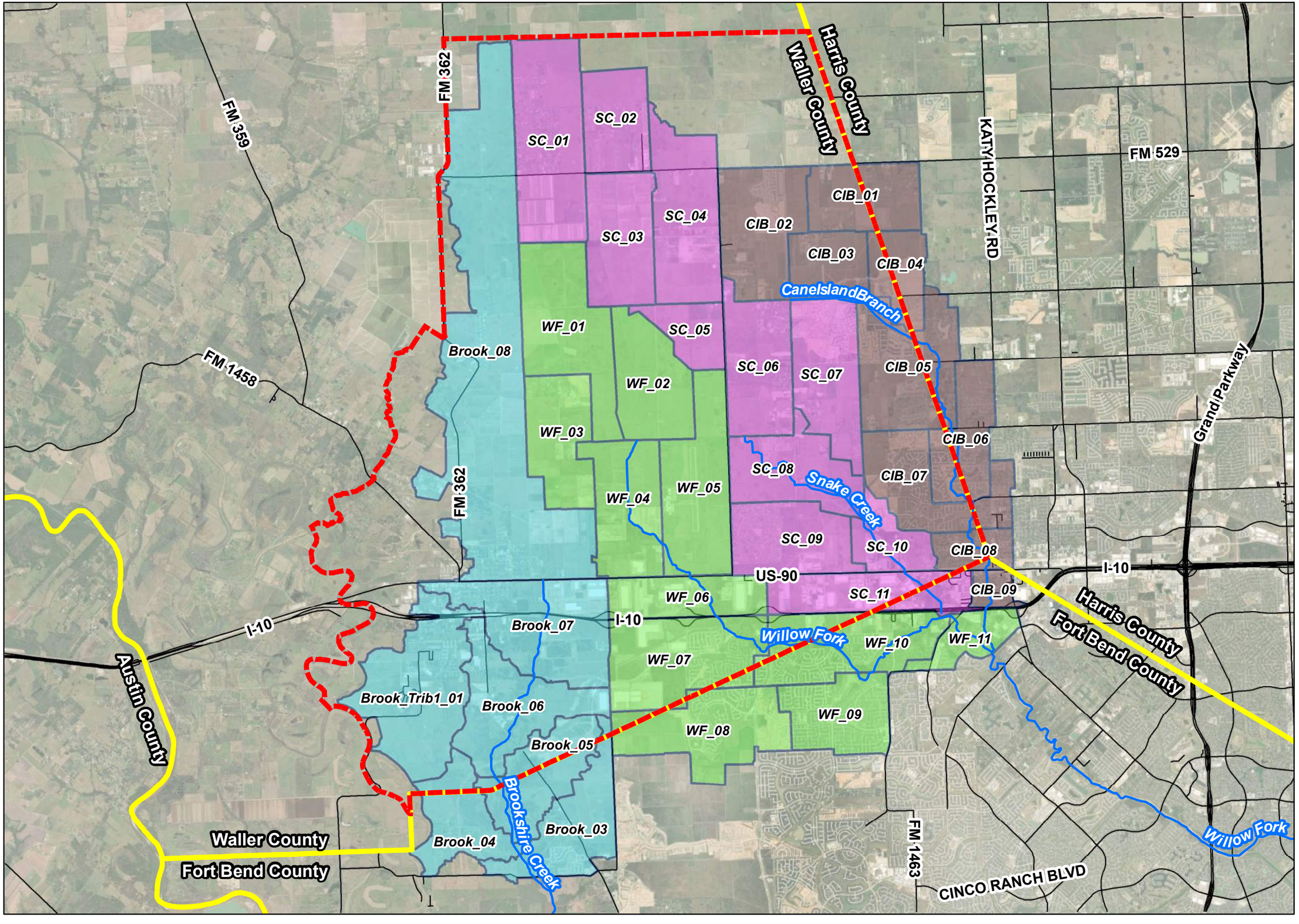
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

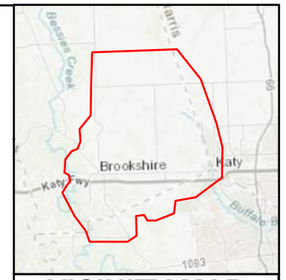
N W E S

0 3,500
1 INCH : 3,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R0\09\2\R0092-0042-00 Master Drainage Plan Updated Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\Ex 4 - Surveyed Structures Map.mxd Project Number: 11608-0018-03 Date: 3/28/2023 User Name: jw1





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- Roads
- BKDD Boundary
- County Boundaries

2017 Conditions Subbasins

- Brookshire Creek
- Cane Island
- Snake Creek
- Willow Fork

EXHIBIT 5 - HURRICANE HARVEY MODEL SUBBASINS MAP

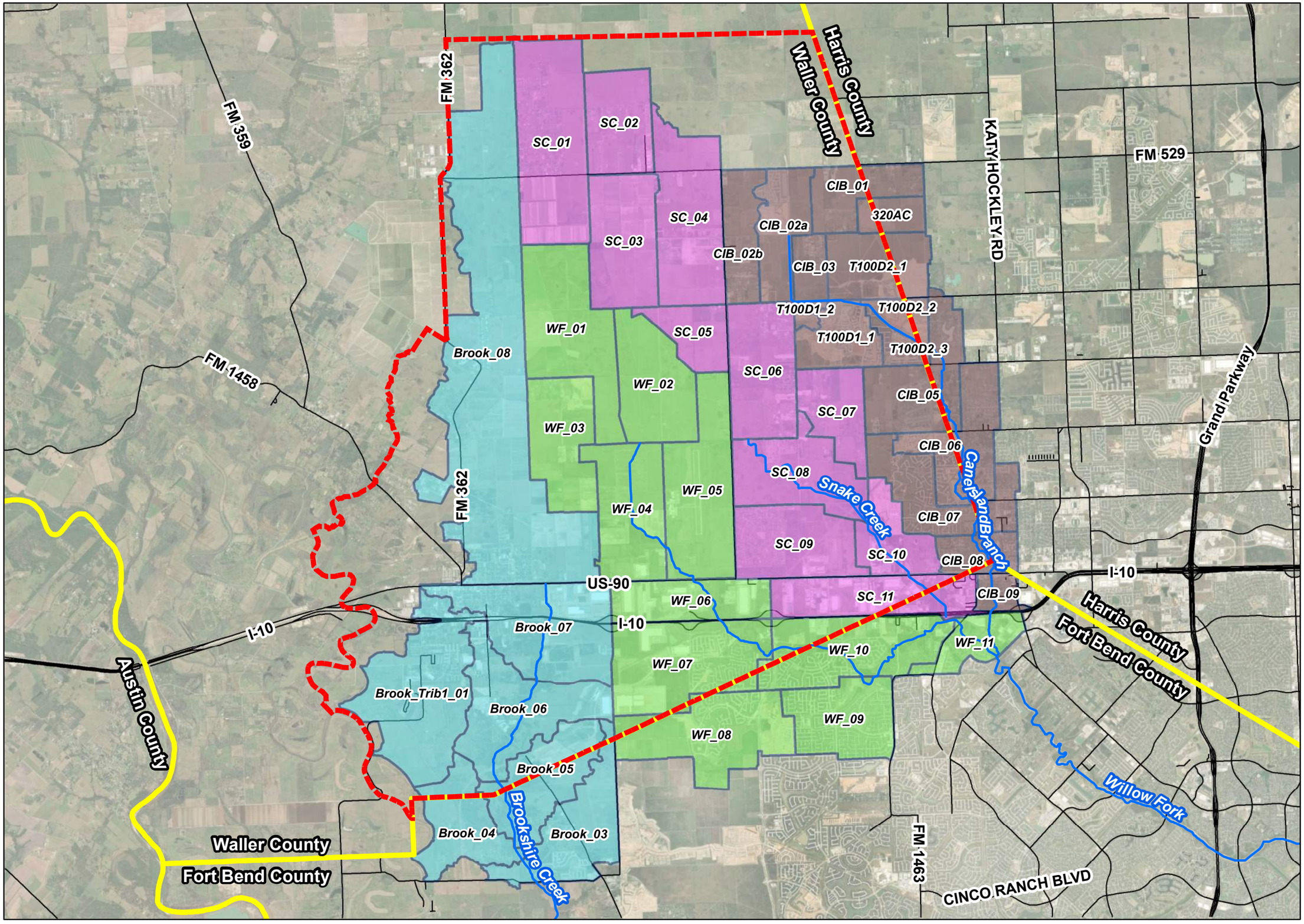
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 7,000
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R\0002\R0002-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\Ex 5 - 2017 Conditions Subbasins Map.mxd Project Number: 11609-0018-03 Date: 2/27/2023 User Name: jw1



VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- Roads
- BKDD Boundary
- County Boundaries

Existing Conditions (2023) Subbasins

- Brookshire Creek
- Cane Island
- Snake Creek
- Willow Fork

EXHIBIT 6 - EXISTING CONDITIONS SUBBASINS MAP

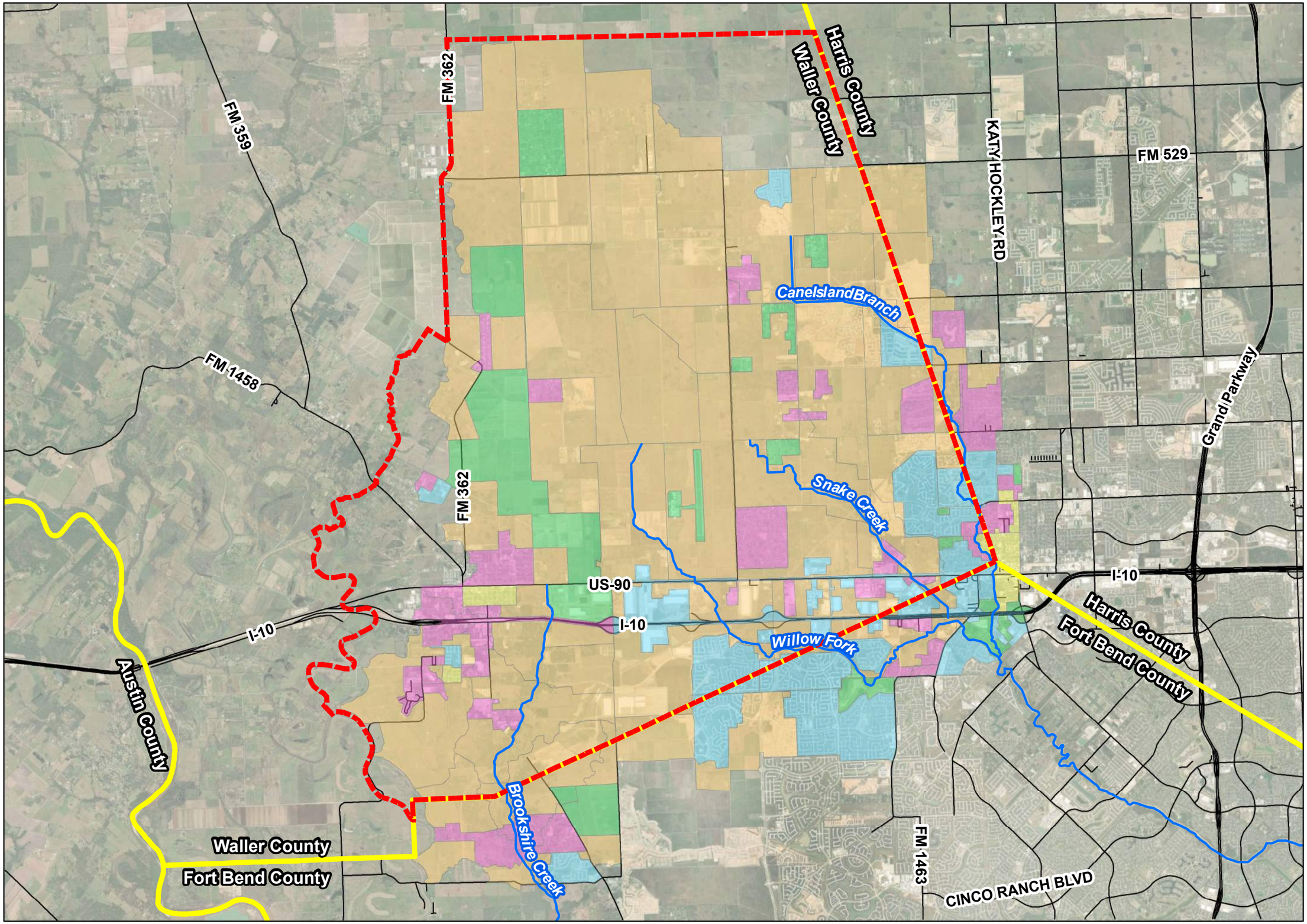
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 7,000
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY
Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R\0002\R0002-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\EB 6 - Existing Conditions Subbasins Map.mxd Project Number: 11665-0018-03 Date: 2/27/2023 User Name: jwt



VICINITY MAP
1 INCH = 10 MILES

LEGEND

Hurricane Harvey (2017) BDF Landuse

- Curb-and-Gutter with Storm Sewer Post-1987
- Curb-and-Gutter with Storm Sewer Pre-1987
- Open Space (Graded)
- Roadside Ditch Drainage
- Undeveloped
- Streams
- Roads
- BKDD Boundary
- County Boundaries

EXHIBIT 7 - HURRICANE HARVEY MODEL (2017) BDF LANDUSE MAP

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

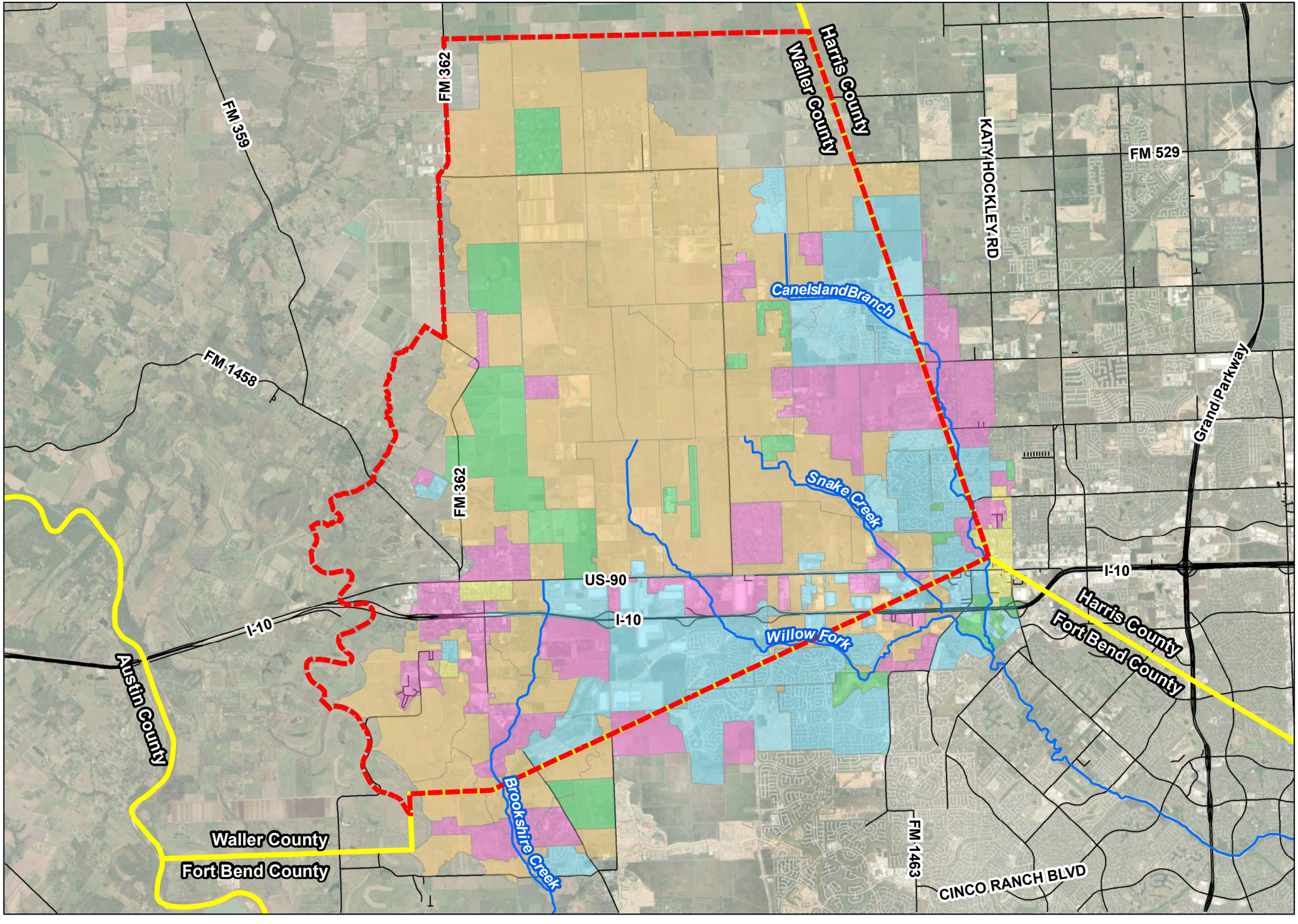
0 7,000

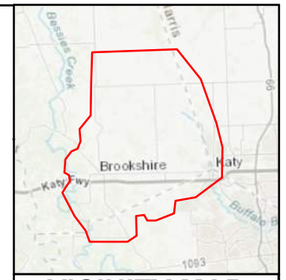
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R\0002\R0002-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\Ex 7 - 2017 Conditions Landuse Map.mxd Project Number: 116608-5018-4-53 Date: 3/28/2023 User Name: jw1





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- Roads
- BKDD Boundary
- County Boundaries

Existing BDF Landuse

- Curb-and-Gutter with Storm Sewer Post-1987
- Curb-and-Gutter with Storm Sewer Pre-1987
- Open Space (Graded)
- Roadside Ditch Drainage
- Undeveloped

EXHIBIT 8 - EXISTING CONDITIONS BDF LANDUSE MAP

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 7,000

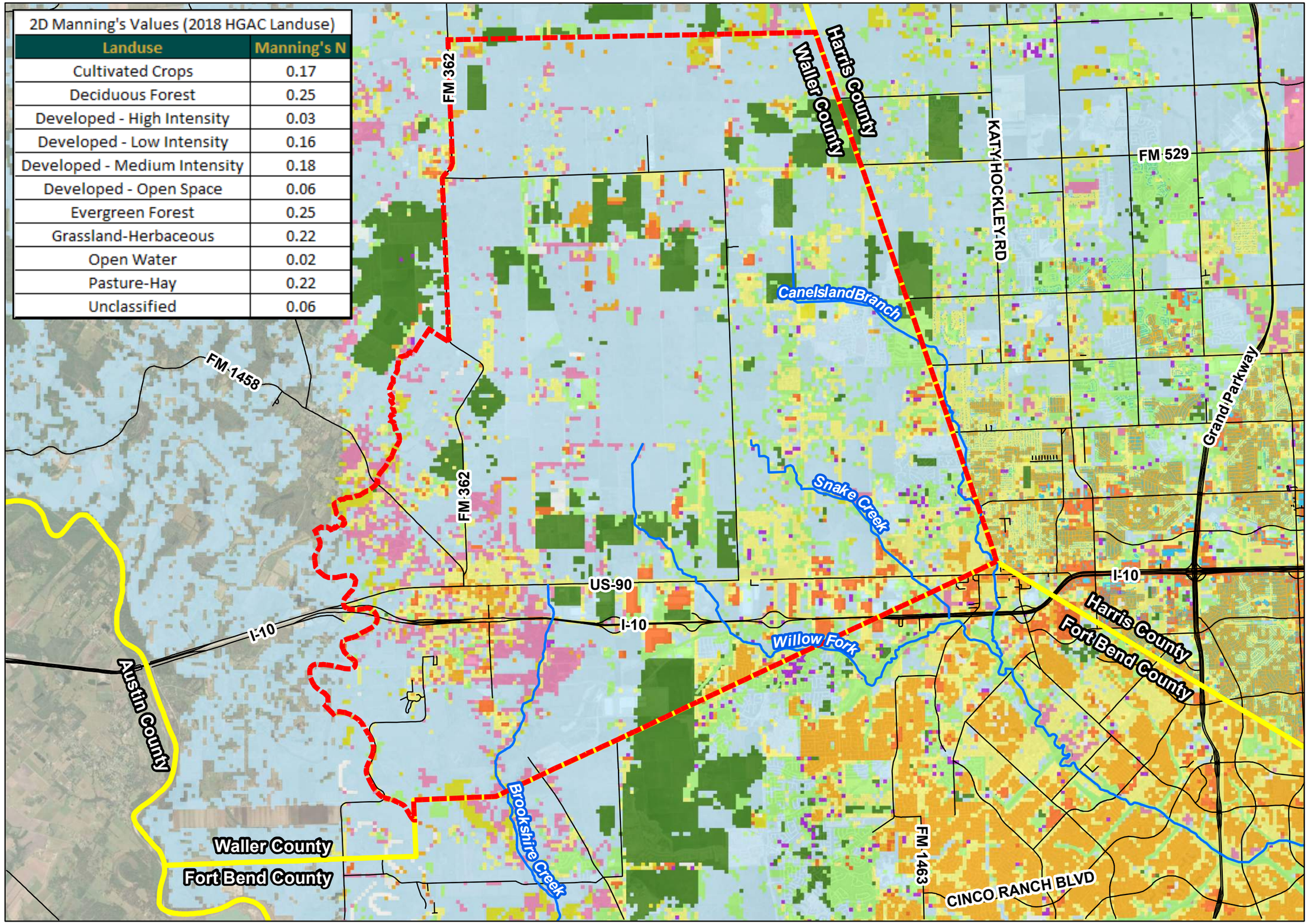
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Path: K:\R\0002\R0002-0042-00 Master Drainage Plan Update\2 Design Phase\Reports\H&H Reports\2 - Exhibits\1 - MXD\ES 7 - Existing Landuse Map.mxd Project Number: 11608-0018-03 Date: 2/27/2023 User Name: jw1

2D Manning's Values (2018 HGAC Landuse)	
Landuse	**Manning's N**
Cultivated Crops	0.17
Deciduous Forest	0.25
Developed - High Intensity	0.03
Developed - Low Intensity	0.16
Developed - Medium Intensity	0.18
Developed - Open Space	0.06
Evergreen Forest	0.25
Grassland-Herbaceous	0.22
Open Water	0.02
Pasture-Hay	0.22
Unclassified	0.06



VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- Roads
- BKDD Boundary
- County Boundaries

2018 HGAC Land Cover for 2D Mapping

- Unclassified
- Developed - High Intensity
- Developed - Medium Intensity
- Developed - Low Intensity
- Developed - Open Space
- Cultivated Crops
- Pasture - Hay
- Grassland - Herbaceous
- Deciduous Forest
- Evergreen Forest
- Open Water

EXHIBIT 9 - 2018 HGAC LAND COVER FOR 2D MAPPING

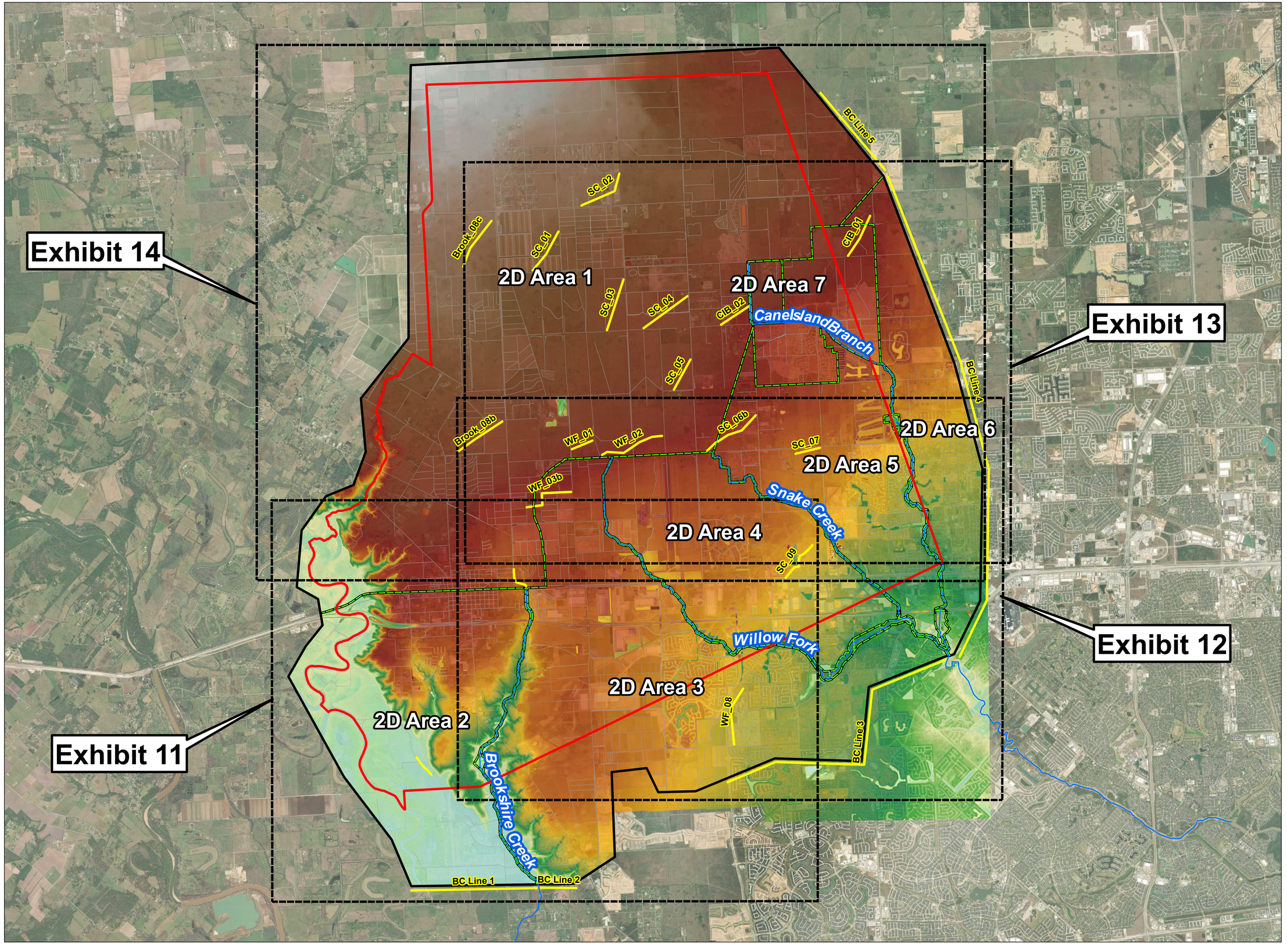
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

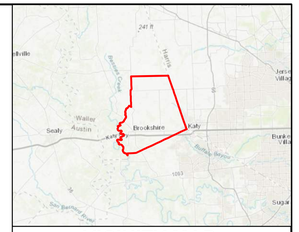
N W E S

0 7,000
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Viewport Windows
- BKDD Boundary
- Streams
- Lateral Weirs
- Boundary Condition Lines
- 2D Perimeters
- Breaklines

Mapping Surface Value (feet)
High : 210
Low : 90

EXHIBIT 10 - EXISTING HEC-RAS SCHEMATIC OVERALL

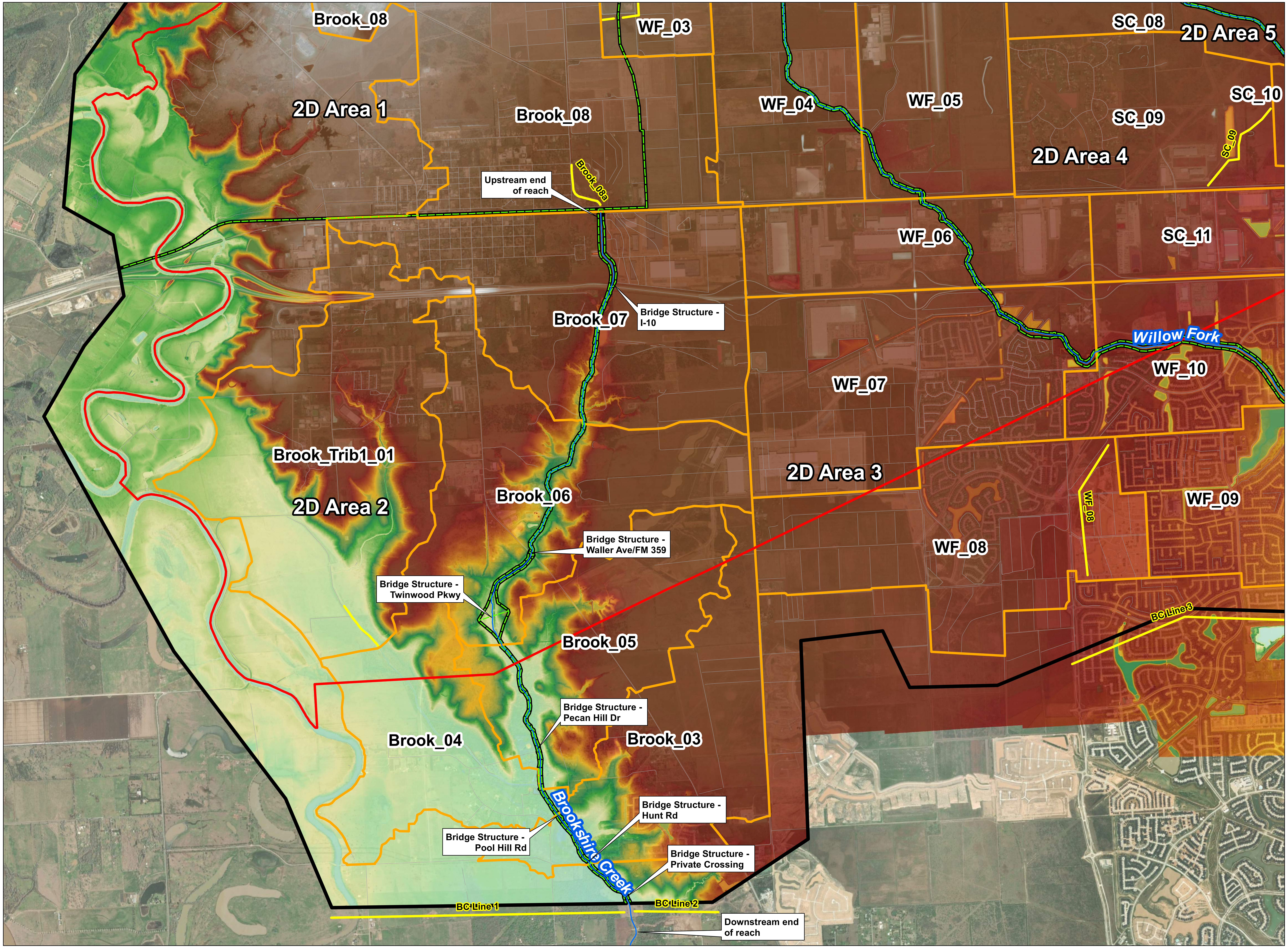
MASTER DRAINAGE PLAN FOR BKDD
WALLER COUNTY, TEXAS

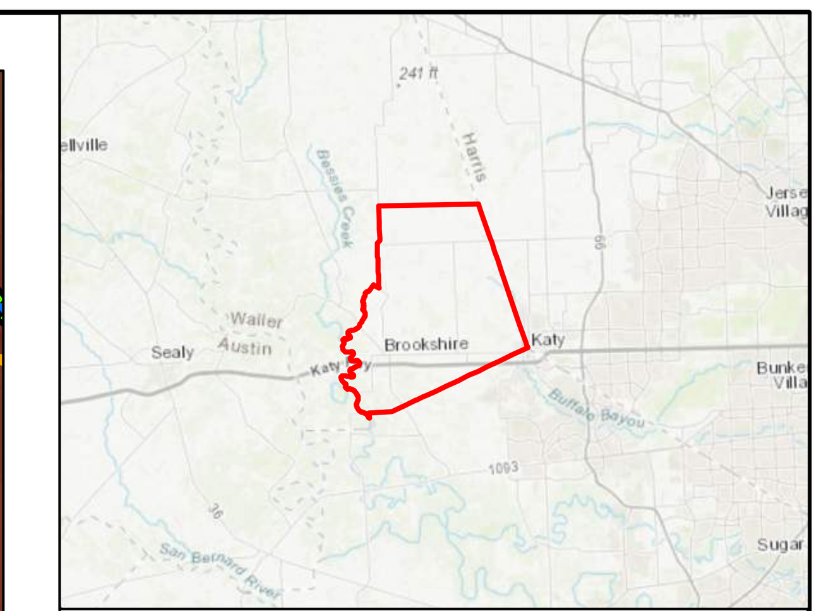
N W E S

0 3,500
1 INCH : 3,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Date: 2/8/2023
Project Number: 11681.0202.00
User Name: jw1





VICINITY MAP

1 INCH = 10 MILES

LEGEND

- BKDD Boundary
- Streams
- Lateral Weirs
- Existing Subbasins
- Boundary Condition Lines
- 2D Perimeters
- Breaklines

Mapping Surface Value (feet)
High : 180
Low : 90

EXHIBIT 11 - EXISTING HEC-RAS SCHEMATIC 1 of 4

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD

WALLER COUNTY, TEXAS

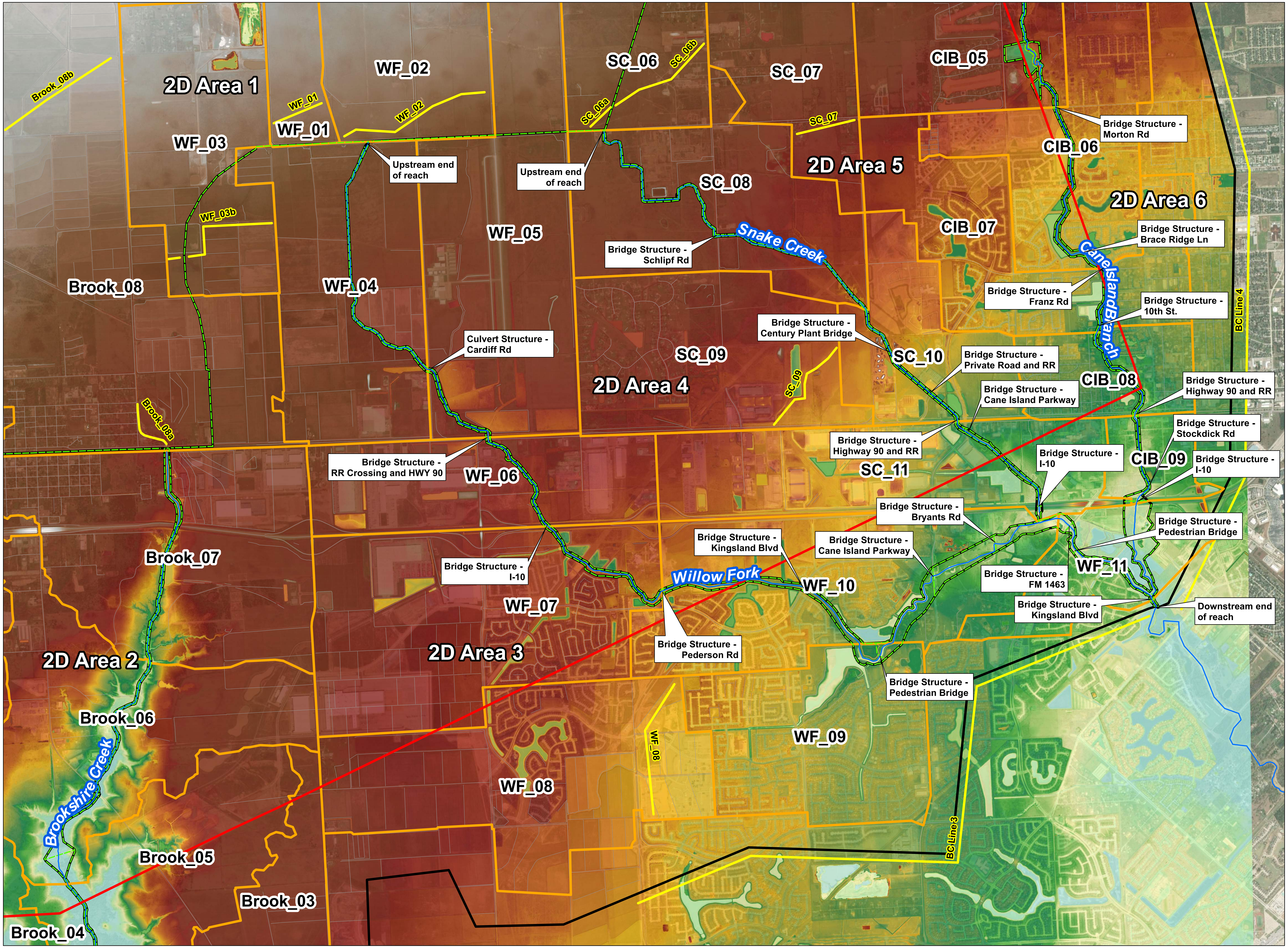
N S E W

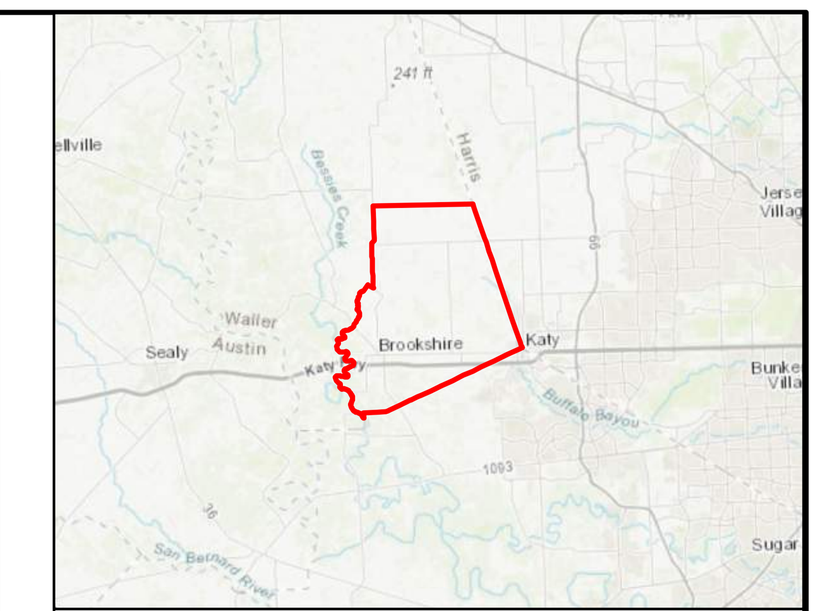
0 1,500

1 INCH : 1,500 FEET

IMAGERY PROVIDED BY ESRI

QUIDDITY





VICINITY MAP

1 INCH = 10 MILES

LEGEND

- BKDD Boundary
- Streams
- Lateral Weirs
- Existing Subbasins
- Boundary Condition Lines
- 2D Perimeters
- Breaklines

Mapping Surface Value (feet)
High : 200
Low : 90

EXHIBIT 12 - EXISTING HEC-RAS SCHEMATIC 2 OF 4

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD

WALLER COUNTY, TEXAS

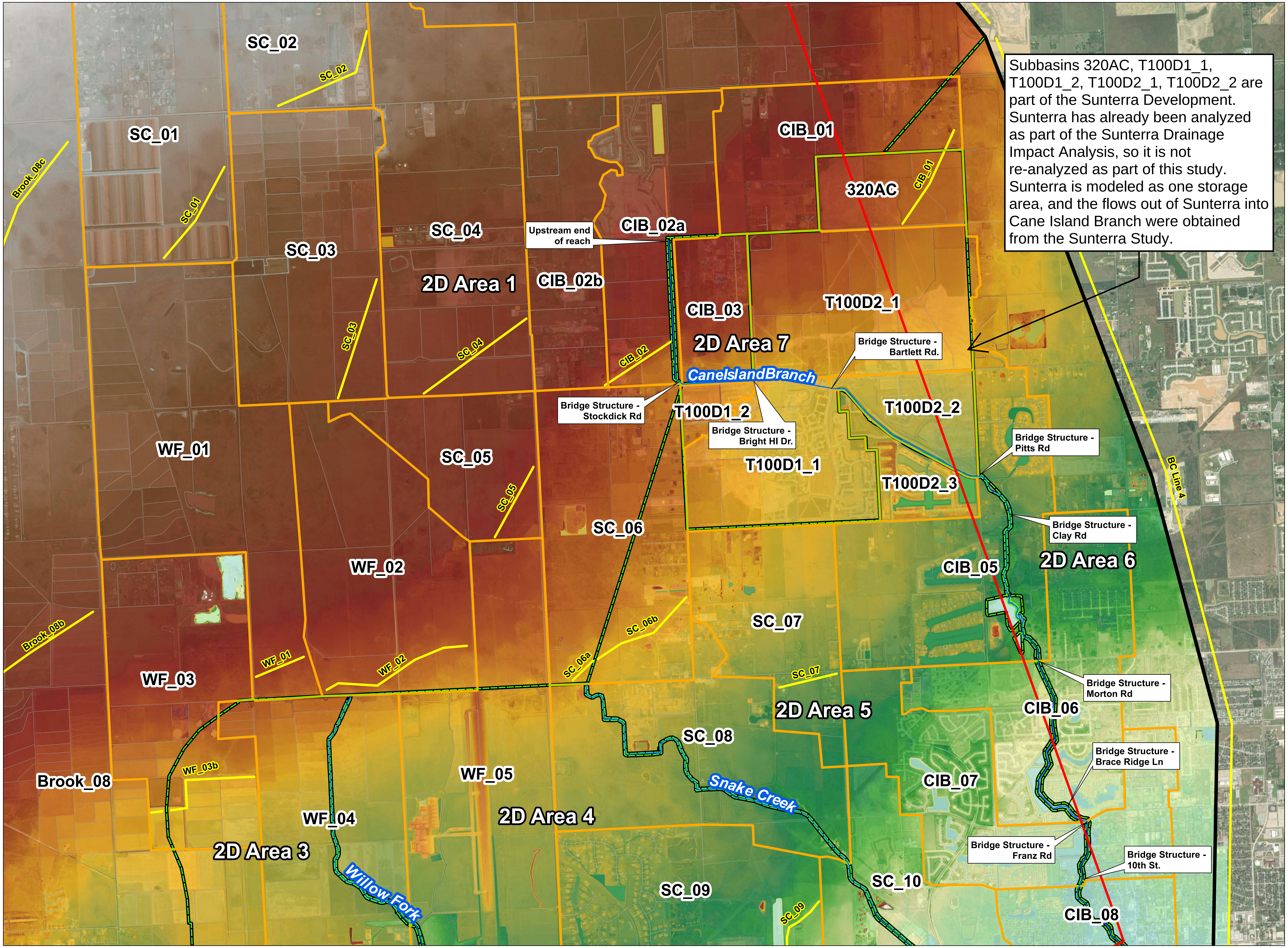
N W E S

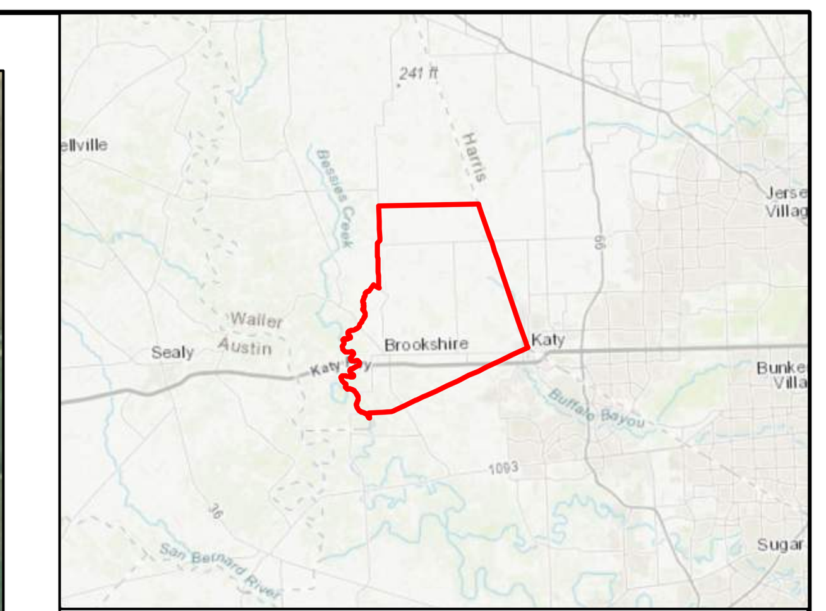
0 1,500

1 INCH : 1,500 FEET

IMAGERY PROVIDED BY ESRI

QUIDDITY





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- BKDD Boundary
- Streams
- Lateral Weirs
- Existing Subbasins
- Boundary Condition Lines
- 2D Perimeters
- Breaklines

Mapping Surface Value (feet)
High : 200
Low : 120

EXHIBIT 13 - EXISTING HEC-RAS SCHEMATIC 3 OF 4

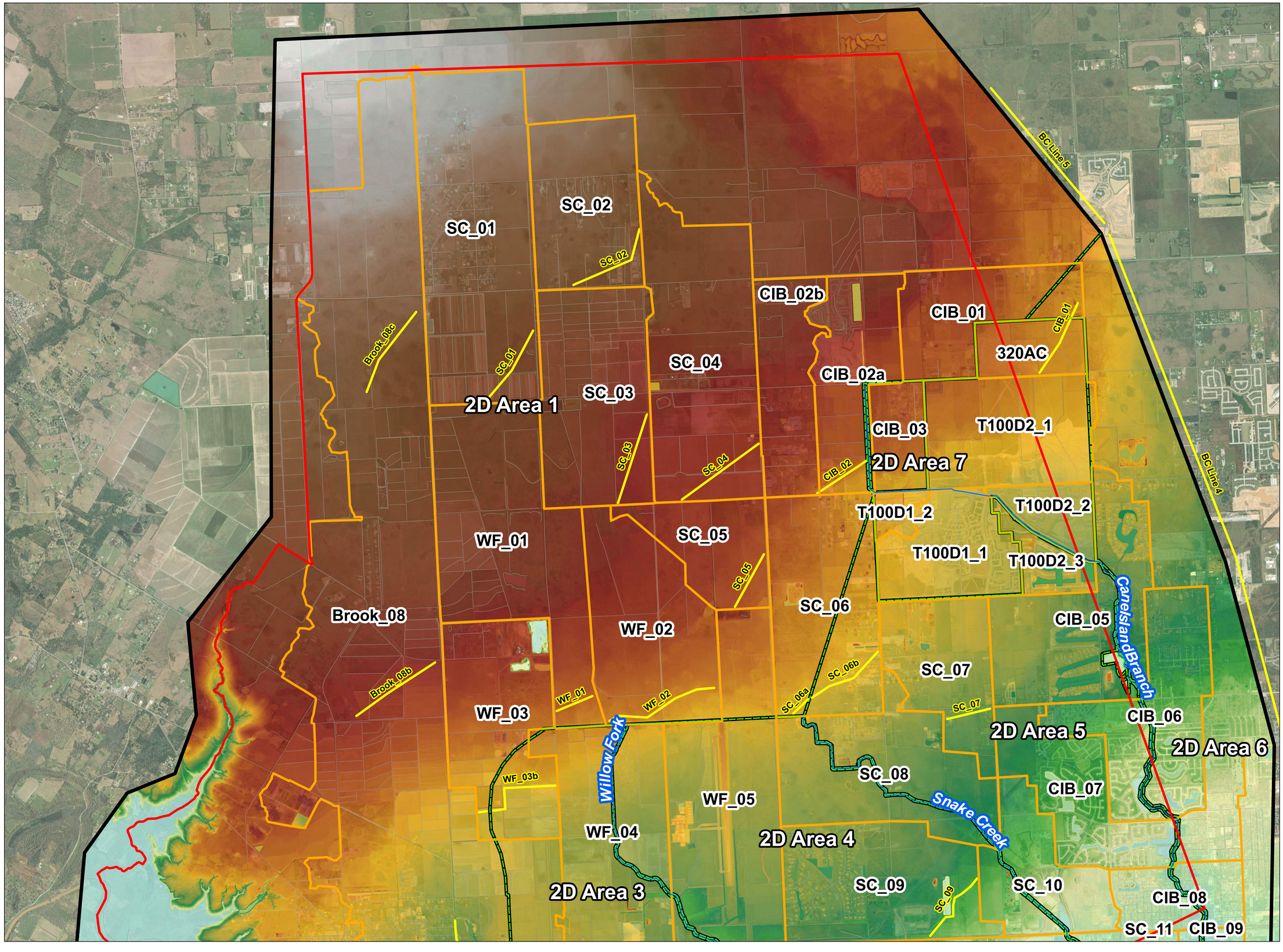
MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

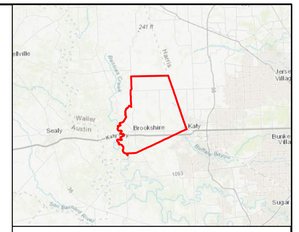
N W E S

0 1,500
1 INCH : 1,500 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Project Number: 15681-0002-00 Date: 3/28/2023 User Name: jw1





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- BKDD Boundary
- Streams
- Lateral Weirs
- Existing Subbasins
- Boundary Condition Lines
- 2D Perimeters
- Breaklines

Mapping Surface
Value (feet)
High : 210
Low : 110

EXHIBIT 14 - EXISTING HEC-RAS SCHEMATIC 4 OF 4

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD

WALLER COUNTY, TEXAS

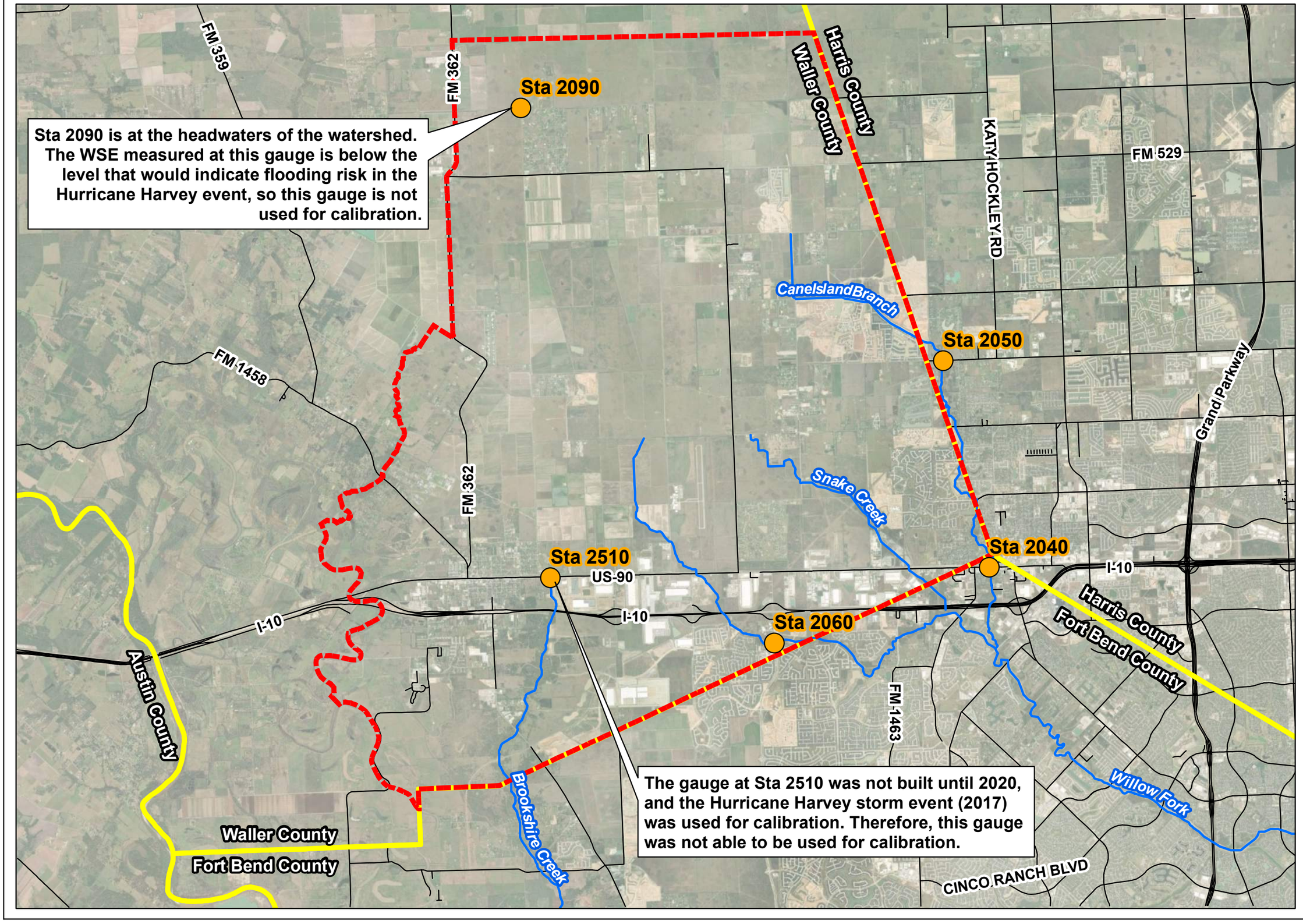
N W E S

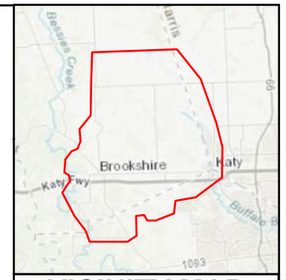
0 2,000

1 INCH : 2,000 FEET

IMAGERY PROVIDED BY ESRI

QUIDDITY





VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Gauge Locations
- Streams
- Roads
- BKDD Boundary
- County Boundaries

EXHIBIT 15 - LOCAL GAUGES IN VICINITY OF BKDD

MASTER DRAINAGE PLAN - PHASE I - EXISTING CONDITIONS FOR BKDD
WALLER COUNTY, TEXAS

N W E S

0 7,000
1 INCH : 7,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY

Texas Board of Professional Engineers Registration No. F-23290

Northwest area without floodplain - This area is at the top of the watershed, and water does not concentrate significantly until further downstream in the watershed. This is why there is no visible floodplain in this area.

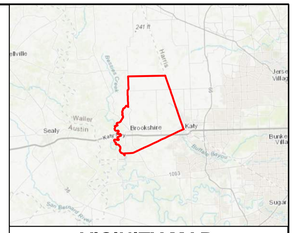
West area without floodplain - Bessie's Creek was not modeled as part of this analysis. This stream was excluded from the Phase I analysis to focus on the streams on the east of the drainage district where more development is occurring. This is why there is no visible floodplain in this area.

Brookshire Creek West area without floodplain - Brookshire Creek has greater capacity than the other creeks due to greater channel depth and width. This is why the floodplain is contained within the channel banks rather than significantly overtopping like the other channels.

Sunterra area without floodplain - This area was modeled in detail as part of the Sunterra Drainage Study. This study incorporates the results of that analysis, so detailed floodplain mapping was not necessary within the Sunterra Development area. This is why there is minimal visible floodplain in this area.

Brookshire Creek East area without floodplain - Same explanation as for Brookshire Creek West

Morrison Rd
FM 362
FM 362
US-90
I-10
I-10
I-10
Grand Pkwy
Grand Pkwy
Harris County
Waller County
Canelsland Branch
Snake Creek
Willow Fork
Brookshire Creek
Waller County
Fort Bend County
Harris County
Fort Bend County
Waller County
Austin County



VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries

2yr Max Depth
Value
High : 16.77
Low : 0.0

- Roads

EXHIBIT 16 - 2-YEAR FLOODPLAIN RESULTS MAP

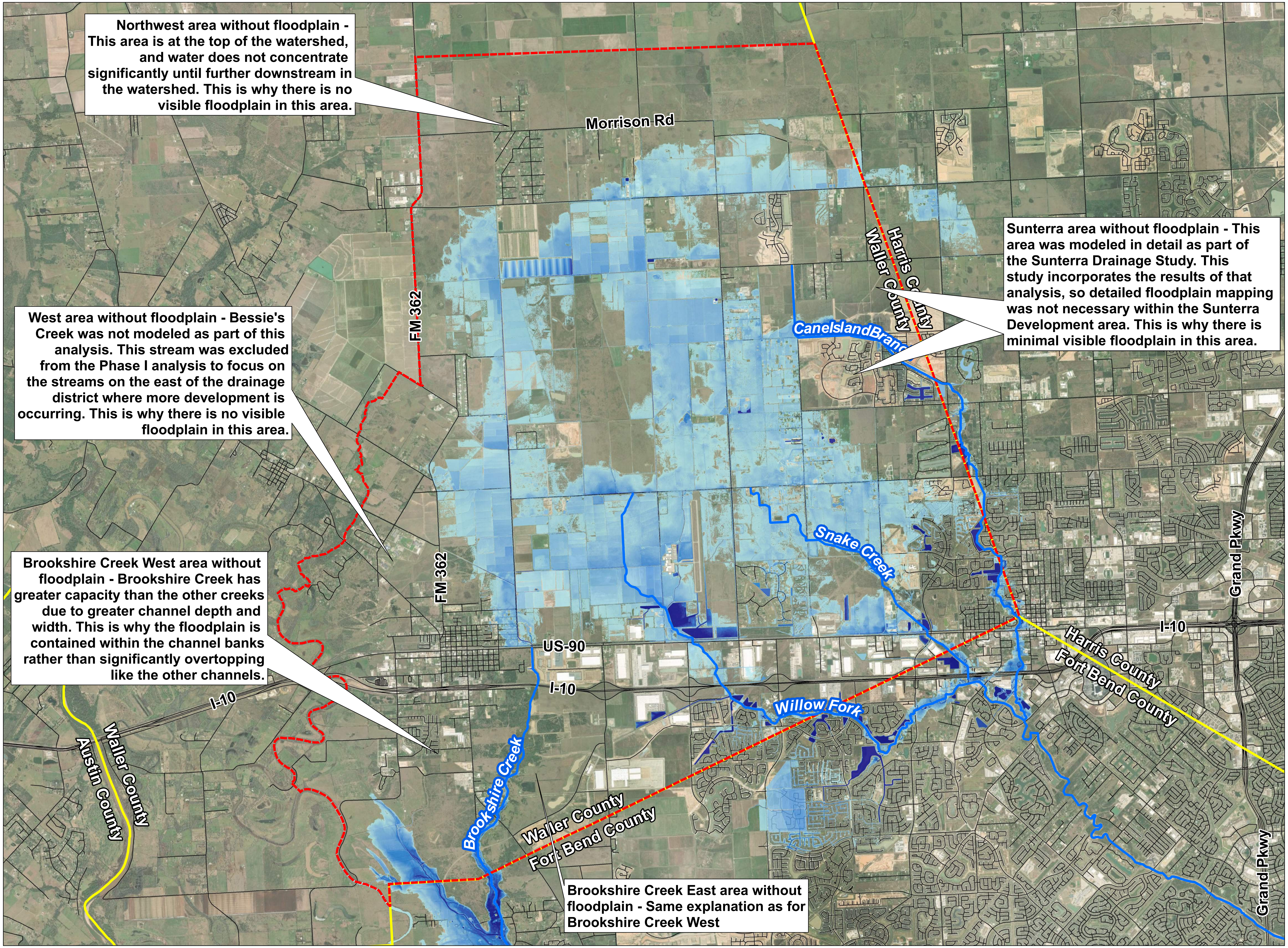
MASTER DRAINAGE PLAN
FOR BKDD
WALLER COUNTY, TEXAS

N
W E
S

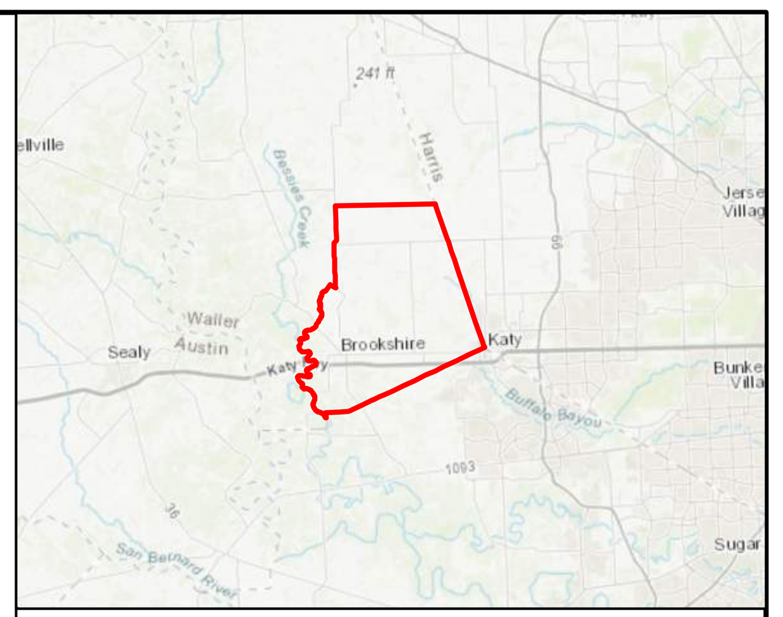
0 3,000
1 INCH : 3,000 FEET

IMAGERY PROVIDED BY ESRI

QUIDDITY



Northwest area without floodplain - This area is at the top of the watershed, and water does not concentrate significantly until further downstream in the watershed. This is why there is no visible floodplain in this area.
Morrison Rd
West area without floodplain - Bessie's Creek was not modeled as part of this analysis. This stream was excluded from the Phase I analysis to focus on the streams on the east of the drainage district where more development is occurring. This is why there is no visible floodplain in this area.
FM 362
FM 362
Harris County
Waller County
CaneIslandBranch
Sunterra area without floodplain - This area was modeled in detail as part of the Sunterra Drainage Study. This study incorporates the results of that analysis, so detailed floodplain mapping was not necessary within the Sunterra Development area. This is why there is minimal visible floodplain in this area.
Snake Creek
Grand Pkwy
I-10
US-90
I-10
I-10
Harris County
Fort Bend County
Willow Fork
Brookshire Creek West area without floodplain - Brookshire Creek has greater capacity than the other creeks due to greater channel depth and width. This is why the floodplain is contained within the channel banks rather than significantly overtopping like the other channels.
Waller County
Austin County
Brookshire Creek
Waller County
Fort Bend County
Brookshire Creek East area without floodplain - Same explanation as for Brookshire Creek West
Grand Pkwy



VICINITY MAP
1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries

10yr Max Depth Value (ft)
High : 19.78
Low : 0.0

- Roads

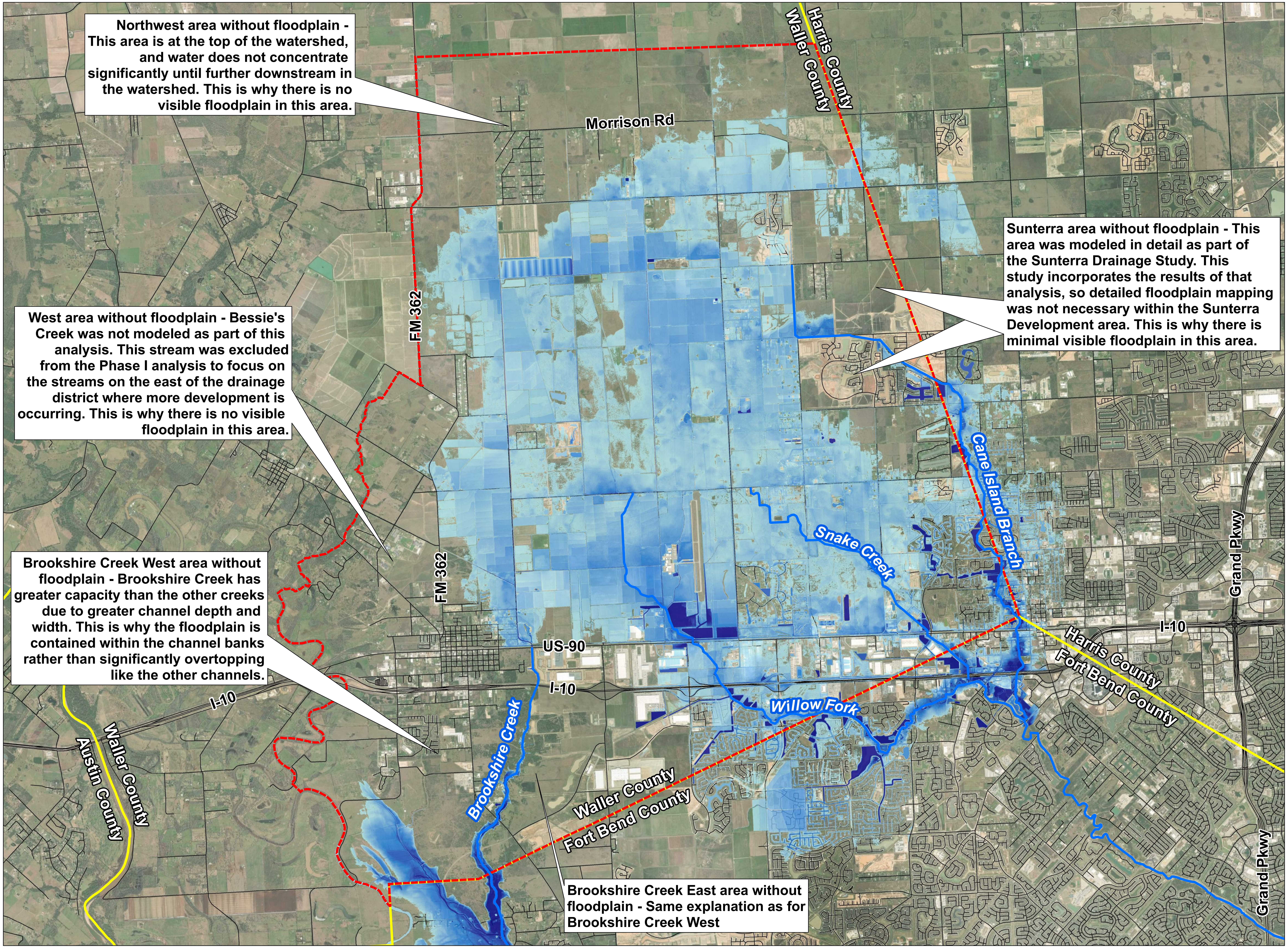
EXHIBIT 17 - 10-YEAR FLOODPLAIN RESULTS MAP

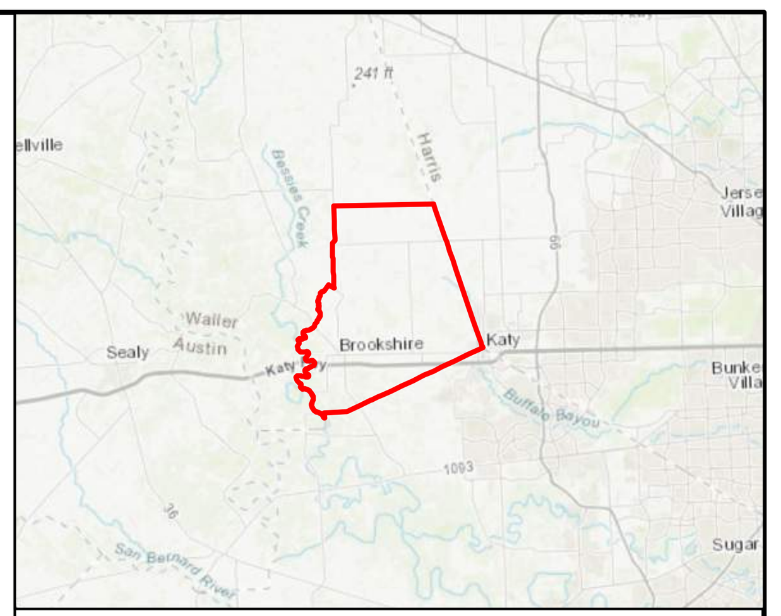
MASTER DRAINAGE PLAN FOR BKDD
WALLER COUNTY, TEXAS

N / W / E / S

0 3,000
1 INCH : 3,000 FEET
IMAGERY PROVIDED BY ESRI

QUIDDITY


Northwest area without floodplain - This area is at the top of the watershed, and water does not concentrate significantly until further downstream in the watershed. This is why there is no visible floodplain in this area.
Sunterra area without floodplain - This area was modeled in detail as part of the Sunterra Drainage Study. This study incorporates the results of that analysis, so detailed floodplain mapping was not necessary within the Sunterra Development area. This is why there is minimal visible floodplain in this area.
West area without floodplain - Bessie's Creek was not modeled as part of this analysis. This stream was excluded from the Phase I analysis to focus on the streams on the east of the drainage district where more development is occurring. This is why there is no visible floodplain in this area.
Brookshire Creek West area without floodplain - Brookshire Creek has greater capacity than the other creeks due to greater channel depth and width. This is why the floodplain is contained within the channel banks rather than significantly overtopping like the other channels.
Brookshire Creek East area without floodplain - Same explanation as for Brookshire Creek West
Harris County
Waller County
Morrison Rd
FM 362
FM 362
Cane Island Branch
Snake Creek
Grand Pkwy
Grand Pkwy
I-10
I-10
I-10
US-90
Harris County
Fort Bend County
Willow Fork
Brookshire Creek
Waller County
Fort Bend County
Waller County
Austin County



VICINITY MAP

1 INCH = 10 MILES

LEGEND

- Streams
- BKDD Boundary
- County Boundaries

100yr Max Depth Value (ft)

High : 22.33

Low : 0.0

- Roads

EXHIBIT 18 - 100-YEAR FLOODPLAIN RESULTS MAP

MASTER DRAINAGE PLAN FOR BKDD

WALLER COUNTY, TEXAS

N W E S

0 3,000

1 INCH : 3,000 FEET

IMAGERY PROVIDED BY ESRI

QUIDDITY

Appendix 1
FEMA FIRM Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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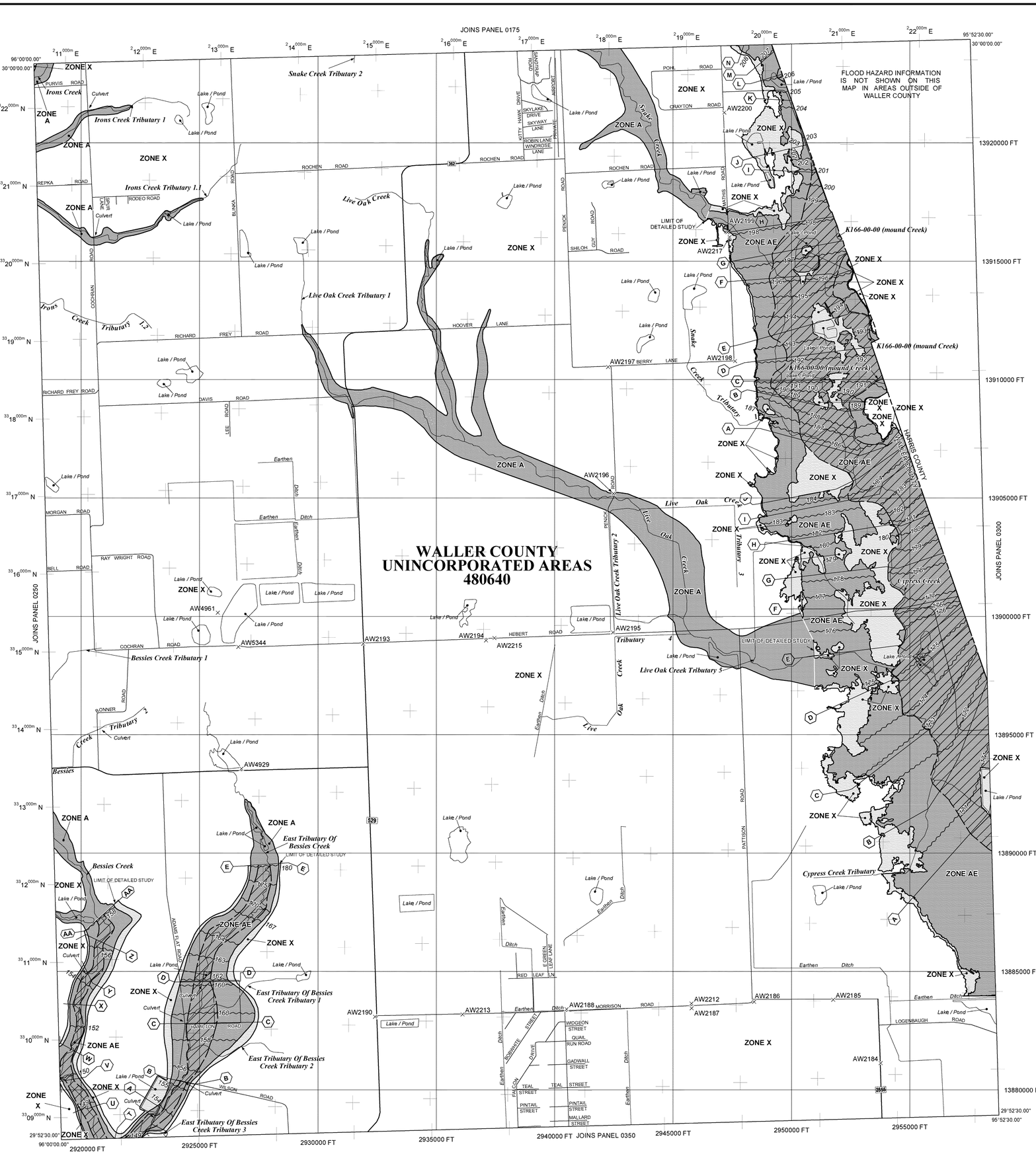

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
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ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referred to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mN — 1000-meter Universal Transverse Mercator grid , zone 15
- 6000000 FT — 5000-foot grid : Texas State Plane coordinate system, south central zone (FIPSZONE 4204), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
February 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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1000 0 2000 4000 FEET
600 0 600 1200 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0275E

FIRM
FLOOD INSURANCE RATE MAP
WALLER COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 275 OF 425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WALLER COUNTY	480640	0275	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48473C0275E
EFFECTIVE DATE
FEBRUARY 18, 2009

Federal Emergency Management Agency

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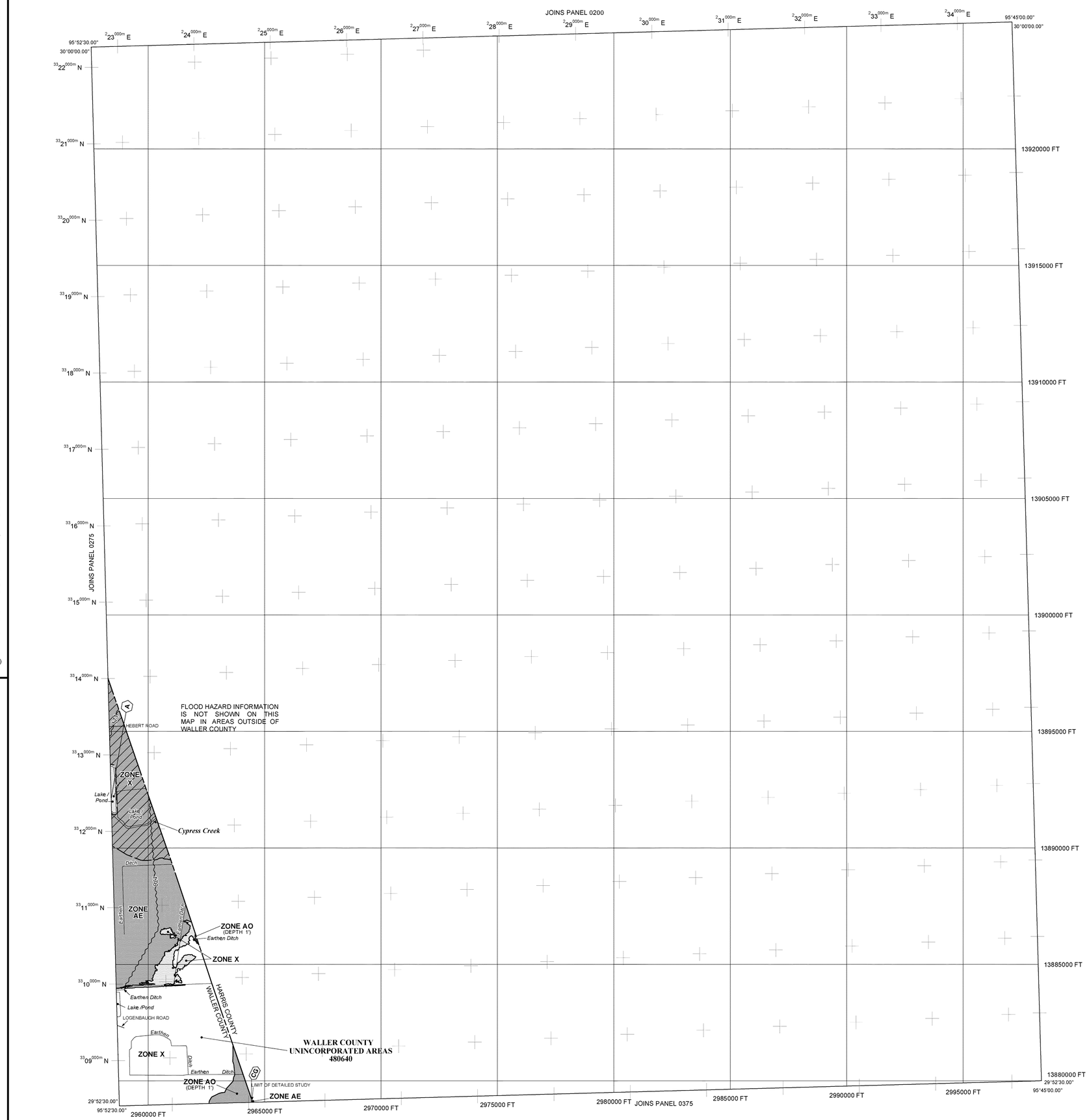

LEGEND

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FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

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	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
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FLOOD INSURANCE RATE MAP
February 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0300E

FIRM
FLOOD INSURANCE RATE MAP
WALLER COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 300 OF 425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WALLER COUNTY	480640	0300	E

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MAP NUMBER
48473C0300E
EFFECTIVE DATE
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Federal Emergency Management Agency

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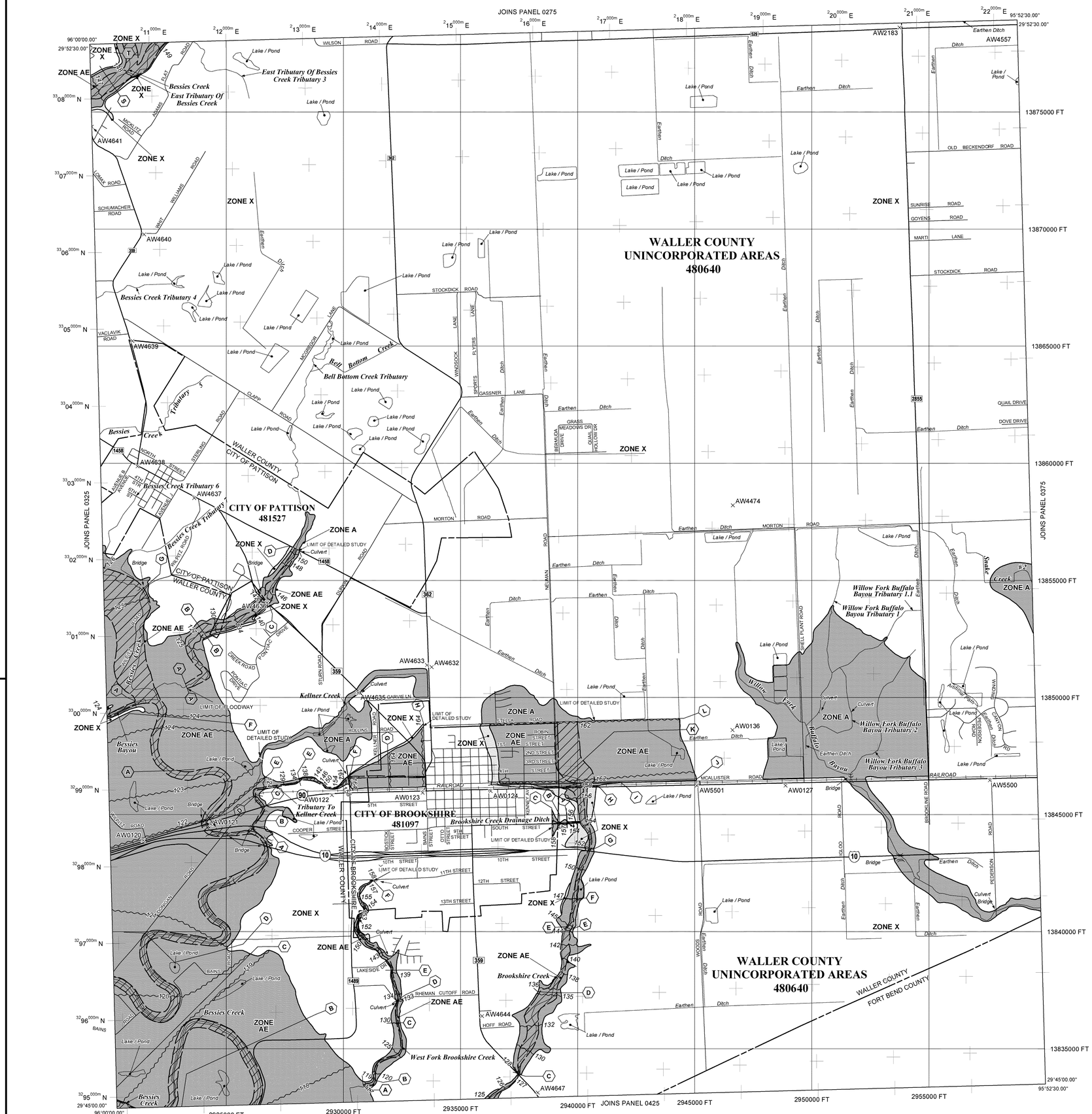

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February 18, 2009
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Silver Spring, MD 20910- 3282

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Base map information shown on this FIRM was provided in digital format by Waller County and Houston-Galveston Area Council (H-GAC). This dataset was digitized at a scale of at least 1:24,000 from H-GAC aerial photography dated 2002 and 2004.

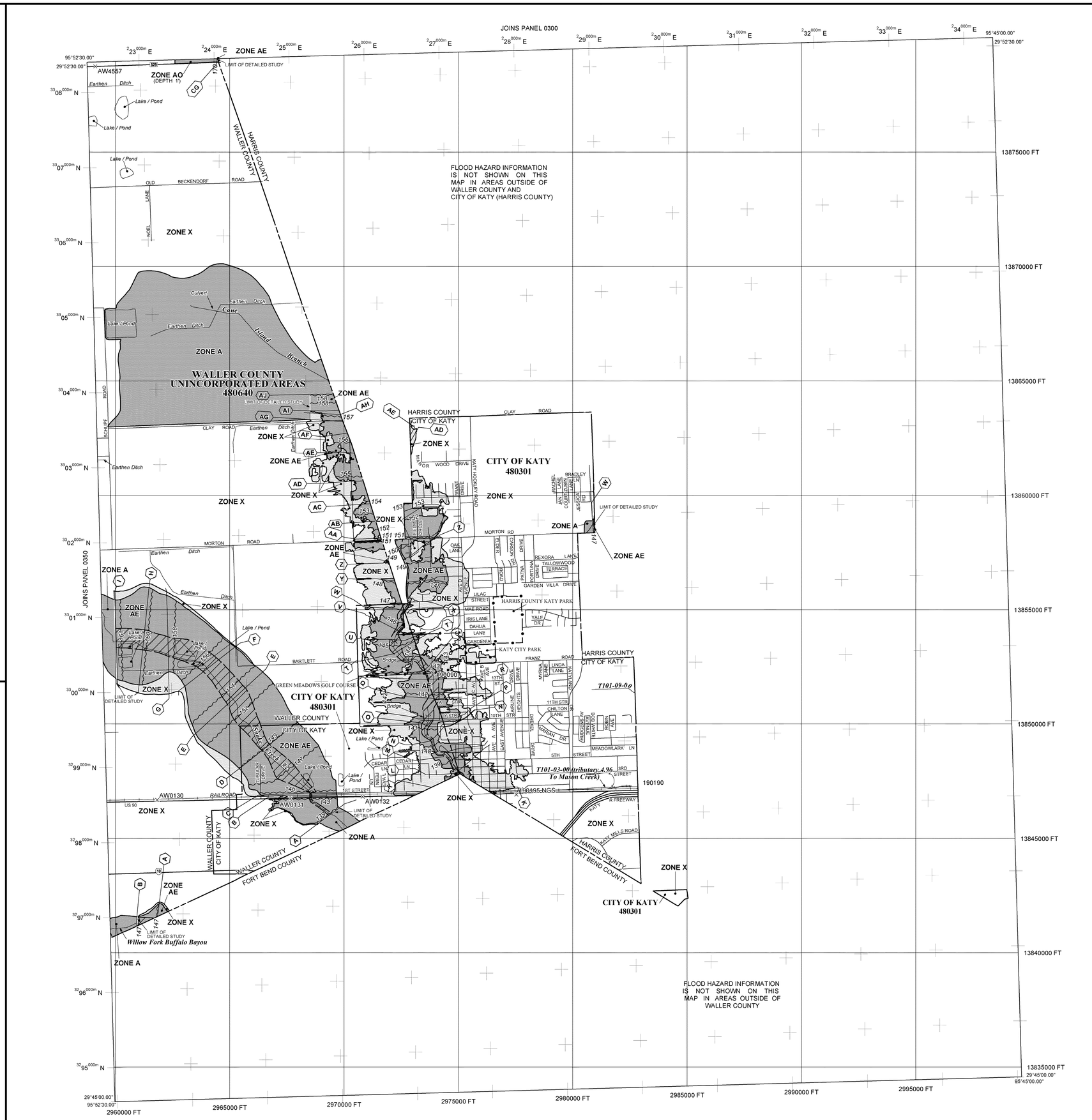
This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de- annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1- 877- 336- 2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid , zone 15
6000000 FT	5000-foot grid : Texas State Plane coordinate system, south central zone (FIPSZONE 4204), Lambert Conformal Conic
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
February 18, 2009
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1- 800- 638- 6620.

MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
600 0 600 1200 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0375E

FIRM
FLOOD INSURANCE RATE MAP
WALLER COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 375 OF 425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

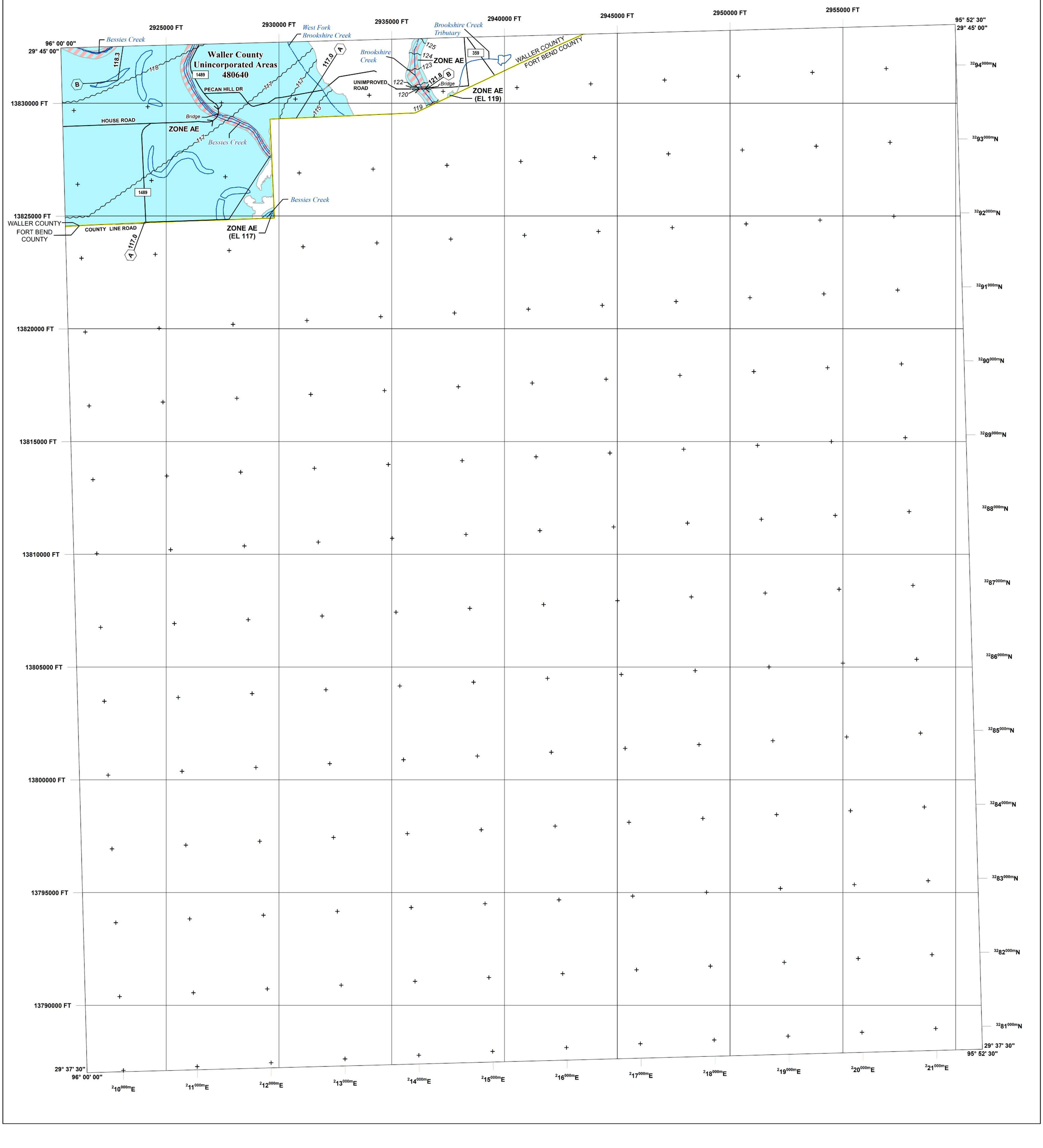
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WALLER COUNTY	480640	0375	E
KATY, CITY OF	480301	0375	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48473C0375E
EFFECTIVE DATE
FEBRUARY 18, 2009

Federal Emergency Management Agency



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by Waller County and Houston- Galveston Area Council (H-GAC). This dataset was digitized at a scale of at least 1:24,000 from aerial photography dated 2002 and 2004. The Texas Natural Resources Information System (TNRIS) provided the Texas Department of Transportation (TXDOT) GIS data for community boundaries and transportation layers dated 2015.

SCALE

N

Map Projection:
State Plane Lambert Conformal Conic, Texas South Central Zone FIPS 4204;
North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 2,000 feet 1:24,000

0 2,000 4,000 8,000 Feet

0 500 1,000 2,000 Meters

PANEL LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

WALLER COUNTY, TEXAS
and Incorporated Areas

PANEL 425 OF 425

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WALLER COUNTY	480640	0425	F

VERSION NUMBER
2.3.3.3

MAP NUMBER
48473C0425F

MAP REVISED
MAY 16, 2019

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane south central zone (FIPSZONE 4204). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

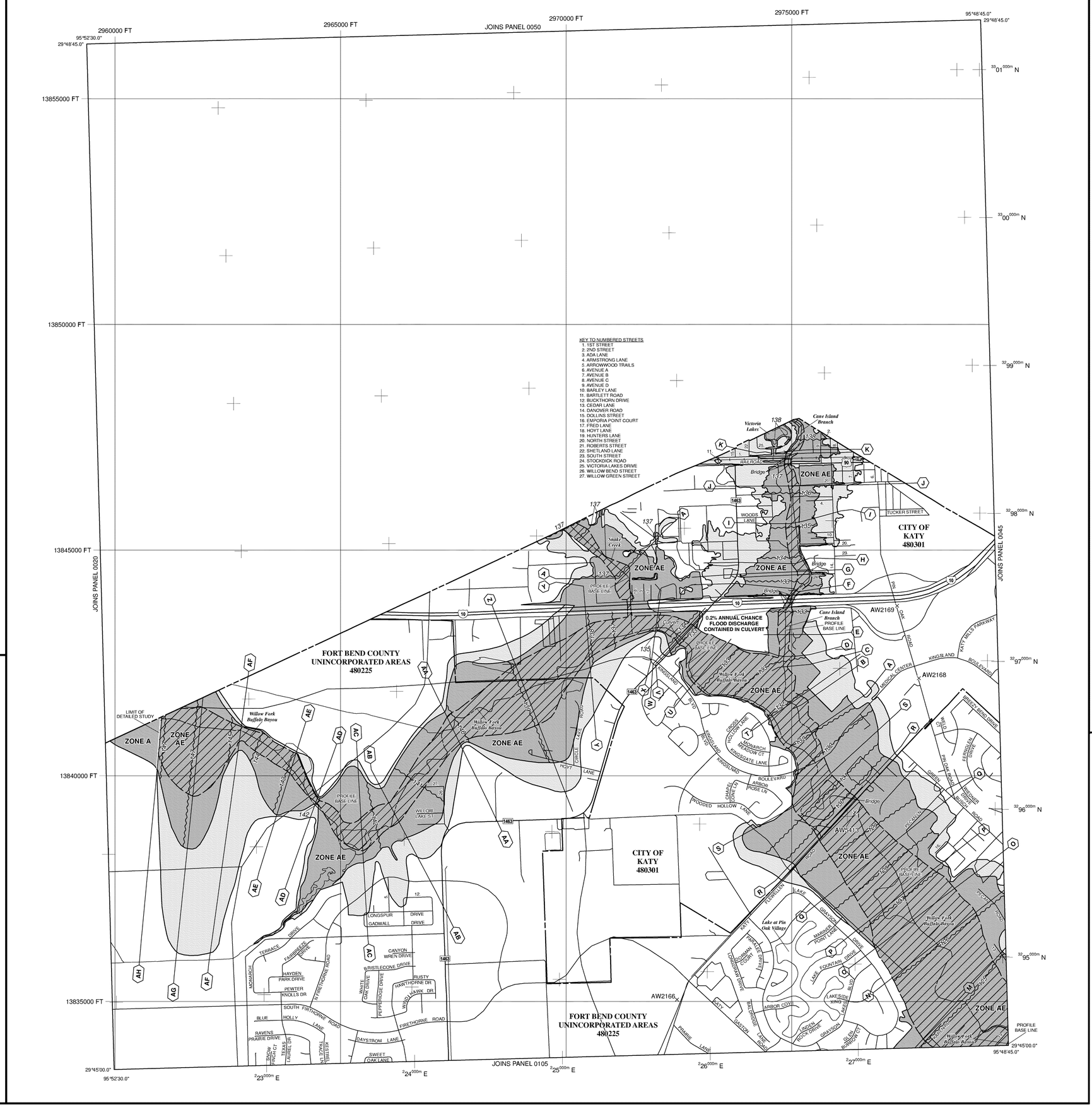
To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713–3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information was obtained from the Texas Natural Resources Information System, Fort Bend County Department of Engineering, the National Geodetic Survey, U.S. Geological Survey, Houston-Galveston Area Council, FEMA, and from local communities and districts.
This map may reflect more detailed or up to date stream channel configurations than those shown on the previous FIRM. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations and improved topographic data. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de–annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the **FEMA Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A–A Cross section line

23–23 Transect line

97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

42 75 000mN 1000-meter Universal Transverse Mercator grid ticks, zone 15

6000000 FT 5000-foot grid values: Texas State Plane coordinate system, south central zone (FIPSZONE 4204), Lambert Conformal Conic

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 30, 1992
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
January 3, 1997
April 2, 2014 –to update corporate limits, to change Base Flood Elevations, to change Special Flood Hazard Areas, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1–800–638–6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0040L

FIRM
FLOOD INSURANCE RATE MAP
FORT BEND COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 40 OF 575
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

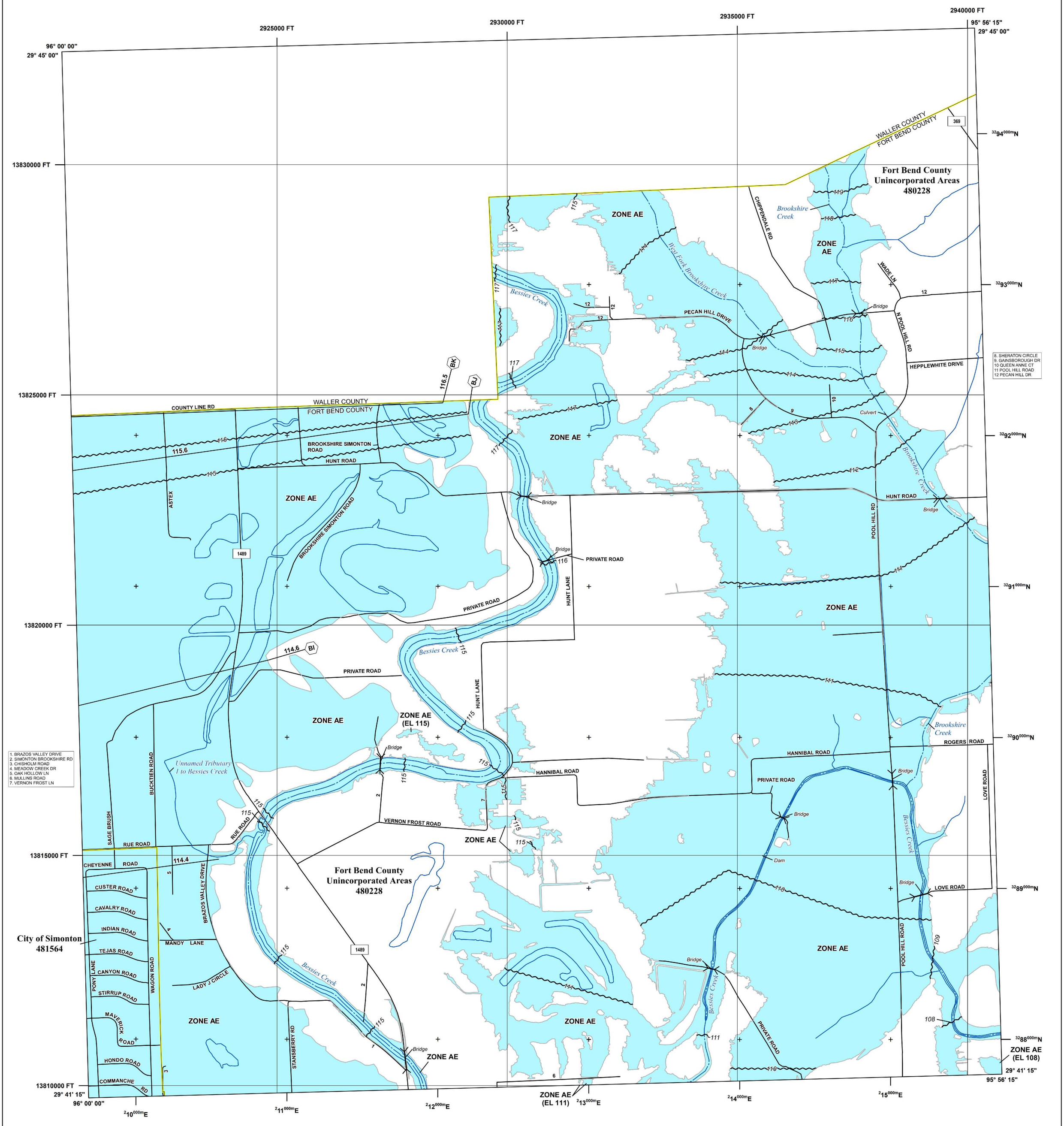
COMMUNITY	NUMBER	PANEL	SUFFIX
FORT BEND COUNTY	480228	0040	L
KATY, CITY OF	480301	0040	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48157C0040L

MAP REVISED
APRIL 2, 2014

Federal Emergency Management Agency



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base Map information shown on this FIRM was derived from multiple sources. The FEMA National Flood Hazard Layer (NFHL) data provided base transportation and city limit information, 2015. The Texas Natural Resources Information System (TNRIS) provided the Texas Department of Transportation (TxDOT) community boundaries and transportation layers dated 2015. Base map data was also provided by the Houston-Galveston Area Council (H-GAC) and from local communities and districts.

SCALE

N

Map Projection:
State Plane Lambert Conformal Conic, Texas South Central Zone FIPS 4204;
North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR

*PANEL NOT PRINTED

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

FORT BEND COUNTY, TEXAS
and Incorporated Areas

PANEL **80** OF **575**

FEMA

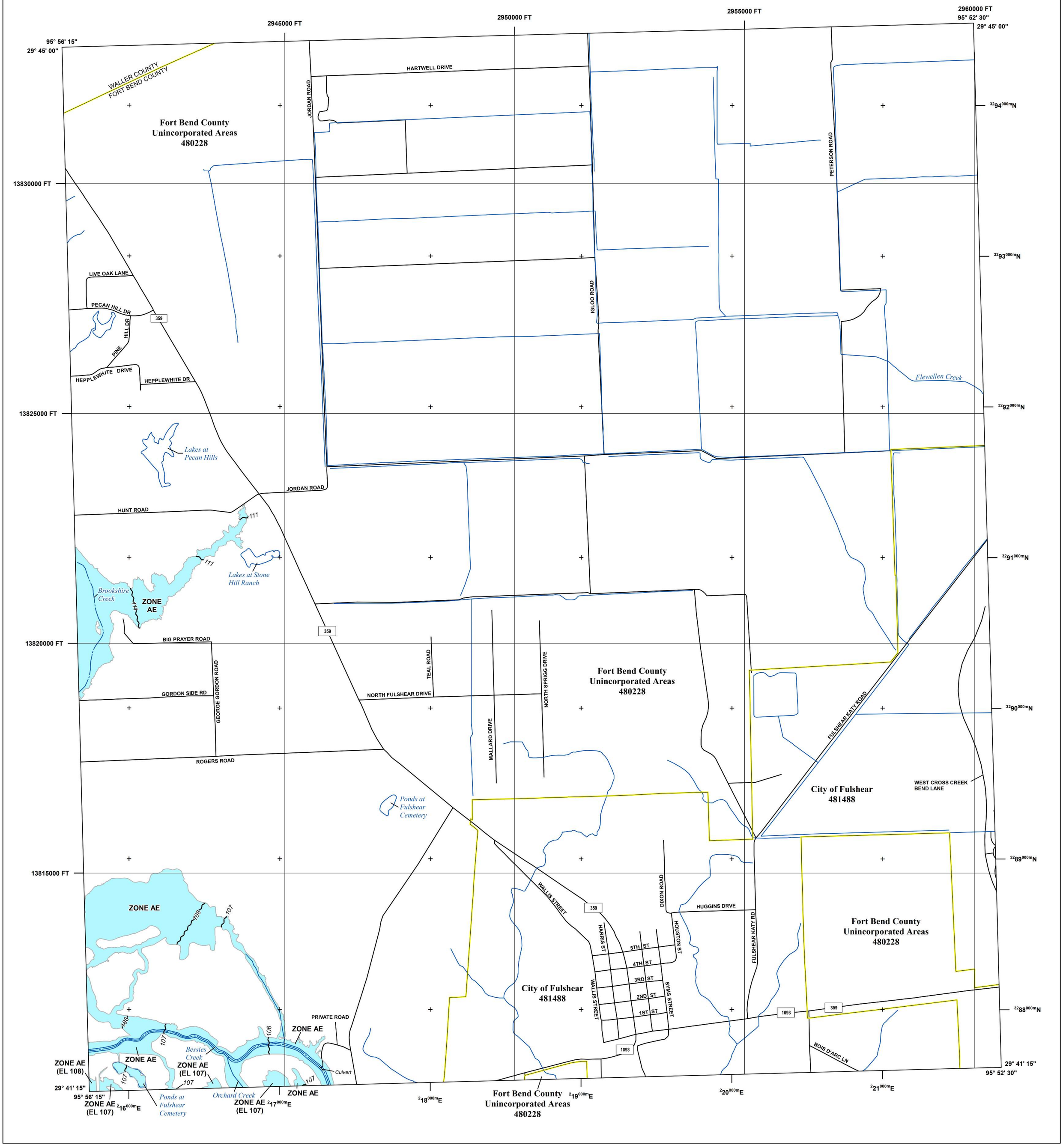
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT BEND COUNTY	480228	0080	M
SIMONTON, CITY OF	481564	0080	M

VERSION NUMBER
2.3.3.3

MAP NUMBER
48157C0080M

MAP REVISED
JANUARY 29, 2021



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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Base Map information shown on this FIRM was derived from multiple sources. The FEMA National Flood Hazard Layer (NFHL) data provided base transportation and city limit information, 2015. The Texas Natural Resources Information System (TNRIS) provided the Texas Department of Transportation (TxDOT) community boundaries and transportation layers dated 2015. Base map data was also provided by the Houston-Galveston Area Council (H-GAC) and from local communities and districts.

SCALE

N

Map Projection:
State Plane Lambert Conformal Conic, Texas South Central Zone FIPS 4204;
North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR

*PANEL NOT PRINTED

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

FORT BEND COUNTY, TEXAS
and Incorporated Areas

PANEL 85 OF 575

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT BEND COUNTY	480228	0085	M
FULSHEAR, CITY OF	481488	0085	M

VERSION NUMBER
2.3.3.3

MAP NUMBER
48157C0085M

MAP REVISED
JANUARY 29, 2021

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit their website at http://www.ngs.noaa.gov/.

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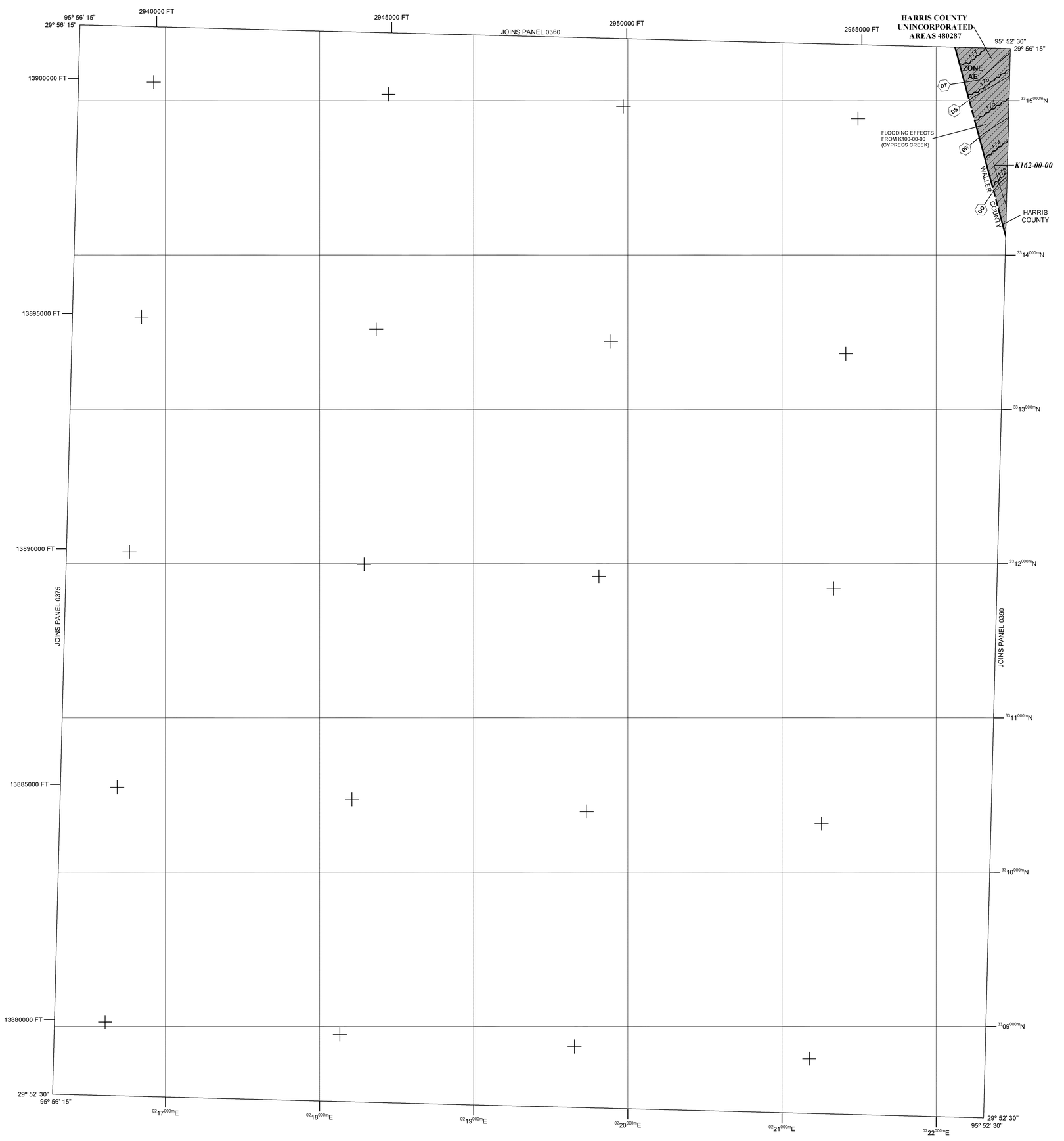
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Vertical Datum Adjustment due to subsidence is the 2001 adjustment.

Benchmarks shown on this map were provided by either Harris County or the National Geodetic Survey. To obtain elevation, description, and location information for benchmarks provided by Harris County, please contact the Permits Office of the Public Infrastructure Department at (713) 956-3000 or visit their website at http://www.eng.hctx.net/permits. For information regarding the benchmarks provided by the National Geodetic Survey, please see note above.

Some bridges and other structures shown on the detailed studied streams are not labeled. See corresponding flood profile for appropriate name.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA Boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 (EL 987)	Base Flood Elevation line and value; elevation in feet* / Base Flood Elevation value where uniform within zone; elevation in feet*
	*Referenced to the North American Vertical Datum of 1988
A — A	Cross section line
23 — 23	Transect line
	Culvert, Flume, Penstock or Aqueduct
	Road or Railroad Bridge
	Footbridge
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{4276'000"}$E	1000-meter Universal Transverse Mercator grid values, zone 15
600000 FT	5000-foot grid ticks: Texas State Plane coordinate system, zone South Central (FIPSZONE 4204), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD
INSURANCE RATE MAP PANEL
SEPTEMBER 28, 1990

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

SEPTEMBER 30, 1992
NOVEMBER 6, 1996
APRIL 20, 2000
JUNE 18, 2007
OCTOBER 16, 2013

For accompanying Reasons for Revision, refer to the Notice to Flood Insurance Study Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0370M

FIRM

FLOOD INSURANCE RATE MAP

HARRIS COUNTY, TEXAS AND INCORPORATED AREAS

PANEL 370 OF 1150

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HARRIS COUNTY, UNINCORPORATED AREAS	480287	0370	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48201C0370M

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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ZONE A	No Base Flood Elevations determined.
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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

	Floodplain boundary
	Floodway boundary
	Zone D boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section Line
23 - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
2476000mN	1000-meter Universal Transverse Mercator grid values, zone 15N
600000 FT	5000-foot grid values: Texas State Plane coordinate system, South Central zone (FIPSZONE 4204), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 1990

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 30, 1992
NOVEMBER 6, 1996
APRIL 20, 2000
JUNE 18, 2007
OCTOBER 16, 2013
NOVEMBER 15, 2019
FOR REASON OF REVISION
SEE NOTICE TO FLOOD INSURANCE USERS IN THE FIS REPORT

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0390N

FIRM
FLOOD INSURANCE RATE MAP

HARRIS COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 390 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HARRIS COUNTY	480287	0390	N

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48201C0390N

MAP REVISED
NOVEMBER 15, 2019

Federal Emergency Management Agency

NOTES TO USERS

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1315 East-West Highway
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LEGEND

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ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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	Floodplain boundary
	Floodway boundary
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(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*
	* Referenced to the North American Vertical Datum of 1988
A — A	Cross section Line
23 - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 15N
600000 FT	5000-foot grid values: Texas State Plane coordinate system, South Central zone (FIPSZONE 4204), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
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EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 1990

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 30, 1992
NOVEMBER 6, 1996
APRIL 20, 2000
JUNE 18, 2007
NOVEMBER 15, 2019

FOR REASON OF REVISION
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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0580M

FIRM
FLOOD INSURANCE RATE MAP

HARRIS COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 580 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HARRIS COUNTY	480287	0580	M

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
48201C0580M

MAP REVISED
NOVEMBER 15, 2019

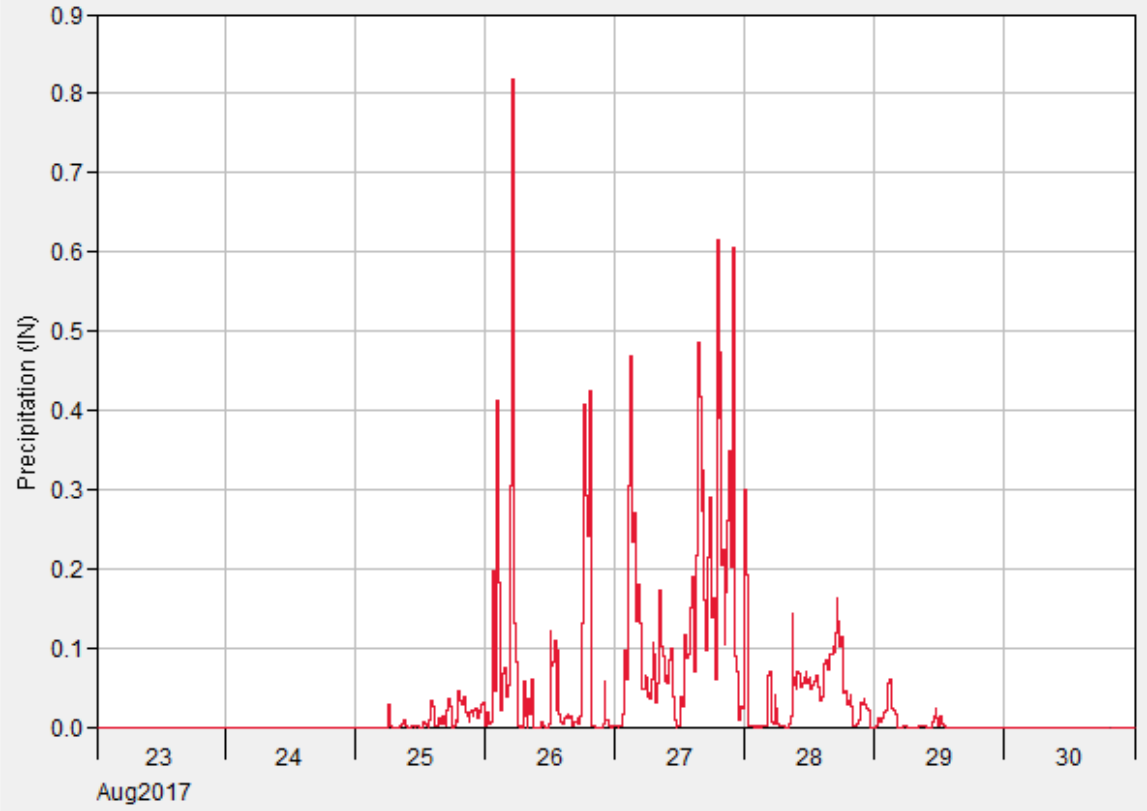
Federal Emergency Management Agency

Appendix 2
Hurricane Harvey Rainfall Gauge Data

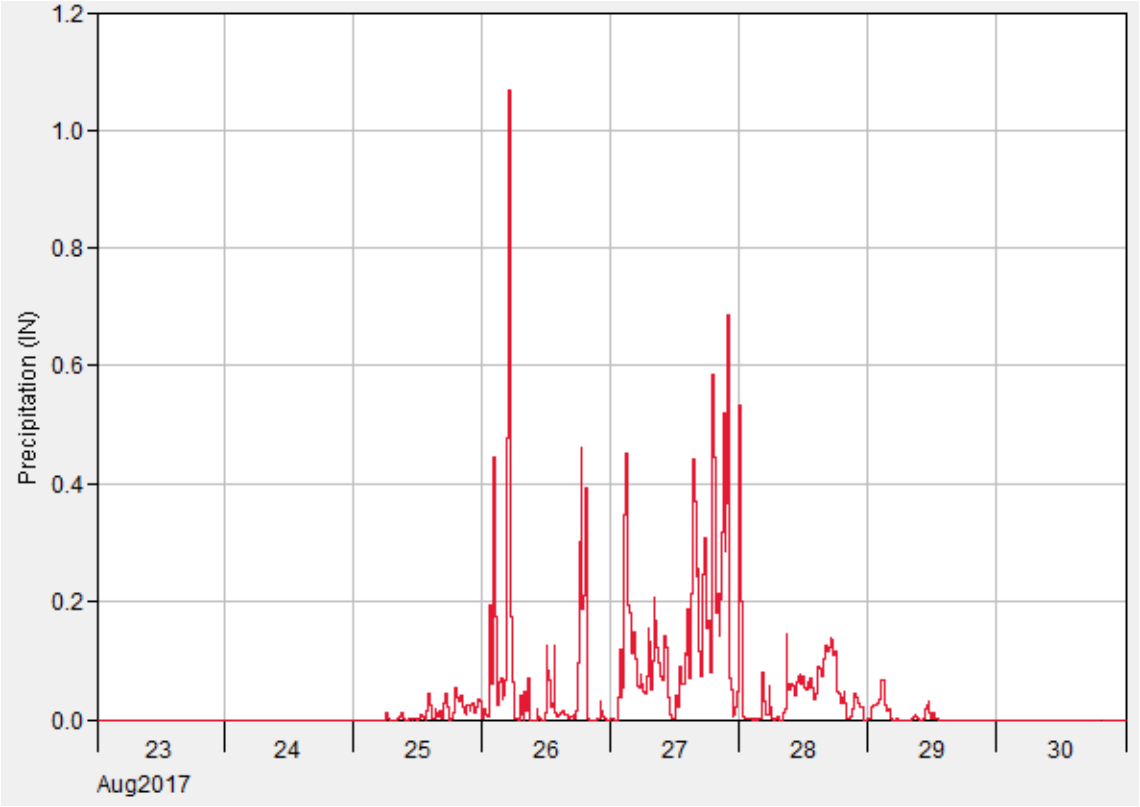
Table 1: Subbasin and Precipitation Gauge Association

Subbasin	Gauge
Brook_Trib1_01	WF_07_201708_Harvey
Brook_03	WF_08_201708_Harvey
Brook_04	WF_08_201708_Harvey
Brook_05	WF_08_201708_Harvey
Brook_06_R	WF_07_201708_Harvey
Brook_07_R	WF_06_201708_Harvey
Brook_08	WF_01_201708_Harvey
CIB_01	CIB_01_201708_Harvey
CIB_02	CIB_02_201708_Harvey
CIB_03	CIB_03_201708_Harvey
CIB_04	CIB_04_201708_Harvey
CIB_05	CIB_05_201708_Harvey
CIB_06	CIB_06_201708_Harvey
CIB_07	CIB_07_201708_Harvey
CIB_08	CIB_08_201708_Harvey
CIB_09	CIB_09_201708_Harvey
SC_01	SC_01_201708_Harvey
SC_02	SC_02_201708_Harvey
SC_03	SC_03_201708_Harvey
SC_04	SC_04_201708_Harvey
SC_05	SC_05_201708_Harvey
SC_06	SC_06_201708_Harvey
SC_07	SC_07_201708_Harvey
SC_08	SC_08_201708_Harvey
SC_09	SC_09_201708_Harvey
SC_10	SC_10_201708_Harvey
SC_11	SC_11_201708_Harvey
WF_01	WF_01_201708_Harvey
WF_02	WF_02_201708_Harvey
WF_03	WF_03_201708_Harvey
WF_04	WF_04_201708_Harvey
WF_05	WF_05_201708_Harvey
WF_06	WF_06_201708_Harvey
WF_07	WF_07_201708_Harvey
WF_08	WF_08_201708_Harvey
WF_09	WF_09_201708_Harvey
WF_10	WF_10_201708_Harvey
WF_11	WF_11_201708_Harvey

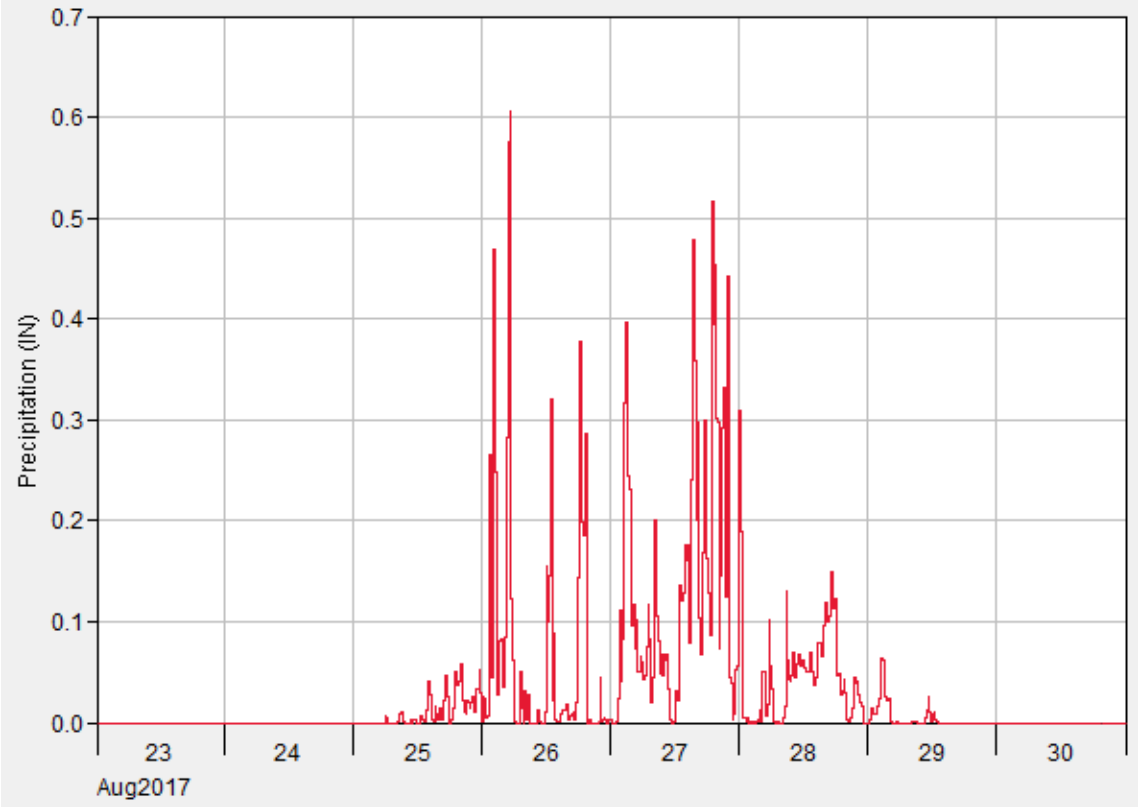
WF_01_201708_Harvey Precipitation Gauge:



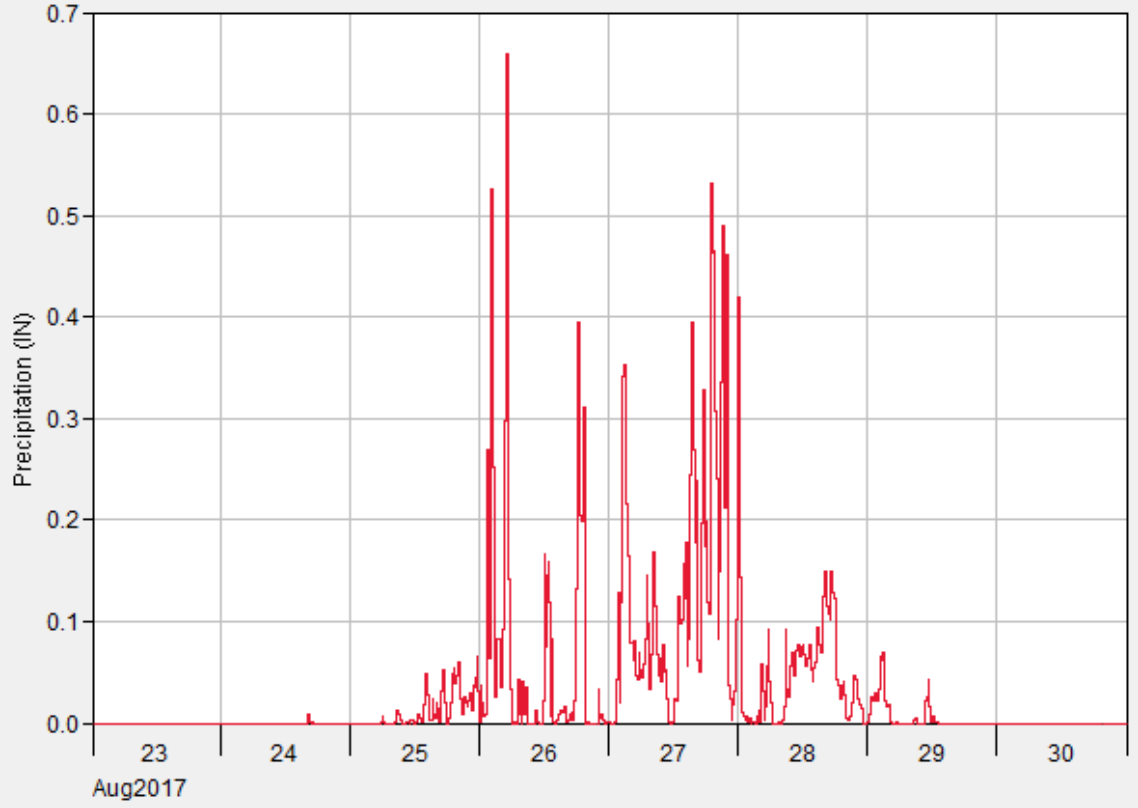
WF_02_201708_Harvey Precipitation Gauge:



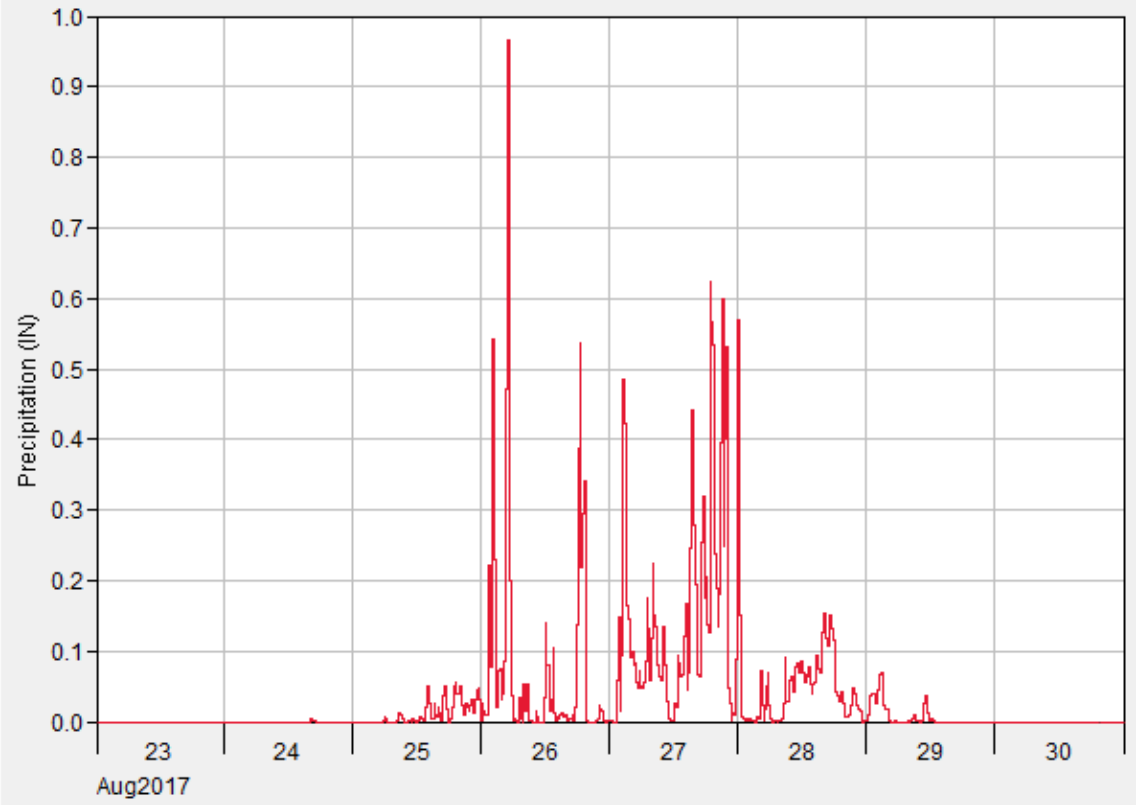
WF_03_201708_Harvey Precipitation Gauge:



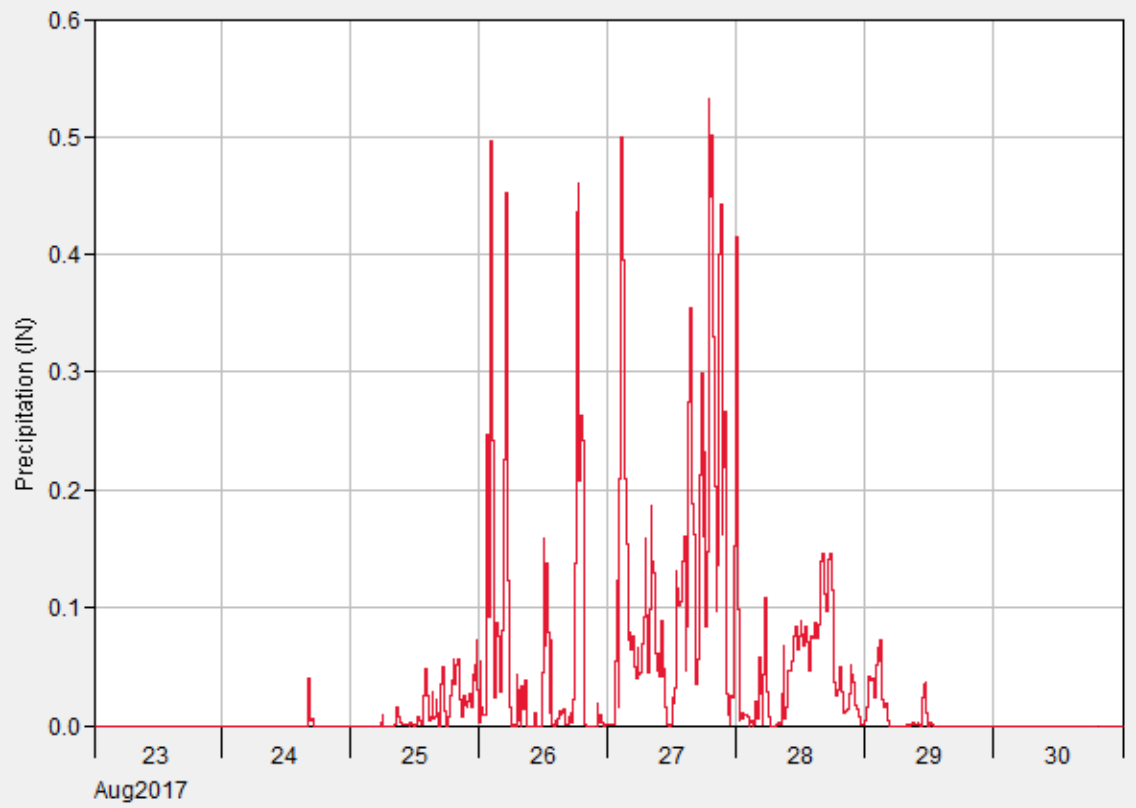
WF_04_201708_Harvey Precipitation Gauge:



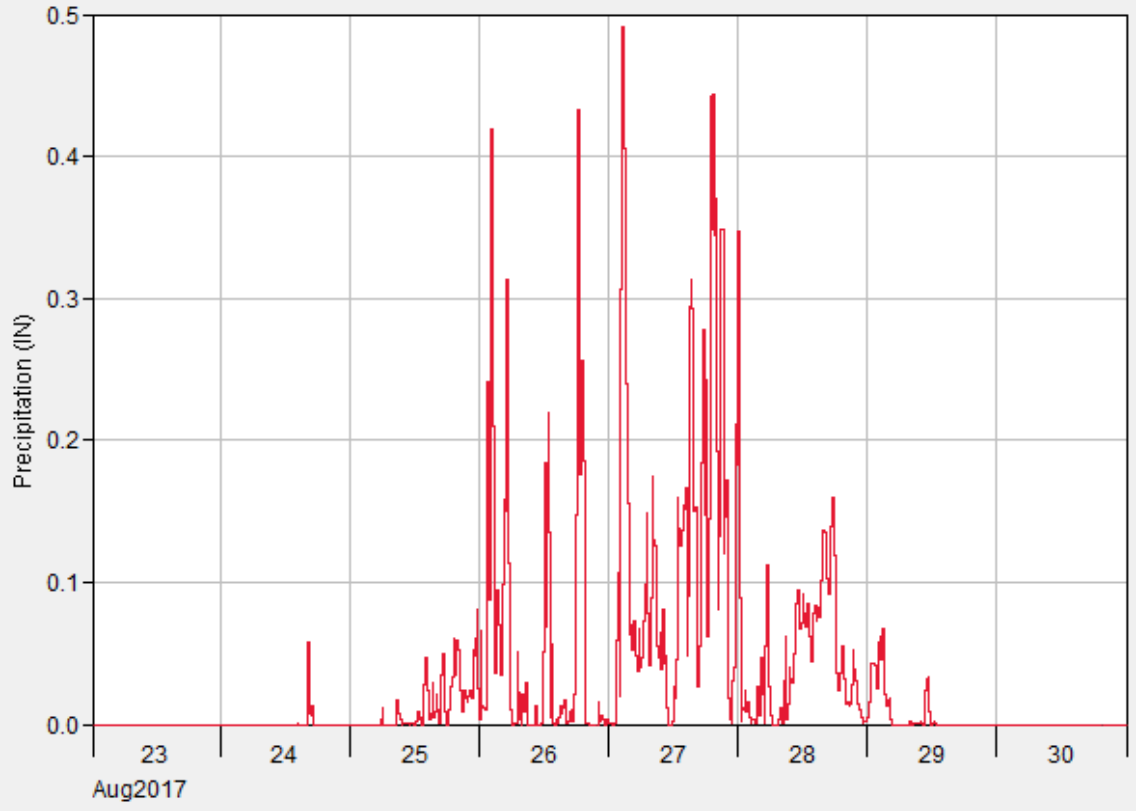
WF_05_201708_Harvey Precipitation Gauge:



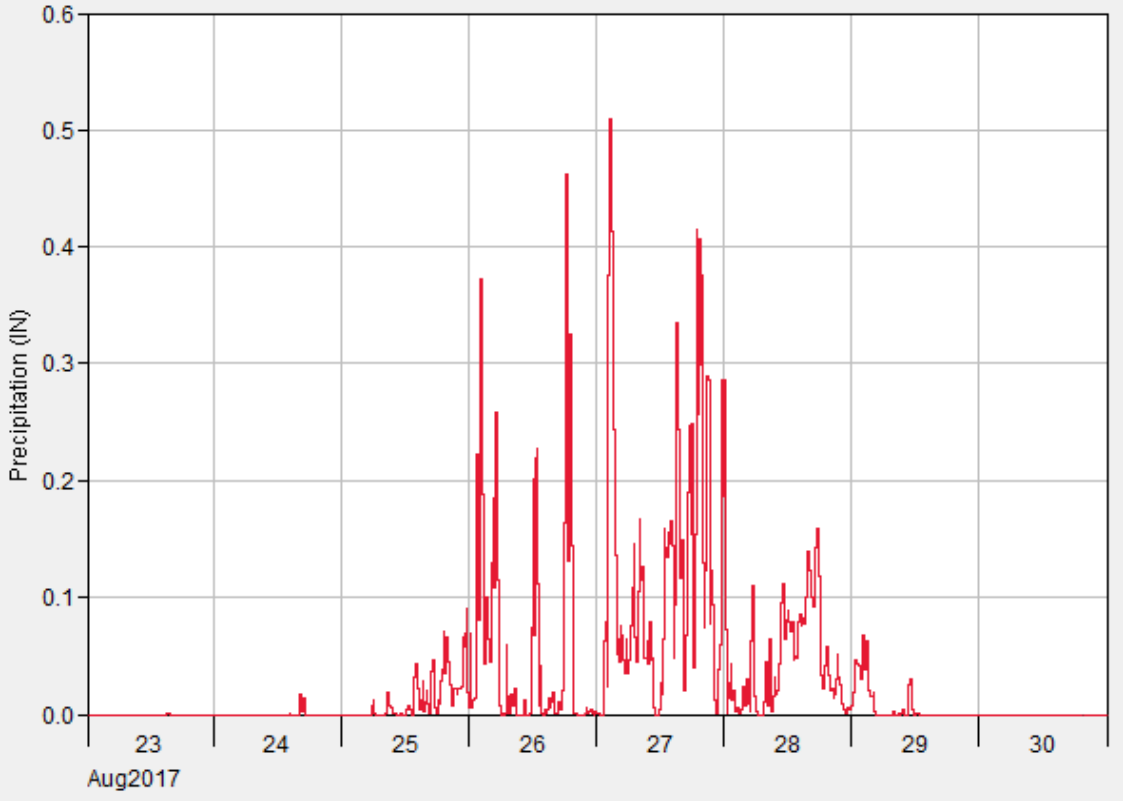
WF_06_201708_Harvey Precipitation Gauge:



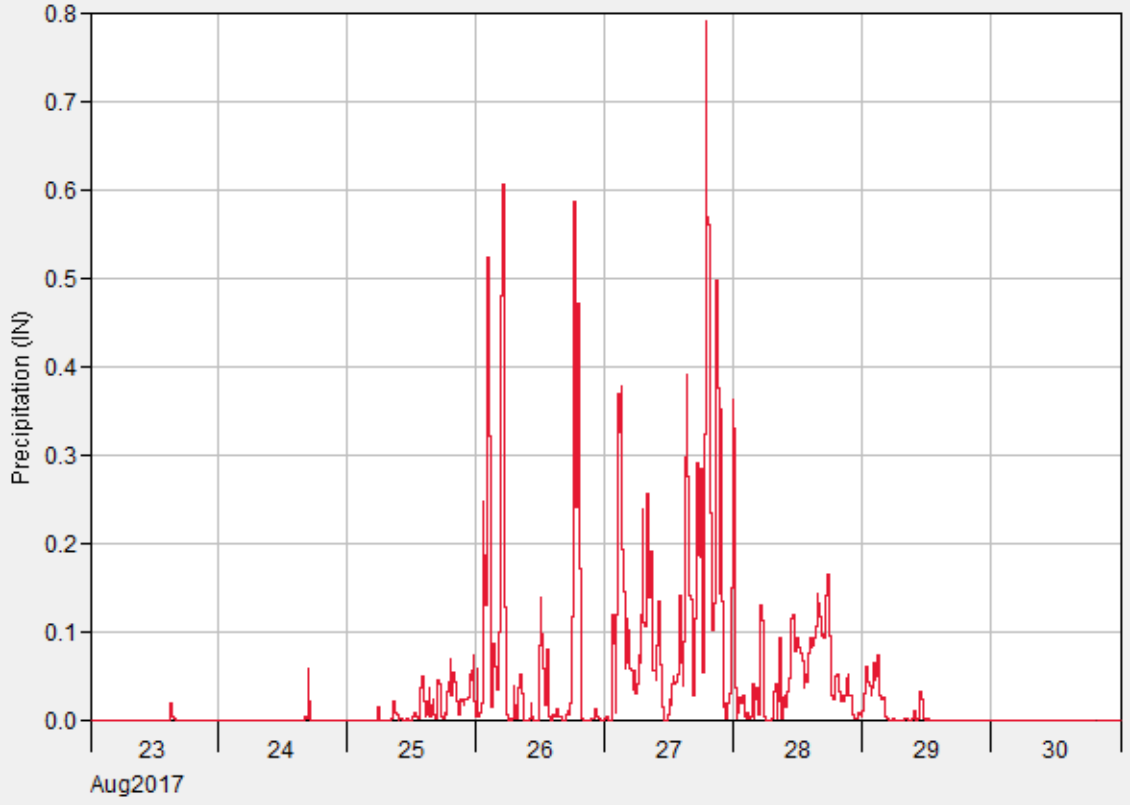
WF_07_201708_Harvey Precipitation Gauge:



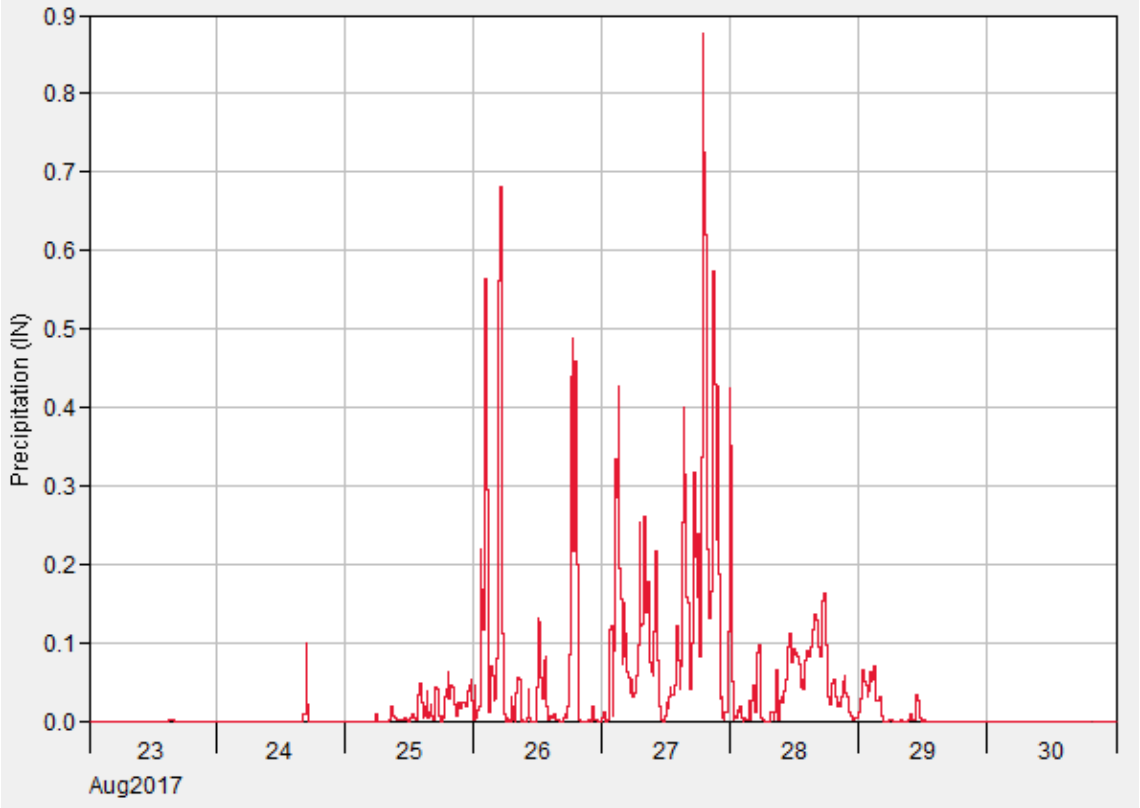
WF_08_201708_Harvey Precipitation Gauge:



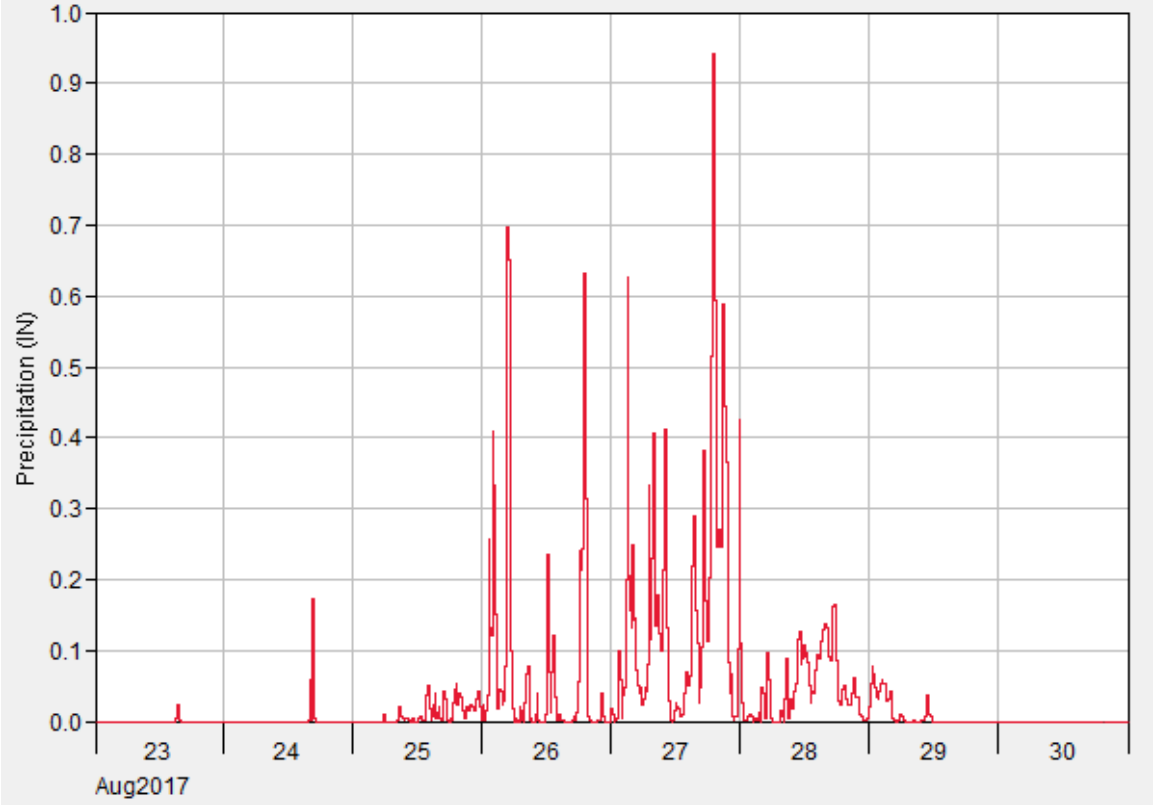
WF_09_201708_Harvey Precipitation Gauge:



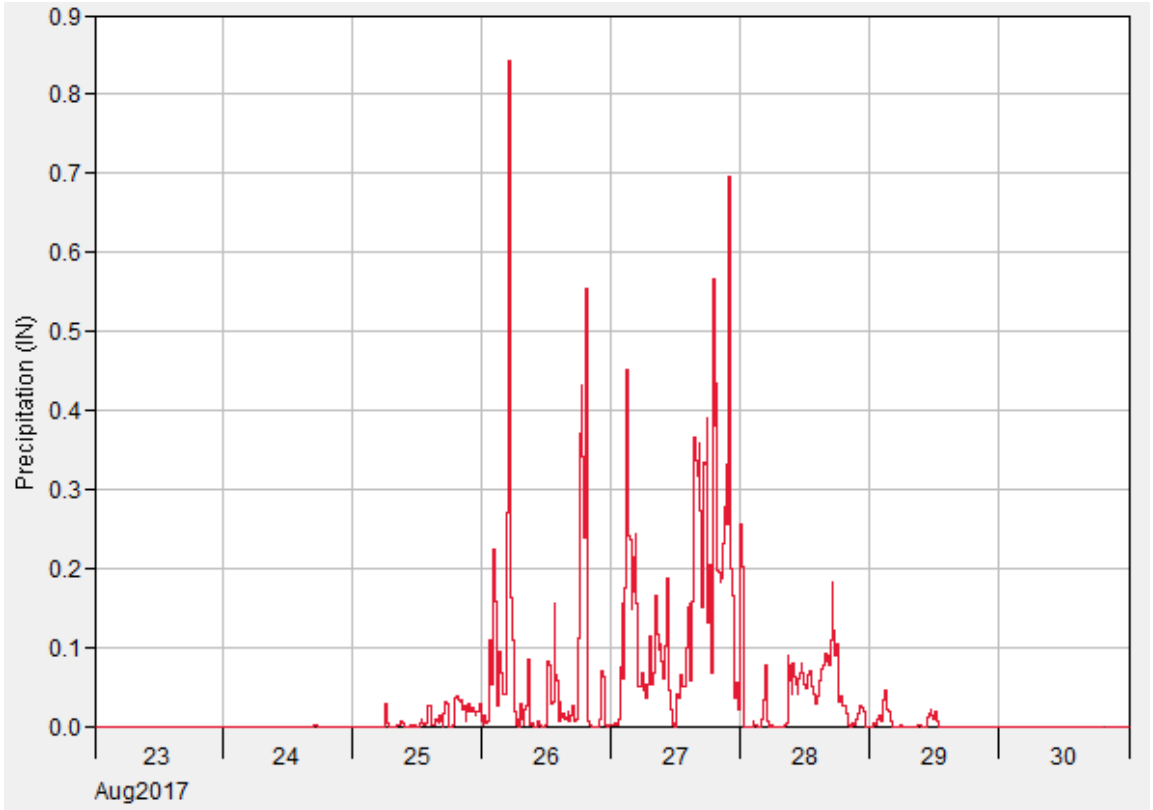
WF_10_201708_Harvey Precipitation Gauge:



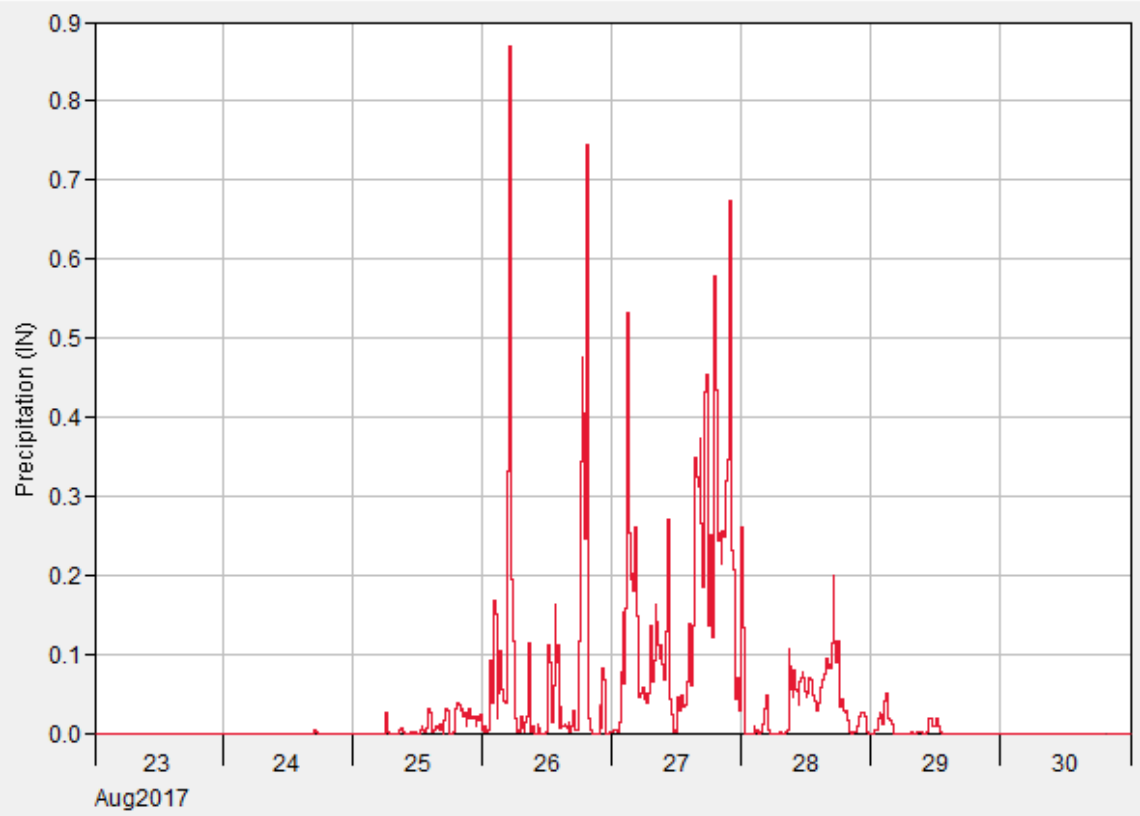
WF_11_201708_Harvey Precipitation Gauge:



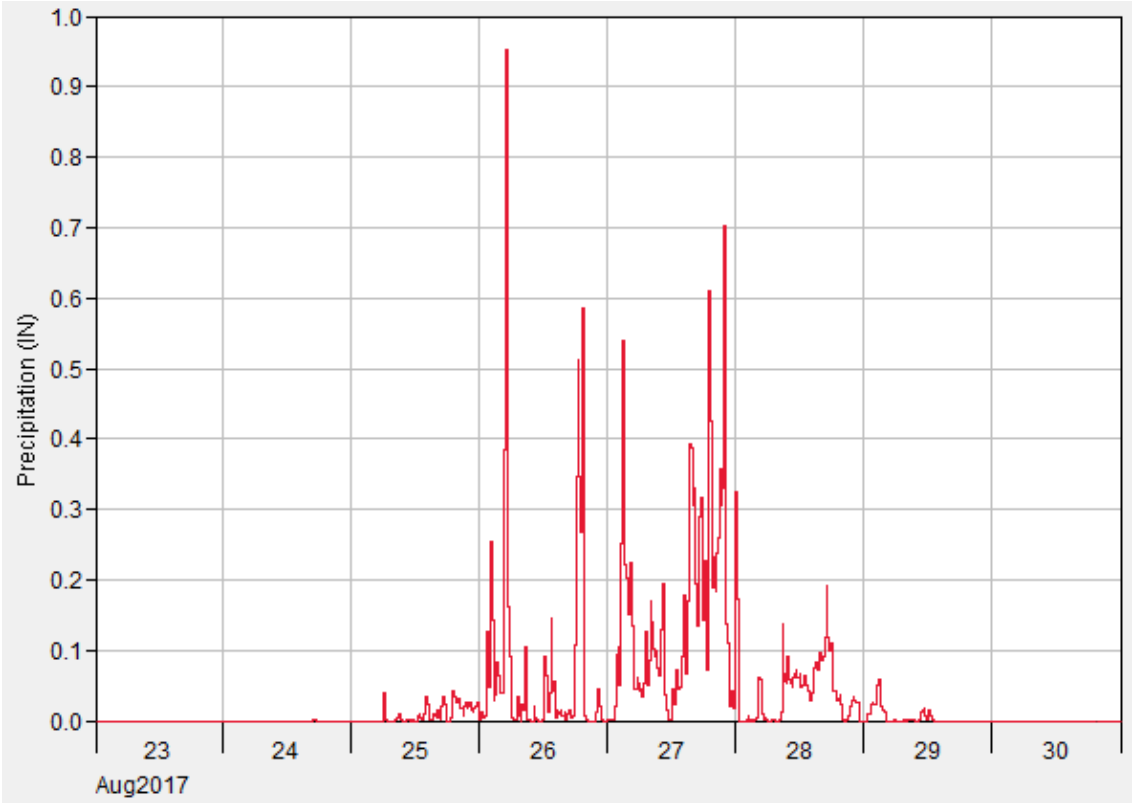
SC_01_201708_Harvey Precipitation Gauge:



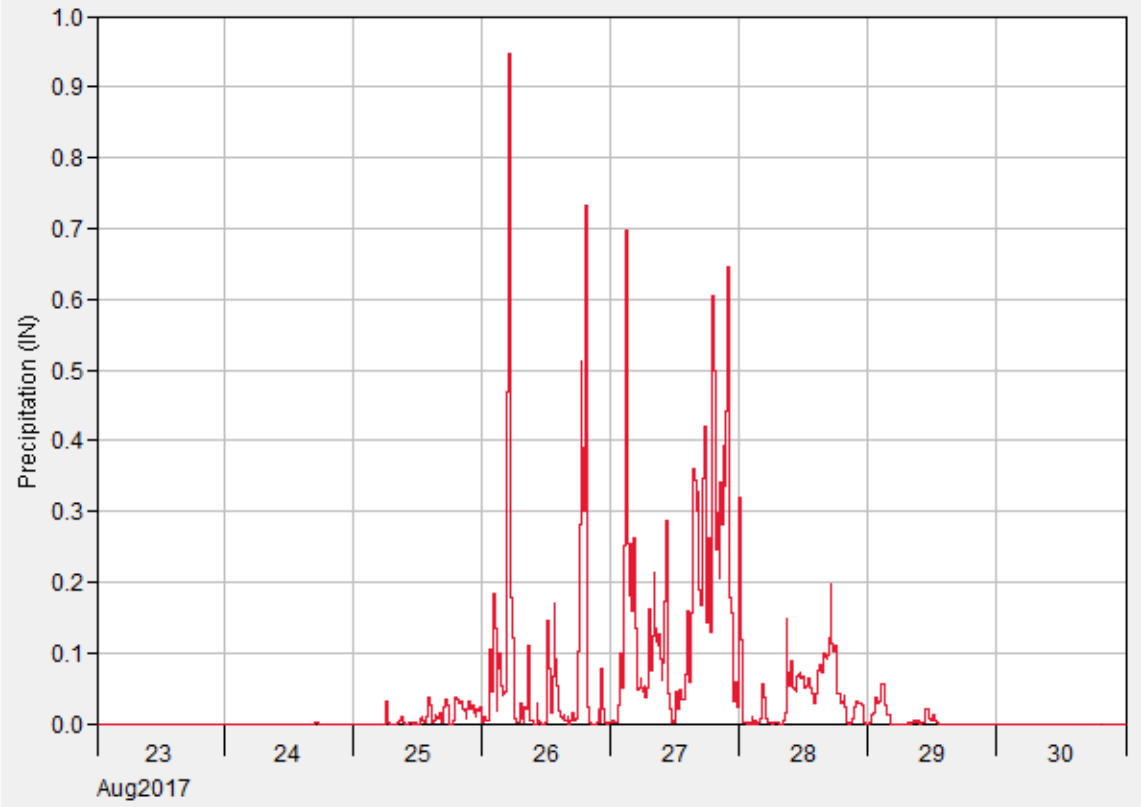
SC_02_201708_Harvey Precipitation Gauge:



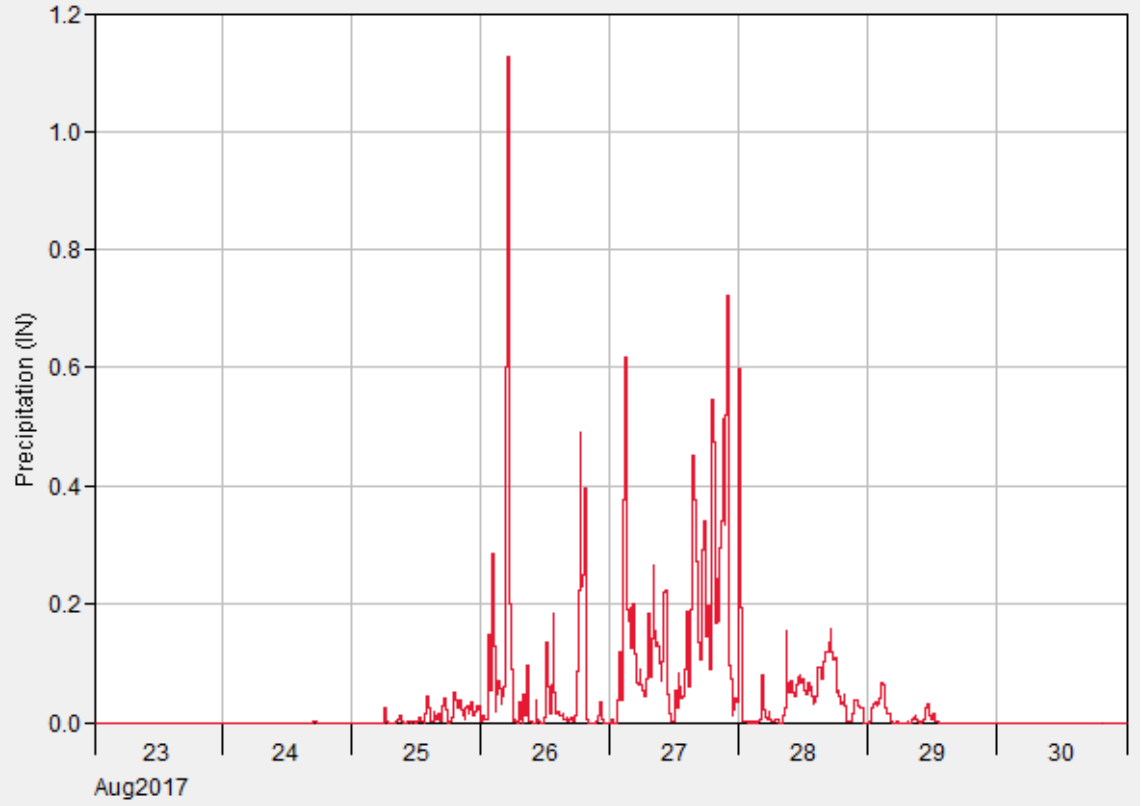
SC_03_201708_Harvey Precipitation Gauge:



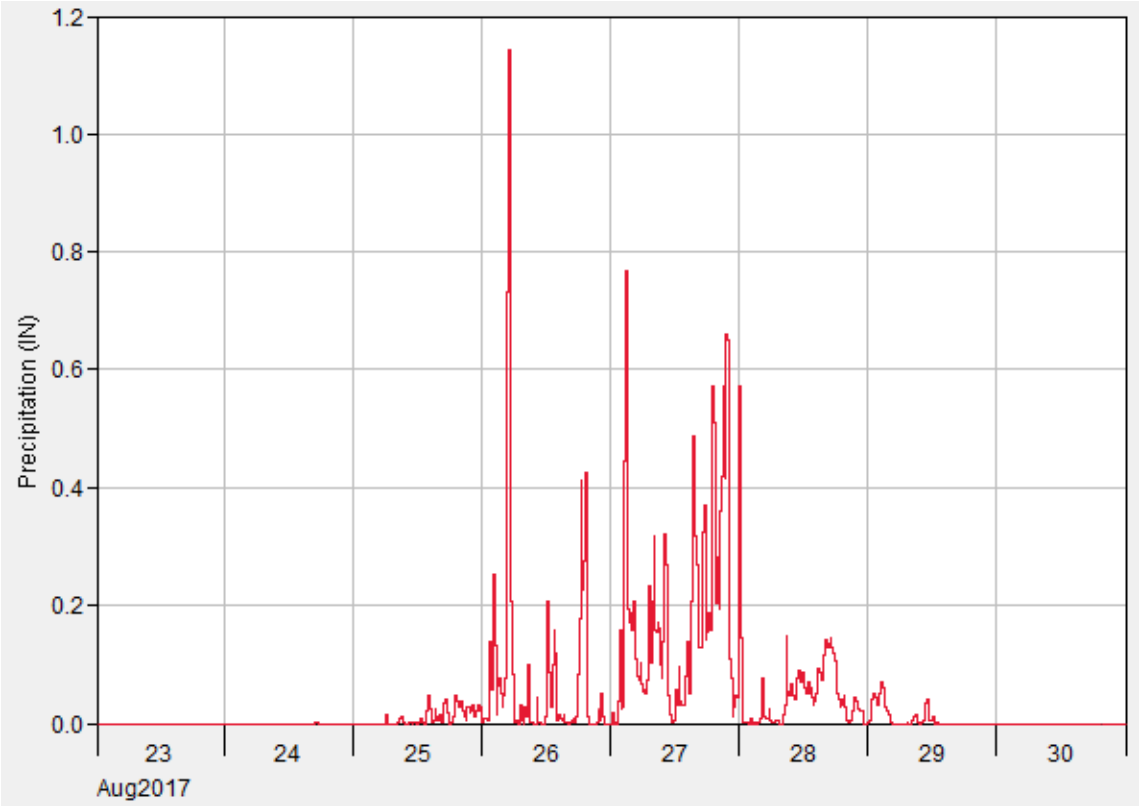
SC_04_201708_Harvey Precipitation Gauge:



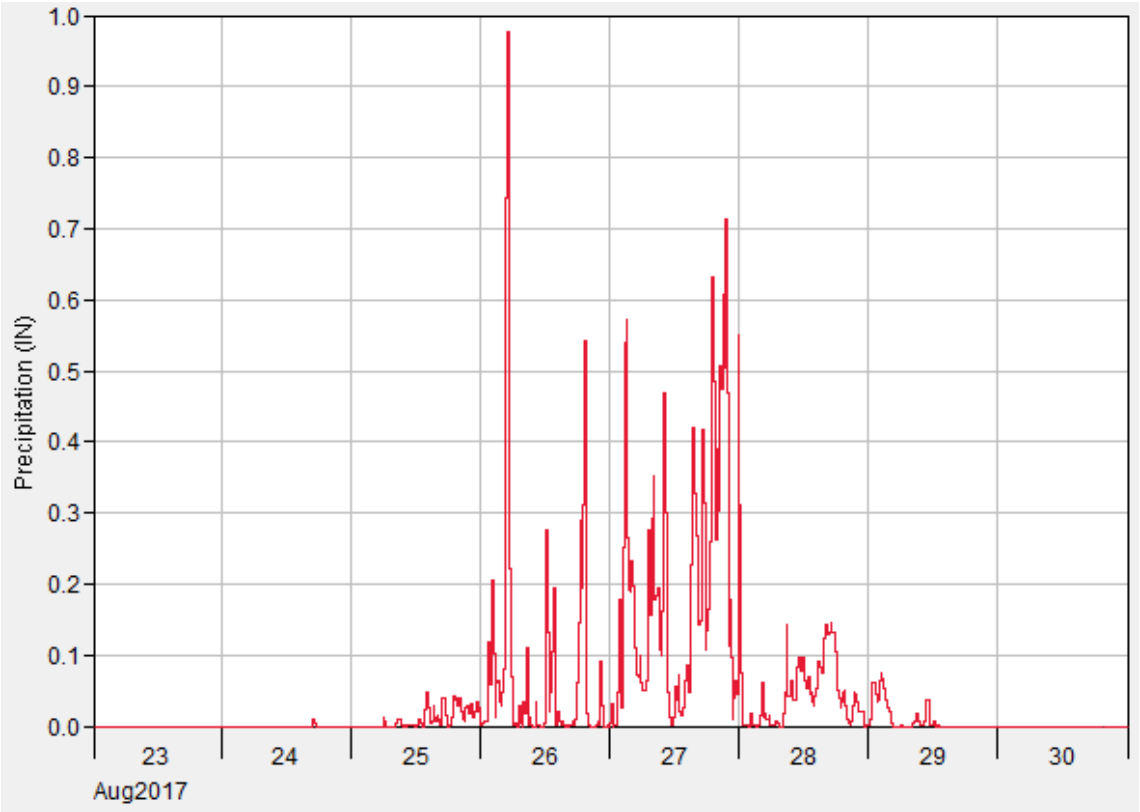
SC_05_201708_Harvey Precipitation Gauge:



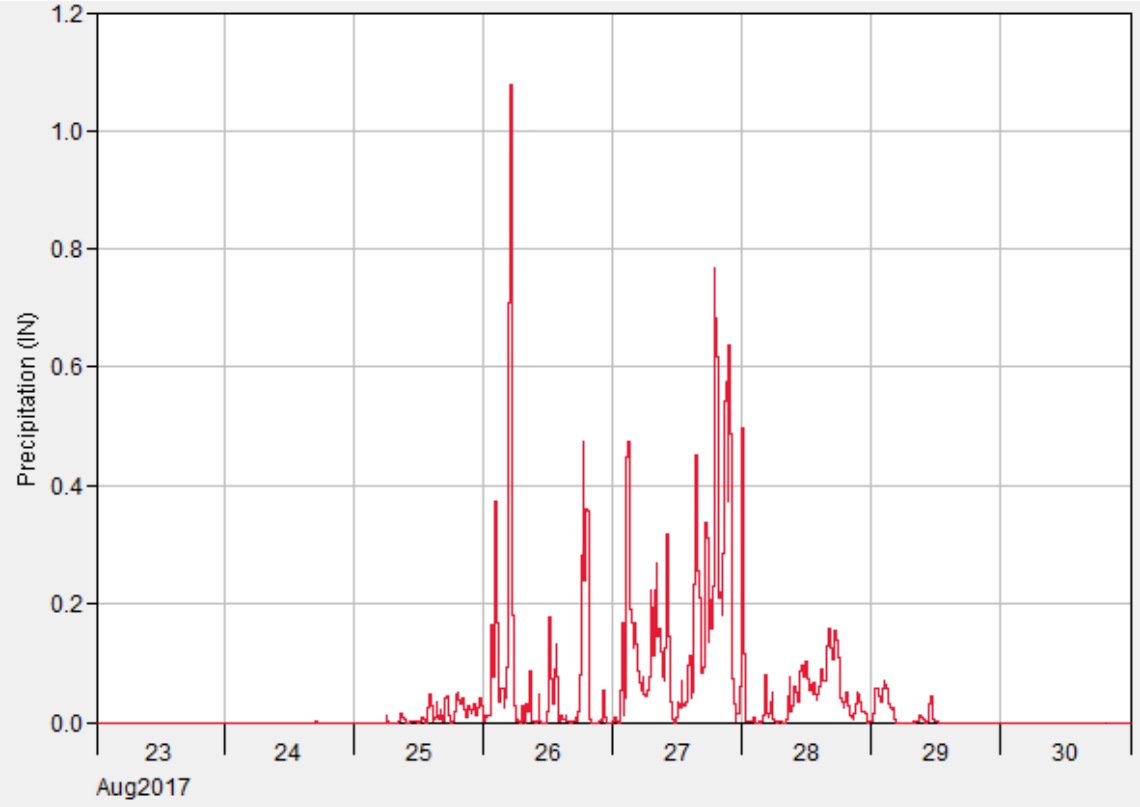
SC_06_201708_Harvey Precipitation Gauge:



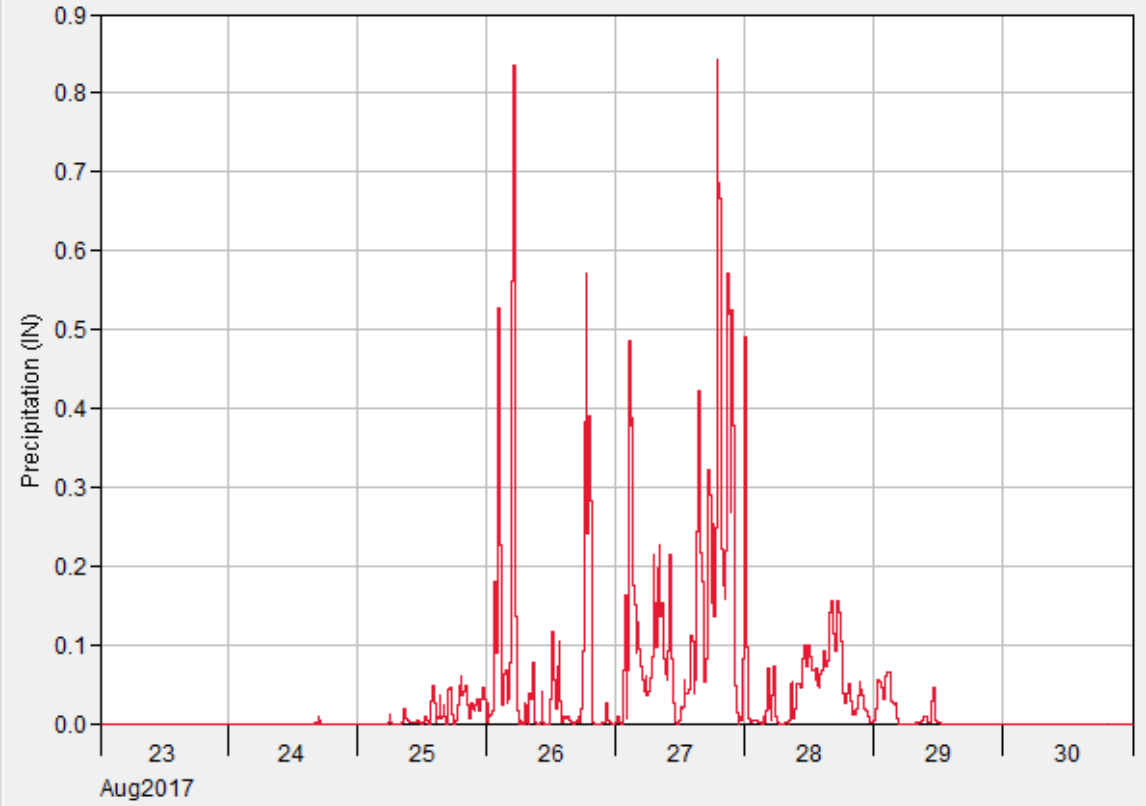
SC_07_201708_Harvey Precipitation Gauge:



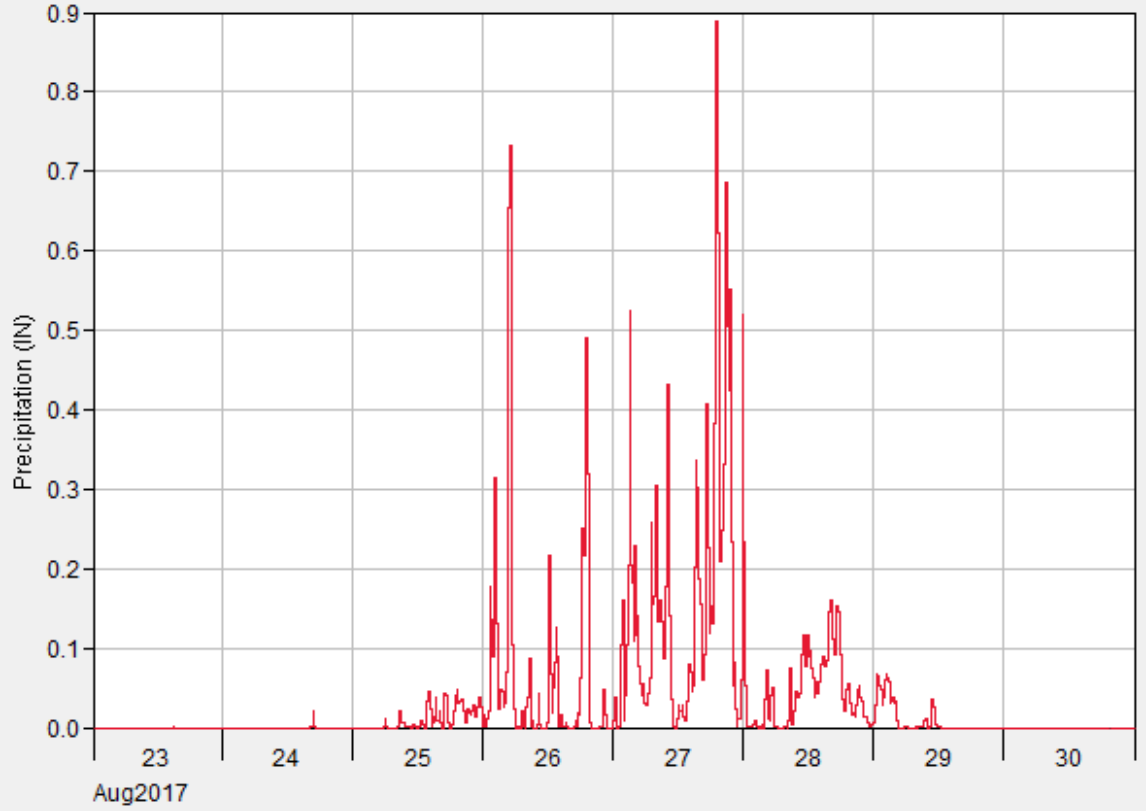
SC_08_201708_Harvey Precipitation Gauge:



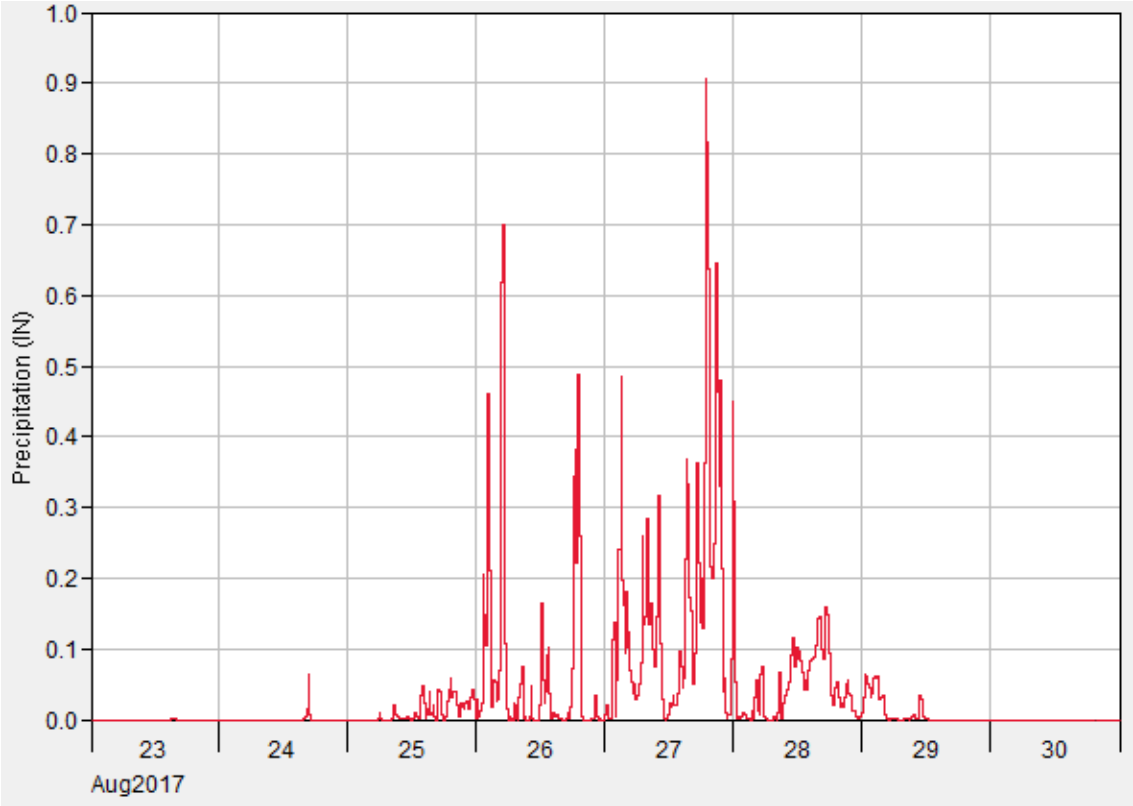
SC_09_201708_Harvey Precipitation Gauge:



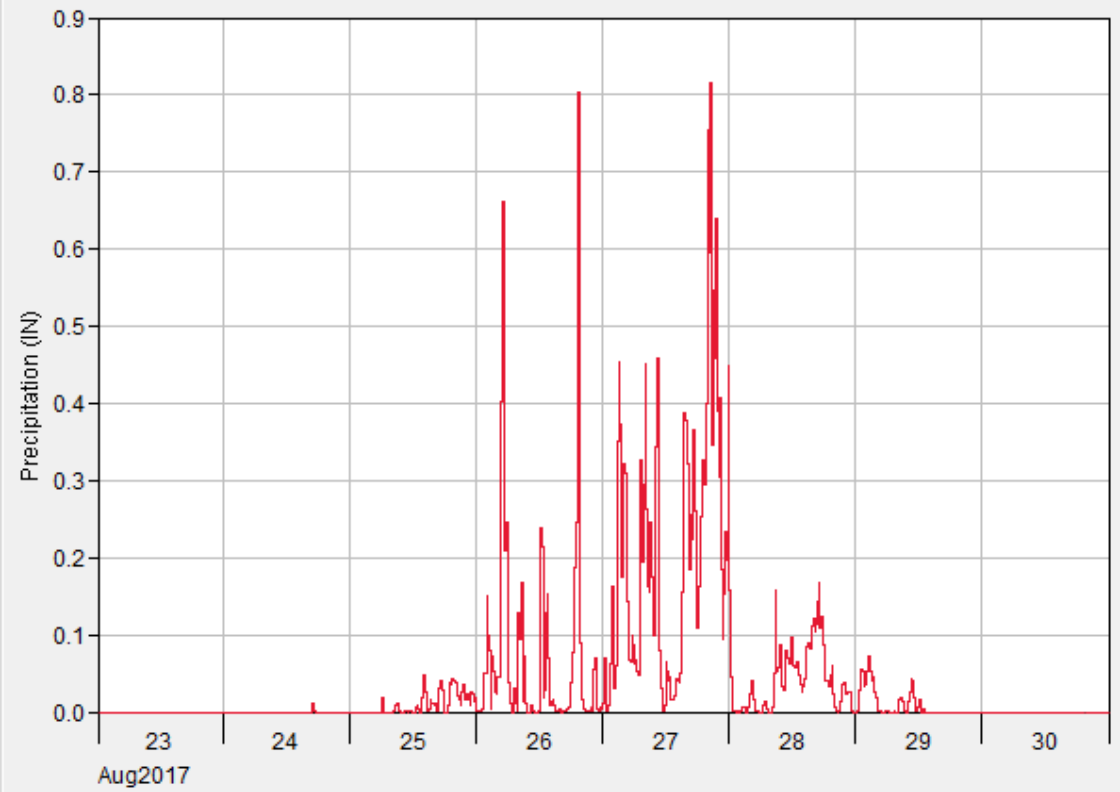
SC_10_201708_Harvey Precipitation Gauge:



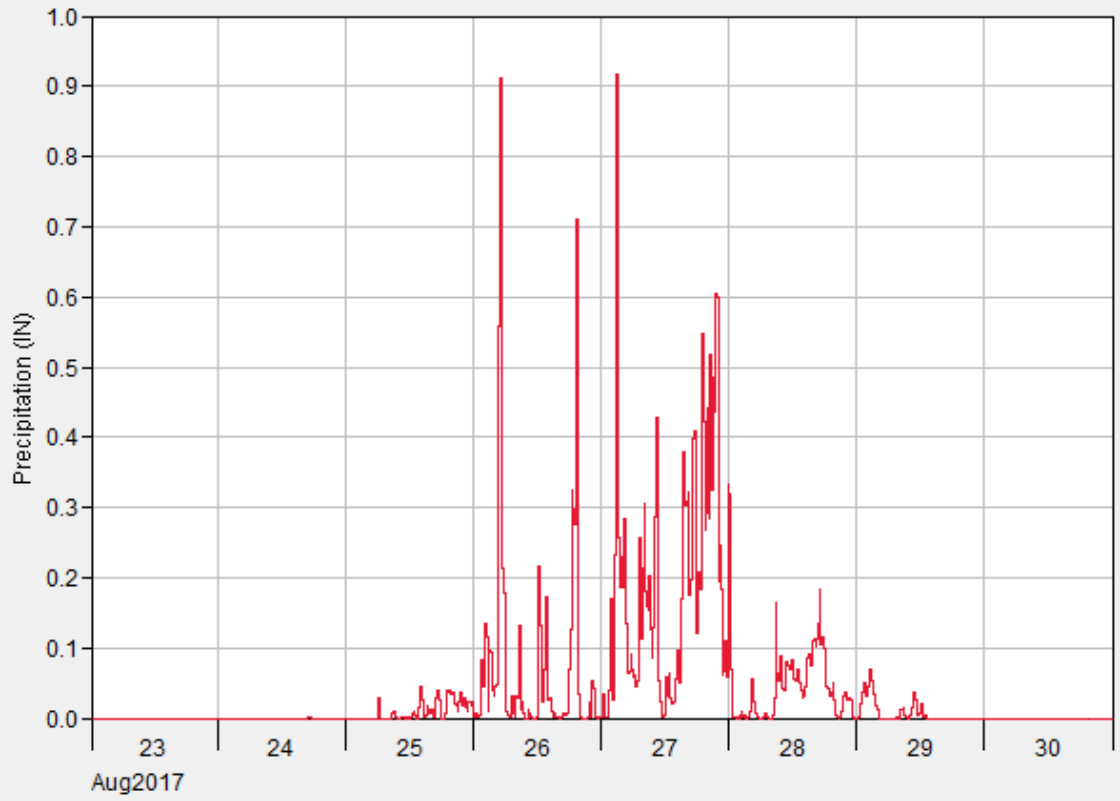
SC_11_201708_Harvey Precipitation Gauge:



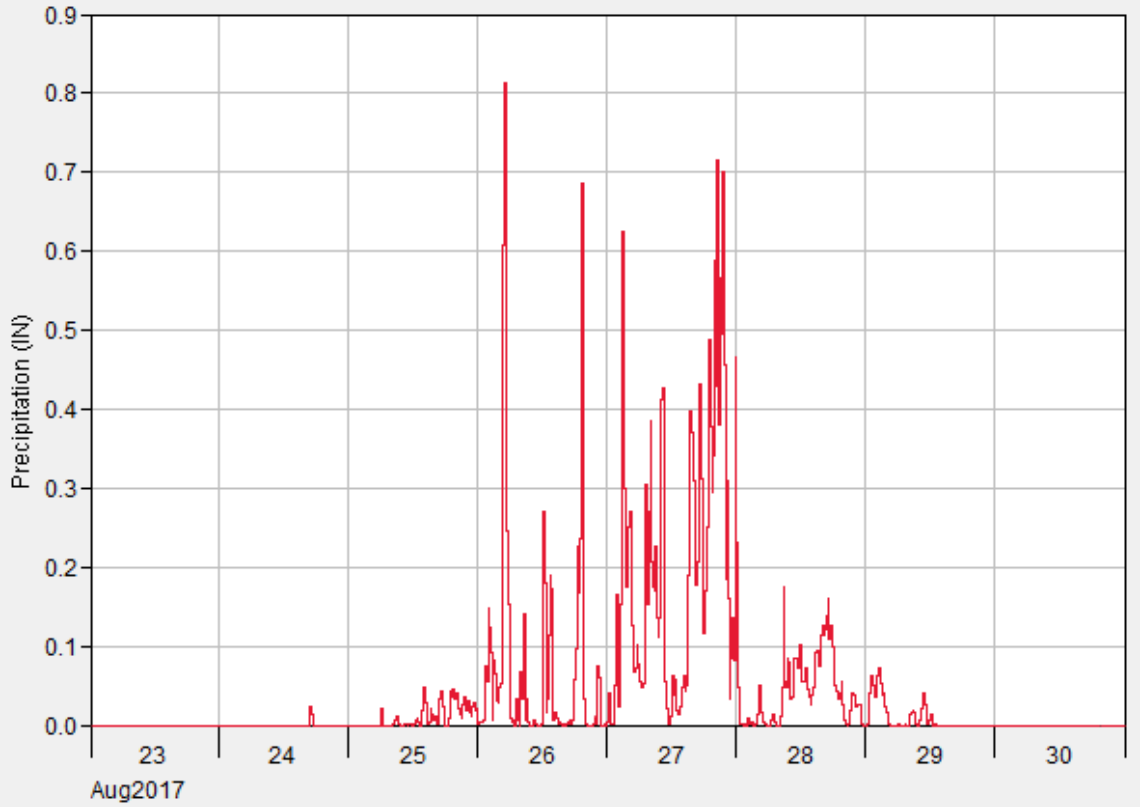
CIB_01_201708_Harvey Precipitation Gauge:



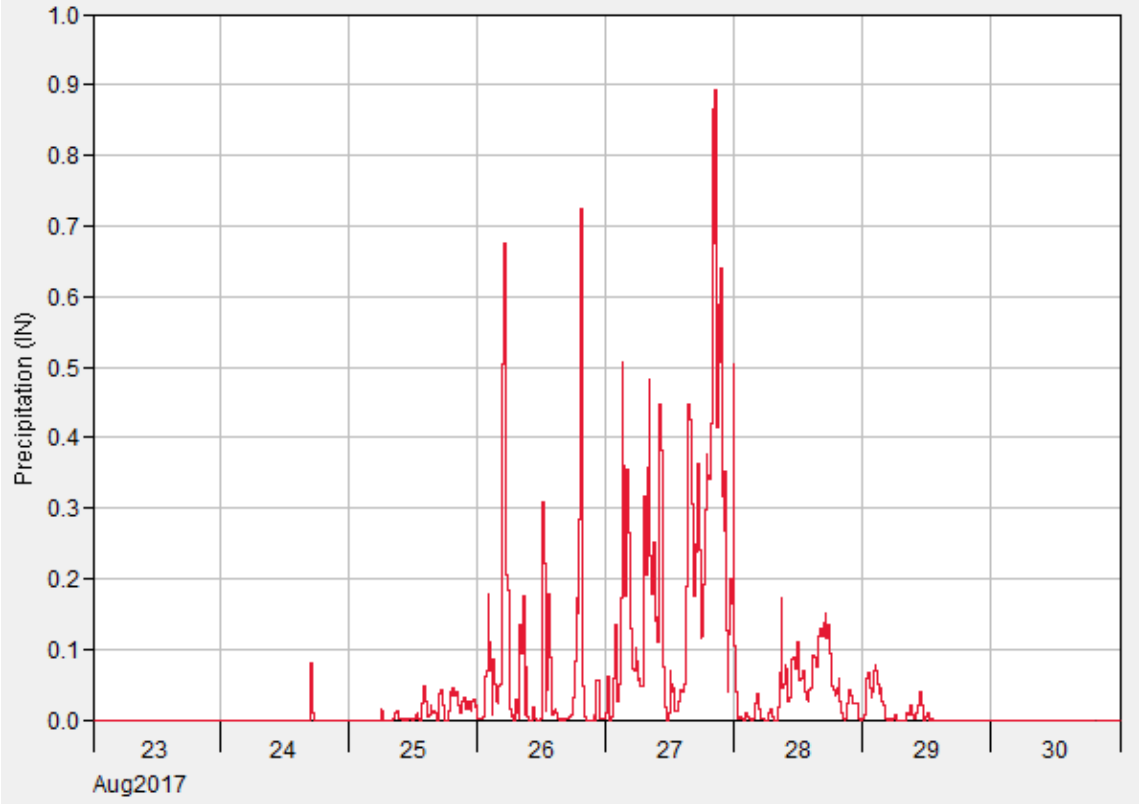
CIB_02_201708_Harvey Precipitation Gauge:



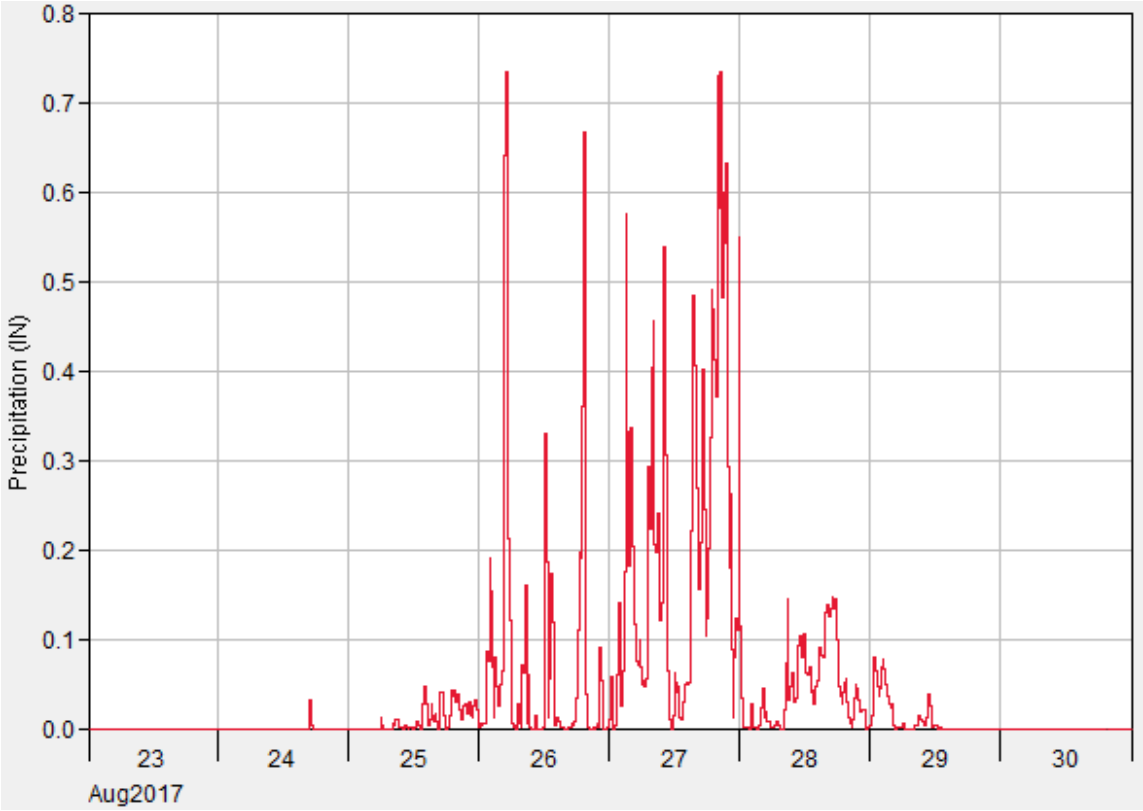
CIB_03_201708_Harvey Precipitation Gauge:



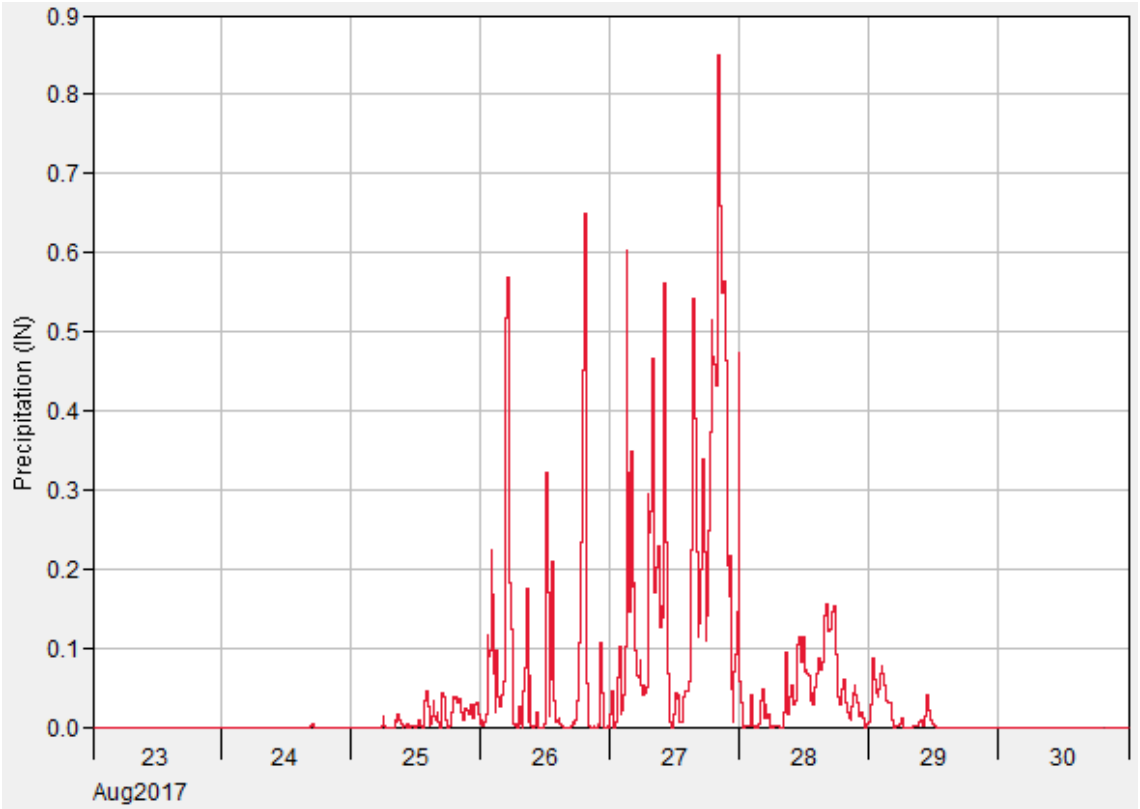
CIB_04_201708_Harvey Precipitation Gauge:



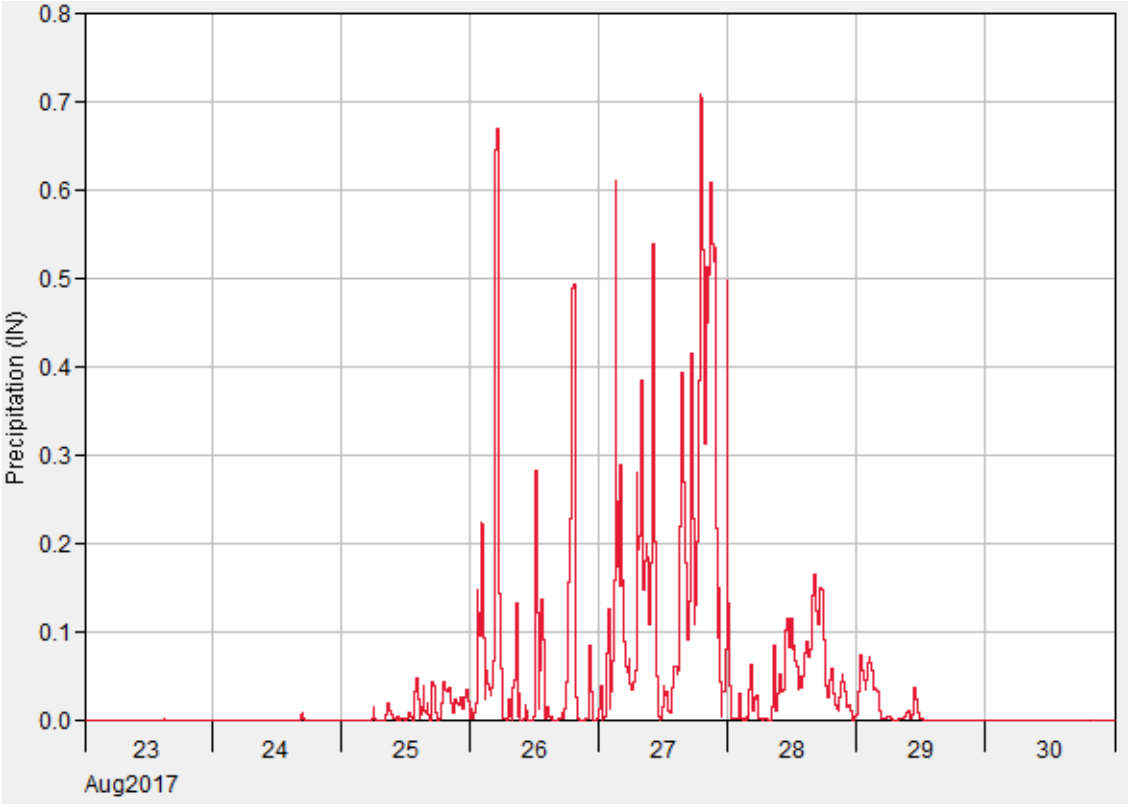
CIB_05_201708_Harvey Precipitation Gauge:



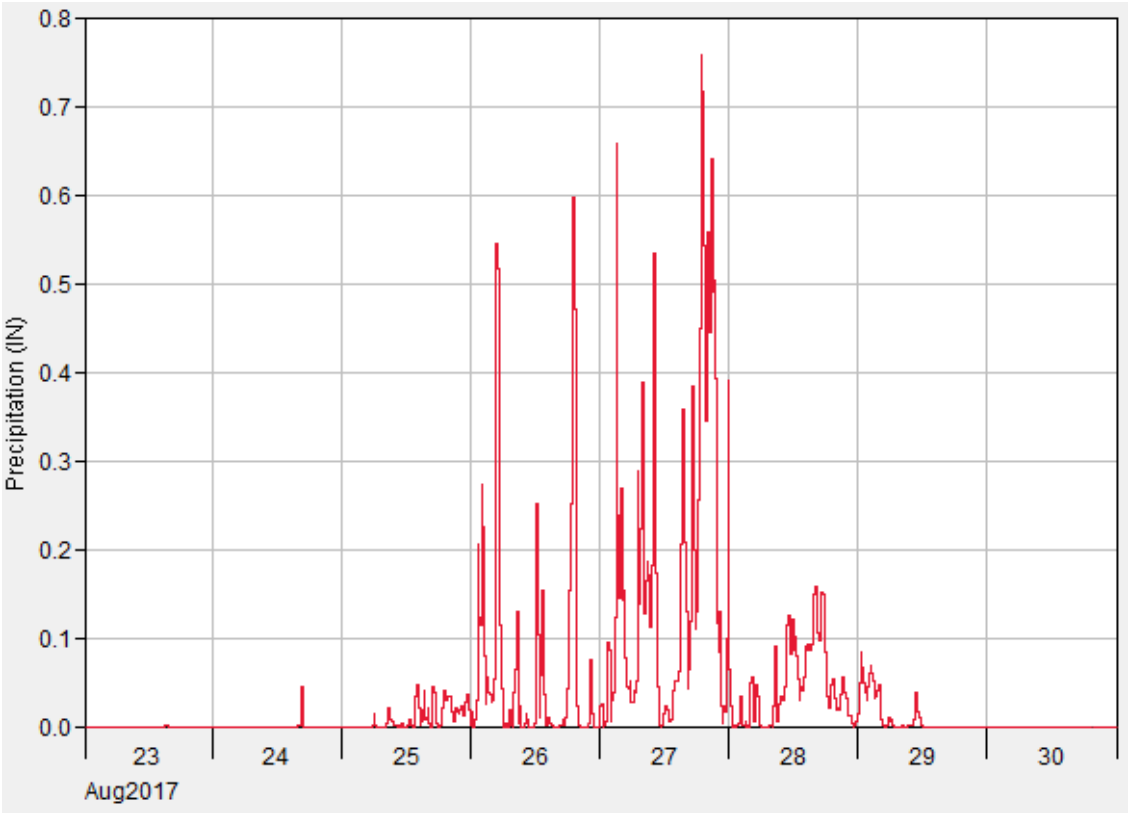
CIB_06_201708_Harvey Precipitation Gauge:



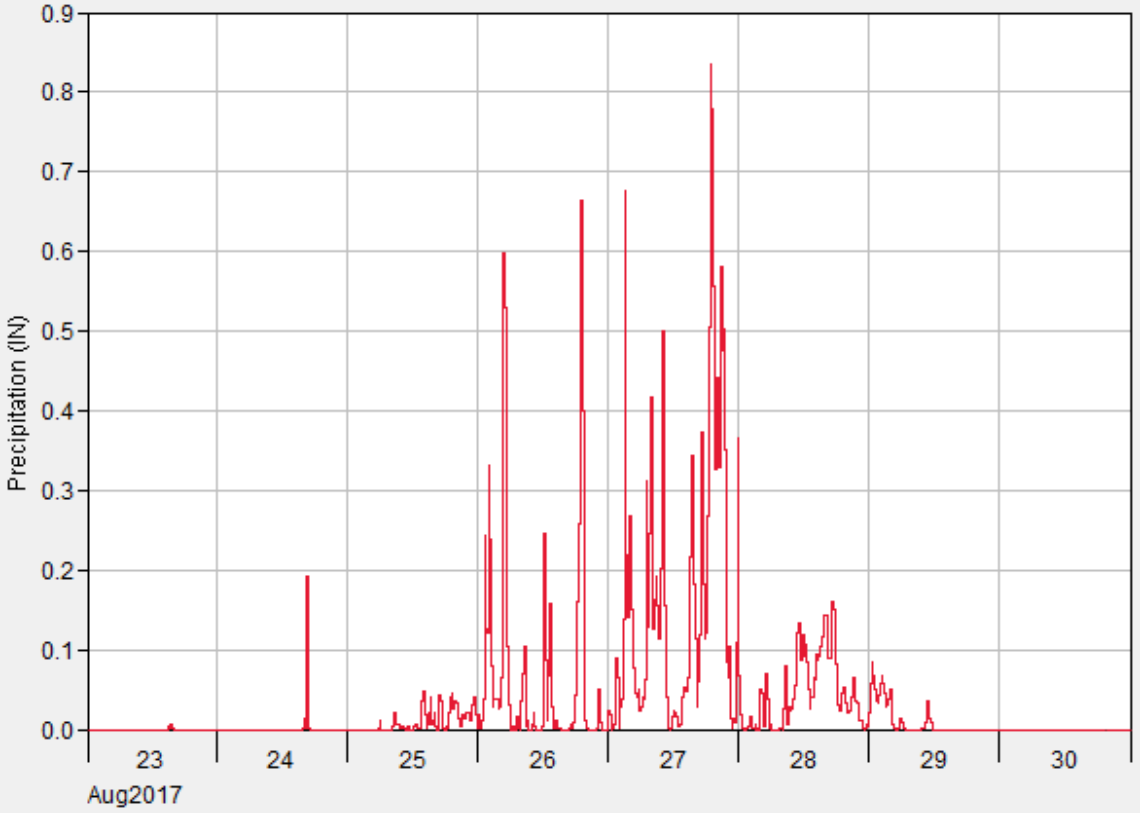
CIB_07_201708_Harvey Precipitation Gauge:



CIB_08_201708_Harvey Precipitation Gauge:



CIB_09_201708_Harvey Precipitation Gauge:



Appendix 3
Hydrologic Parameter Calculations

Hydrologic Methodology Utilized for Each Study:

BKDD:

Loss Method - Green and Ampt Method using a mix of Fort Bend County and Harris County loss parameters

Transform Method - Clark Unit Hydrograph Method using BDF calculations

Bessie's Creek:

Loss Method - Green and Ampt Method using Fort Bend County loss parameters

Transform Method - Clark Unit Hydrograph Method using BDF calculations

Willow Fork:

Loss Method - Green and Ampt Method using Harris County loss parameters

Transform Method - Clark Unit Hydrograph Method using BDF calculations

Sunterra:

Loss Method - Green and Ampt Method using 2009 Harris County loss parameters (outdated)

Transform Method - Clark Unit Hydrograph Method using BDF calculations

Summary of All Subbasins

Effective					Corrected Existing Conditions (2023)			
SUBBASIN	Watershed	Subwatershed	Subwater_1	Based on	SUBBASIN	Watershed	Subwatershed	Based on
Brook_03	Bessie's Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
Brook_04	Bessies Creek	Brookshire Creek	Ft Bend Co	Bessie's Creek - Sep 2021				
Brook_05	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_05	Bessies Creek	Brookshire Creek	New Dev.
Brook_06	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_06	Bessies Creek	Brookshire Creek	New Dev.
Brook_07	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_07	Bessies Creek	Brookshire Creek	New Dev.
Brook_08	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
Brook_Trib1_01	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
CIB_01	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_01	Willow Fork	Cane Island	Sunterra - Nov 2021
					320AC	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_02	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_02a	Willow Fork	Cane Island	New Dev.
					CIB_02b	Willow Fork	Cane Island	New Dev.
CIB_03	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_03	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_04	Willow Fork	Cane Island	Harris Co.	Willow Fork - Oct 2021	T100D2_1	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D2_2	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_05	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_05	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D2_3	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_06	Willow Fork	Cane Island	Harris Co.	Willow Fork - Oct 2021	CIB_06	Willow Fork	Cane Island	New Dev.
CIB_07	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_07	Willow Fork	Cane Island	New Dev.
CIB_08	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021				
SC_01	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_02	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_03	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_04	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_05	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_06	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_06	Willow Fork	Snake Creek	Sunterra - Nov 2021
SC_07	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_07	Willow Fork	Snake Creek	Sunterra - Nov 2021
					T100D1_1	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D1_2	Willow Fork	Cane Island	Sunterra - Nov 2021
SC_08	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_09	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_10	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_10	Willow Fork	Snake Creek	New Dev.
SC_11	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
WF_01	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_02	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_03	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_04	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_05	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_06	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021	WF_06	Willow Fork	Willow Fork	New Dev
WF_07	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021	WF_07	Willow Fork	Willow Fork	New Dev
WF_08	Willow Fork	Willow Fork	FortBend Co.	Willow Fork - Oct 2021	WF_08	Willow Fork	Willow Fork	New Dev
WF_10	Willow Fork	Willow Fork	FortBend Co.	Willow Fork - Oct 2021				

*Gray highlight indicates an effective subbasin that was revised

Summary of All Subbasins

Effective					Corrected Existing			
SUBBASIN	Watershed	Subwatershed	Subwater_1	Based on	SUBBASIN	Watershed	Subwatersh	Based on
Brook_03	Bessie's Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
Brook_04	Bessies Creek	Brookshire Creek	Ft Bend Co	Bessie's Creek - Sep 2021				
Brook_05	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_05	Bessies Creek	Brookshire Creek	New Dev.
Brook_06	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_06	Bessies Creek	Brookshire Creek	New Dev.
Brook_07	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021	Brook_07	Bessies Creek	Brookshire Creek	New Dev.
Brook_08	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
Brook_Trib1_01	Bessies Creek	Brookshire Creek	Waller Co	Bessie's Creek - Sep 2021				
CIB_01	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_01	Willow Fork	Cane Island	Sunterra - Nov 2021
					320AC	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_02	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_02a	Willow Fork	Cane Island	New Dev.
					CIB_02b	Willow Fork	Cane Island	New Dev.
CIB_03	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_03	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_04	Willow Fork	Cane Island	Harris Co.	Willow Fork - Oct 2021	T100D2_1	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D2_2	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_05	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_05	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D2_3	Willow Fork	Cane Island	Sunterra - Nov 2021
CIB_06	Willow Fork	Cane Island	Harris Co.	Willow Fork - Oct 2021	CIB_06	Willow Fork	Cane Island	New Dev.
CIB_07	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021	CIB_07	Willow Fork	Cane Island	New Dev.
CIB_08	Willow Fork	Cane Island	Waller Co.	Willow Fork - Oct 2021				
SC_01	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_02	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_03	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_04	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_05	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_06	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_06	Willow Fork	Snake Creek	Sunterra - Nov 2021
SC_07	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_07	Willow Fork	Snake Creek	Sunterra - Nov 2021
					T100D1_1	Willow Fork	Cane Island	Sunterra - Nov 2021
					T100D1_2	Willow Fork	Cane Island	Sunterra - Nov 2021
SC_08	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_09	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
SC_10	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021	SC_10	Willow Fork	Snake Creek	New Dev.
SC_11	Willow Fork	Snake Creek	Waller Co.	Willow Fork - Oct 2021				
WF_01	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_02	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_03	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_04	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_05	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021				
WF_06	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021	WF_06	Willow Fork	Willow Fork	New Dev
WF_07	Willow Fork	Willow Fork	Waller Co.	Willow Fork - Oct 2021	WF_07	Willow Fork	Willow Fork	New Dev
WF_08	Willow Fork	Willow Fork	FortBend Co.	Willow Fork - Oct 2021	WF_08	Willow Fork	Willow Fork	New Dev
WF_10	Willow Fork	Willow Fork	FortBend Co.	Willow Fork - Oct 2021				

*Gray highlight indicates an effective subbasin that was revised

Summary of Revised Subbasins

Effective						Corrected Existing							
Drainage Area	mi2	Ac	% IC	TC (hr)	Storage Coef (hr)	Drainage Area	mi2	Ac	% IC	TC (hr)	Storage Coef (hr)	Source	Change
Brook_05	1.83125	1172.00	3.95	2.04	5.37	Brook_05	1.83125	1172.00	11.43	2.35	5.02	Calculated	LU updated
Brook_06	2.36094	1511.00	12.85	2.4	6.23	Brook_06	2.471623	1581.84	19.10	3.02	6.61	Calculated	Delineation and LU updated
Brook_07	2.9125	1864.00	15.31	2.64	6.57	Brook_07	2.802653	1793.70	34.06	3.34	7.47	Calculated	Delineation and LU updated
CIB_01	1.6722	1070.21	4.86	4.89	13.38	CIB_01	1.16625	746.40	4.72	8.77	35.92	Sunterra Report	Matches Sunterra
						320AC	0.51203125	327.70	51.02	0.85	1.49	Sunterra Report	Matches Sunterra
CIB_02	2.3	1446.30	11.88	3.65	9.61	CIB_02a	1.25875	805.60	17.47	3.33	8.39	Calculated	Delineation
						CIB_02b	1.06125	679.20	19.66	3.76	9.91	Calculated	Delineation and LU updated
CIB_03	1.1774	753.54	3.76	3.03	8.32	CIB_03	0.4929	315.46	7.49	2.33	6.10	Calculated	Delineation and LU updated
CIB_04	1.0621	679.74	1.51	2.96	8.24	T100D2_1	1.51796875	971.50	47.09	3.89	4.55	Sunterra Report	Matches Sunterra
						T100D2_2	0.43421875	277.90	44.97	1.18	1.44	Sunterra Report	Matches Sunterra
CIB_05	2.7001	1728.06	22.74	3.21	8.17	CIB_05	1.9297	1235.01	14.86	3.42	8.16	Calculated	Delineation and LU updated
						T100D2_3	0.349375	223.60	52.34	1.02	3.2	Sunterra Report	Matches Sunterra
CIB_06	1.5434	987.78	24.83	2.38	6	CIB_06	1.717482	1099.19	37.47	2.69	6.14	Calculated	Delineation and LU updated
CIB_07	1.9872	1271.81	27.1	2.43	5.98	CIB_07	1.686221	1079.18	34.27	2.60	5.89	Calculated	Delineation and LU updated
SC_06	2	1311.40	8.63	3.9	10.54	SC_06	1.98525	1270.56	11.47	4.69	11.98	Calculated	Delineation and LU updated
SC_07	2.147	1374.08	6.57	4.04	10.94	SC_07	1.171268	749.61	8.54	2.98	7.40	Calculated	Delineation and LU updated
						T100D1_1	1.05	672.00	45.12	3.97	4.16	Sunterra Report	Matches Sunterra
						T100D1_2	0.16	102.40	39.10	1.71	0.10	Sunterra Report	Matches Sunterra
SC_10	0.9869	631.62	17.14	1.9	4.93	SC_10	1.11358	712.69	32.15	2.45	5.82	Calculated	Delineation and LU updated
WF_06	1.4612	935.17	23.44	2.26	5.61	WF_06	1.4612	935.17	84.82	2.91	6.94	Calculated	Landuse updated
WF_07	2.7601	1766.46	17.22	3.94	9.68	WF_07	2.7601	1766.46	48.55	3.61	8.03	Calculated	Landuse updated
WF_08	2.4763	1584.83	6.56	3.75	9.62	WF_08	2.4763	1584.83	29.77	3.46	8.02	Calculated	Landuse updated

Gray highlight indicates subbasins that were revised to match Sunterra report and were not recalculated - CIB_01, CIB_04, CIB_05, and SC_07

Yellow highlight indicates subbasins that were revised per non-Sunterra new development and/or new landuse - Brook_05, Brook_06, Brook_07, CIB_02, CIB_03, CIB_06, CIB_07, SC_06, SC_10, WF_06, WF_07, and WF_08

Revised Weighted Average BDF Calcs

DA Brook_05

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	659.42	0.56	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	340.72	0.29	6	1.74
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	172.12	0.15	1.5	0.22
Total	1172.26	1.00		**1.96**

DA Brook_06

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	686.14	0.43	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	205.74	0.13	6	0.78
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	689.95	0.44	1.5	0.65
Total	1581.83	1		**1.43**

DA Brook_07

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	521.12	0.29	0	0.00
Curb and Gutter and Storm Sewers Pre-84	147.4	0.08	3	0.25
Curb and Gutter and Storm Sewers Post-84	409.86	0.23	6	1.37
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	715.32	0.40	1.5	0.60
Total	1793.7	1		**2.22**

Revised Weighted Average % IC Calcs

DA Brook_05

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	123.16	0.11	65	6.83
Pond	11.74	0.01	100	1.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac	169	0.14	25	3.60
Res < 0.25 ac		0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	868.37	0.74	0	0.00
Total	1172.27	1		**11.43**

DA Brook_06

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	418.91	0.26	65	17.21
Pond	29.88	0.02	100	1.89
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac		0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	1133.04	0.72	0	0.00
Total	1581.83	1.00		**19.10**

DA Brook_07

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial	474.63	0.26	85	22.49
Industrial	59.82	0.03	65	2.17
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	310.84	0.17	40	6.93
Thoroughfare	55.26	0.03	80	2.46
Undev	893.15	0.50	0	0.00
Total	1793.7	1.00		**34.06**

Revised Weighted Average BDF Calcs

DA CIB_02a

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	526.22	0.65	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	278.63	0.35	6	2.08
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	0.76	0.00	1.5	0.00
Total	805.61	1.00		**2.08**

DA CIB_02b

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	508.72	0.75	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84		0.00	6	0.00
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	170.48	0.25	1.5	0.38
Total	679.2	1.00		**0.38**

DA CIB_03

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	221.27	0.70	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84		0.00	6	0.00
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	94.19	0.30	1.5	0.45
Total	315.46	1		**0.45**

Revised Weighted Average % IC Calcs

DA CIB_02a

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	45.07	0.06	65	3.64
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	278.63	0.35	40	13.83
Thoroughfare		0.00	80	0.00
Undev	481.89	0.60	0	0.00
Total	805.59	1.00		**17.47**

DA CIB_02b

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	205.39	0.30	65	19.66
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac		0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	473.8	0.70	0	0.00
Total	679.19	1.00		**19.66**

DA CIB_03

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac	94.54	0.30	25	7.49
Res 1 ac		0.00	25	0.00
Res < 0.25 ac		0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	220.92	0.70	0	0.00
Total	315.46	1.00		**7.49**

Revised Weighted Average BDF Calcs

DA CIB_05

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	1.8	0.00	6	0.01
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	1233.2	1.00	1.5	1.50
Total	1235	1		**1.51**

DA CIB_06

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	640.43	0.58	6	3.50
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	458.27	0.42	1.5	0.63
Total	1098.7	1		**4.12**

DA CIB_07

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	164.29	0.15	0	0.00
Curb and Gutter and Storm Sewers Pre-84	64.927	0.06	3	0.18
Curb and Gutter and Storm Sewers Post-84	605.59	0.56	6	3.37
Natural Channels		0.00	0	0.00
Improved Earthen Channels	34.34	0.03	3	0.10
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	210.03	0.19	1.5	0.29
Total	1079.177	1		**3.93**

Revised Weighted Average % IC Calcs

DA CIB_05

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac	247.43	0.20	25	5.01
Res < 0.25 ac	304.21	0.25	40	9.85
Thoroughfare		0.00	80	0.00
Undev	683.23	0.55	0	0.00
Total	1234.87	1.00		**14.86**

DA CIB_06

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac	185.2	0.17	25	4.21
Res < 0.25 ac	913.98	0.83	40	33.26
Thoroughfare		0.00	80	0.00
Undev		0.00	0	0.00
Total	1099.18	1.00		**37.47**

DA CIB_07

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	924.65	0.86	40	34.27
Thoroughfare		0.00	80	0.00
Undev	154.54	0.14	0	0.00
Total	1079.19	1.00		**34.27**

Revised Weighted Average BDF Calcs

DA SC_06

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	1000.38	0.79	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84		0.00	6	0.00
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	270.18	0.21	1.5	0.32
Total	1270.56	1		**0.32**

DA SC_07

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84		0.00	6	0.00
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	749.61	1.00	1.5	1.50
Total	749.61	1		**1.50**

DA SC_10

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped	357.66	0.50	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	265.52	0.37	6	2.24
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	89.52	0.13	1.5	0.19
Total	712.70	1		**2.42**

Revised Weighted Average % IC Calcs

DA SC_06

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	108.78	0.09	65	5.57
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac	300.27	0.24	25	5.91
Res < 0.25 ac		0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	861.51	0.68	0	0.00
Total	1270.56	1.00		**11.47**

DA SC_07

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac	256.1	0.34	25	8.54
Res < 0.25 ac	0.03	0.00	40	0.00
Thoroughfare		0.00	80	0.00
Undev	493.49	0.66	0	0.00
Total	749.62	1.00		**8.54**

DA SC_10

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	183.48	0.26	65	16.73
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	231.17	0.32	40	12.97
Thoroughfare	21.78	0.03	80	2.44
Undev	276.27	0.39	0	0.00
Total	712.70	1.00		**32.15**

Revised Weighted Average BDF Calcs

DA WF_06

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	391.43	0.42	6	2.51
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	543.72	0.58	1.5	0.87
Total	935.15	1		**3.38**

DA WF_07

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	1766.44	1.00	6	6.00
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage		0.00	1.5	0.00
Total	1766.44	1		**6.00**

DA WF_08

Landuse	Area	Proportion	BDF	Prop*BDF
Undeveloped		0.00	0	0.00
Curb and Gutter and Storm Sewers Pre-84		0.00	3	0.00
Curb and Gutter and Storm Sewers Post-84	987.65	0.62	6	3.74
Natural Channels		0.00	0	0.00
Improved Earthen Channels		0.00	3	0.00
Concrete Lined Channels		0.00	3	0.00
Streets w Roadside Ditches		0.00	1.5	0.00
Roadside Ditch Drainage	597.14	0.38	1.5	0.57
Total	1584.79	1		**4.30**

Revised Weighted Average % IC Calcs

DA WF_06

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial	901.7	0.96	85	81.96
Industrial		0.00	65	0.00
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac		0.00	40	0.00
Thoroughfare	33.46	0.04	80	2.86
Undev		0.00	0	0.00
Total	935.16	1.00		**84.82**

DA WF_07

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial	29.02	0.02	85	1.40
Industrial	910.24	0.52	65	33.49
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	549.53	0.31	40	12.44
Thoroughfare	26.78	0.02	80	1.21
Undev	250.89	0.14	0	0.00
Total	1766.46	1.00		**48.55**

DA WF_08

Landuse	Area	Proportion	% IC	Prop*%IC
Commercial		0.00	85	0.00
Industrial	9.77	0.01	65	0.40
Pond		0.00	100	0.00
Res 0.5 ac		0.00	25	0.00
Res 1 ac		0.00	25	0.00
Res < 0.25 ac	1163.73	0.73	40	29.37
Thoroughfare		0.00	80	0.00
Undev	411.31	0.26	0	0.00
Total	1584.81	1.00		**29.77**

Revised TC and R Calculations

Subbasin	DA (ac)	DA (mi2)	Weighted Average BDF	Tr	Tc (Unadjusted)	R (Unadjusted)	Channel Slope (ft/mi)* S	Overland Slope (ft/mi)* So	SxSo	Tc Slope Constant Ktc	R Slope Constant Kr	Watershed Detention Volume (ac-ft)*	Detention Rate DR	Tc Detention Constant CF Tc	R Detention Constant CF R	TC (hr) (Slope and Detention Adjusted)	R (hr) (Slope and Detention Adjusted)	Percent Impervious 2018
Brook_05	1172.00	1.83125	1.96	2.49	3.16	8.30	5.94	39.82	236.53	0.68	0.60	0	0.00	1.09	1.01	2.35	5.02	11.43
Brook_06	1581.84	2.471623	1.43	2.99	3.78	9.92	5.47	30.63	167.55	0.73	0.66	0	0.00	1.09	1.01	3.02	6.61	19.10
Brook_07	1793.70	2.802653	2.22	2.86	3.70	9.50	6.17	14.02	86.50	0.83	0.78	0	0.00	1.09	1.01	3.34	7.47	34.06
CIB_02a	805.60	1.25875	2.08	2.11	2.67	7.09	2.26	4.28	9.67	1.14	1.17	0	0.00	1.09	1.01	3.33	8.39	17.47
CIB_02b	679.20	1.06125	0.38	2.42	2.93	8.10	2.2	3.5	7.70	1.18	1.21	0	0.00	1.09	1.01	3.76	9.91	19.66
CIB_03	324.24	0.506621	0.44	1.78	2.14	6.04	3.96	5.99	23.72	1.01	1.01	0	0.00	1.09	1.01	2.36	6.17	7.58
CIB_05	1238.56	1.935249	1.50	2.69	3.38	8.95	7.04	6.1	42.94	0.93	0.90	0	0.00	1.09	1.01	3.43	8.17	14.88
CIB_06	1099.19	1.717482	4.12	1.87	2.52	6.30	3.7	8.21	30.38	0.98	0.97	0	0.00	1.09	1.01	2.69	6.14	37.47
CIB_07	1079.18	1.686221	3.93	1.90	2.55	6.39	4.69	8.73	40.94	0.93	0.91	0	0.00	1.09	1.01	2.60	5.89	34.27
SC_06	1272.90	1.988906	0.32	3.14	3.84	10.39	2.22	5.09	11.30	1.12	1.14	0	0.00	1.09	1.01	4.69	11.99	11.50
SC_07	749.61	1.171268	1.50	2.20	2.74	7.38	5.87	4.46	26.18	1.00	0.99	0	0.00	1.09	1.01	2.98	7.40	8.54
SC_10	712.69	1.11358	2.42	1.93	2.45	6.50	5.28	8.96	47.31	0.91	0.89	0	0.00	1.09	1.01	2.45	5.82	32.15
WF_06	935.17	1.4612	3.38	1.91	2.52	6.45	3.84	4.53	17.40	1.06	1.07	0	0.00	1.09	1.01	2.91	6.94	84.82
WF_07	1766.46	2.7601	6.00	1.81	2.64	6.07	3.84	5.32	20.43	1.03	1.04	299	108.33	1.32	1.28	3.61	8.03	48.55
WF_08	1584.83	2.4763	4.30	2.12	2.91	7.10	4.4	5.18	22.79	1.02	1.02	180	72.69	1.17	1.11	3.46	8.02	29.77

Bessie's Creek Model Effective Hydrological Calculations

Table B1. Hydrologic Parameters Summary Table

Subbasin	Area (acres)	Area (mi2)	Composite BDF	Channel Slope (ft./mi)	Overland Slope (ft./mi.)	Slope Adj.	Detention Rate (ac-ft/mi2)	Detention Adj.	Ponding (%)	Imp (%)	TC'' (hrs)	R'' (hrs)	Ponding Adjustments for Storage Values (R'')						
				S	So	Ks	DR	Cf	DPP				50% (2-Yr)	20% (5-Yr)	10% (10-Yr)	4% (25-Yr)	2% (50-Yr)	1% (100-Yr)	0.2% (500-Yr)
Brookshire Creek																			
Brook_01	1223	1.91	1.88	5.39	12.71	0.84	0.00	1.00	0.00	2.56	2.72	7.15	7.15	7.15	7.15	7.15	7.15	7.15	7.15
Brook_02	1101	1.72	2.18	4.00	28.94	0.75	0.00	1.00	44.00	3.79	2.27	5.96	19.80	17.54	16.20	14.23	13.08	11.88	9.65
Brook_03	1228	1.92	2.25	2.94	20.51	0.86	0.00	1.00	27.00	15.96	2.69	7.03	20.75	18.63	17.33	15.43	14.31	13.13	10.91
Brook_04	985	1.54	3.42	2.87	25.39	0.83	0.00	1.00	0.00	6.21	2.12	5.43	5.43	5.43	5.43	5.43	5.43	5.43	5.43
Brook_05	1172	1.83	1.84	5.94	39.82	0.64	0.00	1.00	5.00	3.95	2.04	5.37	5.37	5.37	5.37	5.37	5.37	5.37	5.37
Brook_06	1511	2.36	2.12	5.47	30.63	0.69	0.00	1.00	0.00	12.85	2.40	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.23
Brook_07	1864	2.91	3.60	6.17	14.02	0.80	0.00	1.00	17.00	15.31	2.64	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57
Brook_08	6005	9.38	3.58	5.01	5.68	0.98	5.25	1.00	38.00	4.19	5.36	12.67	40.64	36.15	33.45	29.50	27.19	24.78	20.27
Brook_Trib1_01	2049	3.20	3.59	16.07	39.79	0.48	11.51	0.99	0.00	14.33	1.63	4.03	4.03	4.03	4.03	4.03	4.03	4.03	4.03

Willow Fork Model Effective Hydrological Calculations

Watershed	BARKER (T100-00-00)																														
Subwatershed	**Drainage Area (acres)**	**Drainage Area (sq.mi.)**	**Channel Improvements (Total Lengths or Percent)**			Weighted Conveyance BDF	**Undeveloped**		**Open Space**		**Roadside Ditch Drainage**		**Developed Storm Sewer Pre 1984**		**Storm Sewer Post-1984**			Weighted Landuse BDF	**Composite BDF**	**Tc (Unadjusted)**	**R (Unadjusted)**	**Channel Slope (ft./mi)**	**Overland Slope (ft./mi.)**		**Slope Adj**	**Watershed Detention Volume not Modeled Directly (ac-ft)**	**Detention Rate**	**Detention Adj**	**Percent Ponding**		**TC''**	**R''**
			Natural	Improved	Concrete		**Area (ac)**	**BDF**	**Area (ac)**	**BDF**	**Area (ac)**	**BDF**	**Area (ac)**	**BDF**	**Area (ac)**	**BDF**	**AREA CHECK**					**S**	**So**	**SxSo**	K_a		**DR**	C_t	**DPP**	**Percent Impervious 2018**	**(Slope and Detention Adjusted)**	**(Slope and Detention Adjusted)**
CIB_01	1070.2	1.7	19900.0	0.0	0.0	0.00	1070.2	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	3.68	10.08	2.64	5.26	13.88	1.00	203.00	121.39	1.33	0	4.86	4.89	13.38
CIB_02	1446.3	2.3	27607.1	8245.2	0.0	0.69	1173.6	0.0	0.8	1.0	132.1	1.5	0.0	3.0	139.8	6.0	0.0	0.7	1.4	3.65	9.61	3.52	6.63	23.34	1.00	0.00	0.00	1.00	0	11.88	3.65	9.61
CIB_03	753.5	1.2	27672.3	3837.3	0.0	0.37	658.4	0.0	95.1	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.1	0.5	3.03	8.32	3.96	5.99	23.72	1.00	0.00	0.00	1.00	0	3.76	3.03	8.32
CIB_04	679.7	1.1	18142.5	0.0	0.0	0.00	679.7	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	3.05	8.47	6.60	4.51	29.79	0.97	0.00	0.00	1.00	0	1.51	2.96	8.24
CIB_05	1728.1	2.7	33570.0	13739.4	6165.3	1.46	1079.8	0.0	0.0	1.0	420.0	1.5	0.0	3.0	228.3	6.0	0.0	1.2	2.6	3.51	8.94	7.04	6.10	42.93	0.91	0.00	0.00	1.00	0	22.74	3.21	8.17
CIB_06	987.7	1.5	15038.7	7923.0	0.0	1.04	242.6	0.0	0.0	1.0	357.7	1.5	0.0	3.0	387.5	6.0	0.0	2.9	3.9	2.45	6.18	3.70	8.21	30.34	0.97	0.00	0.00	1.00	0	24.83	2.38	6.00
CIB_07	1271.8	2.0	16320.1	9802.4	0.0	1.13	369.8	0.0	34.3	1.0	210.1	1.5	64.9	3.0	592.6	6.0	0.0	3.2	4.3	2.63	6.49	4.69	8.73	40.95	0.92	0.00	0.00	1.00	0	27.10	2.43	5.98
CIB_08	448.2	0.7	2475.8	4106.7	5488.0	3.75	1.9	0.0	31.3	1.0	37.8	1.5	199.3	3.0	178.1	6.0	0.0	3.9	7.7	1.27	2.95	5.66	9.21	52.09	0.88	0.00	0.00	1.00	0	36.56	1.12	2.60
CIB_09	235.4	0.4	1817.6	3555.0	54.3	2.03	0.0	0.0	57.3	1.0	0.0	1.5	116.2	3.0	62.0	6.0	0.0	3.3	5.3	1.17	3.02	1.51	11.31	17.06	1.00	0.00	0.00	1.00	0	27.81	1.17	3.02
SC_01	1990.1	3.1	48148.7	0.0	0.0	0.00	1564.3	0.0	425.8	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.2	0.2	4.68	12.49	1.98	5.64	11.18	1.00	0.00	0.00	1.00	0	5.82	4.68	12.49
SC_02	963.6	1.5	19523.6	0.0	0.0	0.00	963.6	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	3.53	9.68	2.93	4.19	12.30	1.00	0.00	0.00	1.00	0	4.96	3.53	9.68
SC_03	1275.4	2.0	41644.4	0.0	0.0	0.00	1275.4	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	3.97	10.79	3.96	6.76	26.78	0.99	0.00	0.00	1.00	0	6.81	3.93	10.69
SC_04	1652.1	2.6	44001.4	0.0	0.0	0.00	1652.1	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	4.42	11.92	3.73	4.45	16.60	1.00	0.00	0.00	1.00	0	5.88	4.42	11.92
SC_05	581.9	0.9	14413.0	0.0	0.0	0.00	581.9	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	2.85	7.97	6.03	3.10	18.73	1.00	0.00	0.00	1.00	0	1.55	2.85	7.97
SC_06	1311.4	2.0	36943.8	0.0	0.0	0.00	1003.5	0.0	156.9	1.0	151.0	1.5	0.0	3.0	0.0	6.0	0.0	0.3	0.3	3.90	10.54	2.22	5.09	11.31	1.00	0.00	0.00	1.00	0	8.63	3.90	10.54
SC_07	1374.1	2.1	39610.3	0.0	0.0	0.00	1298.8	0.0	0.0	1.0	75.3	1.5	0.0	3.0	0.0	6.0	0.0	0.1	0.1	4.06	11.00	5.87	4.46	26.14	0.99	0.00	0.00	1.00	0	6.57	4.04	10.94
SC_08	1257.9	2.0	34432.4	6507.8	0.0	0.48	1152.3	0.0	94.7	1.0	10.8	1.5	0.0	3.0	0.0	6.0	0.0	0.1	0.6	3.73	10.05	4.80	4.81	23.11	1.00	0.00	0.00	1.00	0	5.04	3.73	10.05
SC_09	1201.6	1.9	18790.7	17670.9	0.0	1.45	671.9	0.0	0.0	1.0	441.8	1.5	0.0	3.0	87.9	6.0	0.0	1.0	2.4	3.06	7.93	3.02	5.41	16.31	1.00	0.00	0.00	1.00	0	12.43	3.06	7.93
SC_10	631.6	1.0	541.5	15426.9	0.0	2.90	504.6	0.0	0.0	1.0	89.5	1.5	0.0	3.0	37.5	6.0	0.0	0.6	3.5	2.11	5.49	5.28	8.96	47.33	0.90	0.00	0.00	1.00	0	17.14	1.90	4.93
SC_11	1187.2	1.9	5096.3	26778.7	4665.0	2.96	446.3	0.0	0.0	1.0	166.3	1.5	0.0	3.0	574.6	6.0	0.0	3.1	6.1	2.20	5.16	9.24	9.53	88.03	0.80	0.00	0.00	1.00	0	34.98	1.76	4.12
WF_01	1746.4	2.7	49116.4	1.7	0.0	0.00	1745.4	0.0	0.0	1.0	1.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.0	4.53	12.18	5.51	6.39	35.23	0.95	0.00	0.00	1.00	0	4.37	4.28	11.52
WF_02	1213.7	1.9	36073.6	1248.7	0.0	0.10	1213.7	0.0	0.0	1.0	0.0	1.5	0.0	3.0	0.0	6.0	0.0	0.0	0.1	3.85	10.46	4.53	4.99	22.57	1.00	0.00	0.00	1.00	0	1.01	3.85	10.46
WF_03	1147.5	1.8	21525.6	0.0	0.0	0.00	1039.1	0.0	0.0	1.0	108.4	1.5	0.0	3.0	0.0	6.0	0.0	0.1	0.1	3.74	10.19	2.26	11.54	26.12	0.99	0.00	0.00	1.00	0	10.68	3.72	10.13
WF_04	1333.5	2.1	28980.3	10112.9	0.0	0.78	1286.6	0.0	0.0	1.0	0.0	1.5	0.0	3.0	46.9	6.0	0.0	0.2	1.0	3.67	9.78	4.69	5.31	24.92	1.00	0.00	0.00	1.00	0	6.05	3.67	9.78
WF_05	1661.6	2.6	35003.3	15484.0	0.0	0.92	1488.7	0.0	159.4	1.0	0.0	1.5	0.0	3.0	13.4	6.0	0.0	0.1	1.1	4.00	10.55	4.59	6.52	29.94	0.97	0.00	0.00	1.00	0	5.76	3.89	10.26
WF_06	935.2	1.5	7814.4	16183.3	0.0	2.02	517.0	0.0	0.0	1.0	26.7	1.5	0.0	3.0	391.4	6.0	0.0	2.6	4.6	2.26	5.61	3.84	4.53	17.40	1.00	0.00	0.00	1.00	0	23.44	2.26	5.61
WF_07	1766.4	2.8	21830.8	14120.4	3701.0	1.63	1094.1	0.0	0.0	1.0	0.0	1.5	0.0	3.0	672.3	6.0	0.0	2.3	3.9	3.15	7.75	3.84	5.32	20.41	1.00	299.00	108.33	1.25	0	17.22	3.94	9.68
WF_08	1584.8	2.5	17826.6	4387.0	1350.9	0.90	1179.8	0.0	0.0	1.0	0.0	1.5	0.0	3.0	405.0	6.0	0.0	1.5	2.4	3.44	8.83	4.40	5.18	22.81	1.00	180.00	72.69	1.09	0	6.56	3.75	9.62
WF_09	1088.2	1.7	5827.3	10112.6	6581.7	3.10	8.8	0.0	159.4	1.0	0.0	1.5	0.0	3.0	920.0	6.0	0.0	5.2	8.3	1.78	3.84	3.52	9.12	32.10	0.96	0.00	0.00	1.00	0	40.95	1.71	3.70
WF_10	1568.7	2.5	24662.5	4209.5	6756.3	1.49	641.9	0.0	18.8	1.0	169.4	1.5	0.0	3.0	738.7	6.0	0.0	3.0	4.5	2.85	6.92	3.77	10.41	39.25	0.93	0.00	0.00	1.00	0	32.48	2.64	6.43
WF_11	528.2	0.8	8083.8	3713.8	3606.6	2.13	10.5	0.0	173.2	1.0	35.4	1.5	0.0	3.0	309.2	6.0	0.1	3.9	6.1	1.56	3.78	4.40	17.37	76.43	0.82	0.00	0.00	1.00	0	35.11	1.28	3.10
WF_12	1204.2	1.9	11556.8	8977.4	12184.0	3.06	250.4	0.0	147.0	1.0	158.4	1.5	55.0	3.0	593.4	6.0	0.0	3.4	6.5	2.15	4.96	13.20	14.73	194.38	0.67	199.00	105.76	1.24	0	31.75	1.78	4.10
WF_13	844.2	1.3	3762.7	80.8	17756.7	4.94	0.0	0.0	287.2	1.0	3.4	1.5	123.0	3.0	430.9	6.0	0.2	3.8	8.8	1.53	3.30	6.16	10.50	64.67	0.85	700.00	530.68	8.94	0	53.41	11.62	25.02
WF_14	1129.6	1.8	37.2	15191.3	2525.5	3.42	2.7	0.0	3.9	1.0	89.2	1.5	0.0	3.0	1034.4	6.0	0.4	5.6	9.0	1.71	3.59	13.20	10.76	142.06	0.72	526.00	298.00	3.38	0	42.65	4.17	8.74
WF_15	1467.3	2.3	6836.5	16721.1	3961.2	2.69	51.0	0.0	131.8	1.0	81.3	1.5	0.0	3.0	1203.0	6.0	-0.2	5.1	7.8	2.11	4.59	3.77	13.90	52.42	0.88	860.00	375.12	4.86	0	42.60	9.05	19.71
WF_16	720.1	1.1	10760.7	7218.0	2120.3	1.71	265.8	0.0	0.0	1.0	202.3	1.5	0.0	3.0	251.9	6.0	-0.1	2.5	4.2	2.09	5.28	15.84	11.58	183.43	0.68	227.00	201.75	2.03	0	32.57	2.87	7.28
WF_17	1532.4	2.4	6865.9	10605.9	10679.2	3.41	68.9	0.0	0.0	1.0	101.9	1.5	0.0	3.0	1361.3	6.0	-0.2	5.4	8.8	1.99	4.13	6.79	15.10	102.50	0.77	251.00	104.83	1.23	0	46.55	1.89	3.93
WF_18	957.9	1.5	3322.8	11893.5	21055.5	4.47	0.0	0.0	0.0	1.0	0.0	1.5	0.0	3.0	957.9	6.0	0.0	6.0	10.5	1.44	2.85	6.03	10.76	64.94	0.85	0.00	0.00	1.00	0	46.42	1.22	2.41
WF_19	562.1	0.9	0.0	8634.4	2539.4	3.68	0.0	0.0	0.0	1.0	0.0	1.5	0.0	3.0	562.1	6.0	0.0	6.0	9.7	1.20	2.54	3.30	7.09	23.39	1.00	0.00	0.00	1.00	0	46.36	1.20	2.54
WF_20	1007.4	1.6	804.6	10159.8	9526.1	4.28	0.0	0.0	0.0	1.0	0.0	1.5	0.0	3.0	1007.4	6.0	0.0	6.0	10.3	1.49	2.97	12.67	10.83	137.19	0.73	0.00	0.00	1.00	0	41.68	1.08	2.16
WF_21	1183.5	1.8	0.0	10450.1	6353.9	4.13	0.2	0.0	0.0	1.0	0.0	1.5	0.0	3.0	1183.3	6.0	0.0	6.0	10.1	1.61	3.21	2.40	10.16	24.39	1.00	0.00	0.00	1.00	0	38.26	1.61	3.21
WF_22	690.2	1.1	7232.5	0.0	0.0	0.00	628.6	0.0	0.0	1.0	0.0	1.5	0.0	3.0	61.7	6.0	0.0	0.5	0.5	2.91	8.00	5.87	7.09	41.61	0.92	0.00	0.00	1.00	0	7.48	2.67	7.35
WF_23	927.1	1.4	0.0	9018.0	3650.7	3.86	0.1	0.0	0.0	1.0	0.0	1.5	0.0	3.0	927.0	6.0	0.0	6.0	9.9	1.48	3.02	3.96	6.72	26.60	0.99	0.00	0.00	1.00	0	41.77	1.46	2.99
WF_24	410.0	0.6	0.0	8956.8	1872.8	3.52	244.7	0.0	0.0	1.0	0.0	1.5	0.0	3.0	165.3	6.0	0.0	2.4	5.9	1.41	3.48	3.30	7.78	25.67	1.00	0.00	0.00	1.00	0	27.20	1.41	3.48

Sunterra Model Effective Hydrological Calculations Pg. 1

TC&R Calculations in Post-Project condition

Subwatershed	Drainage Area (acres)	Drainage Area (sq.mi.)	Watershed Length (mi.) L	Length to Centroid(mi.) Lca	Channel Slope(ft./mi) S	Overland Slope(ft./mi.) So	D	Percent Urban Development DLU	Percent Channel Improvement DCI	Percent Channel Conveyance DCC	Percent Ponding DPP	DLU affected by Detention DET	Percent Impervious	(TC+R)"	TC"	R"	DLU Minimum	DLU *(Detention)*	Ponding Adjustments for Storage Values (R")				
																			10% (10-Yr)	4% (25-Yr)	2% (50-Yr)	1% (100-Yr)	0.2% (500-Yr)
T100A	8802.8	13.75	8.23	3.50	4.22	4.22	2.46	1.74	0	100	83	0.00	2.16	19.32	4.31	15.01	17.59	1.74	46.29	39.94	36.30	32.54	25.68
T100D1_1	669.7	1.05	1.82	0.59	0.10	0.10	2.46	90.23	0	100	0	0.00	45.11	8.13	3.97	4.16	17.59	90.23	4.16	4.16	4.16	4.16	4.16
T100D1_2	104.3	0.16	0.71	0.26	0.10	0.10	2.46	76.73	0	100	0	0.00	39.15	4.67	1.71	2.95	17.59	76.73	2.95	2.95	2.95	2.95	2.95
T100D2_1	971.5	1.52	1.93	0.58	0.10	0.10	2.46	90.62	0	100	0	0.00	47.19	8.44	3.89	4.55	17.59	90.62	4.55	4.55	4.55	4.55	4.55
T100D2_2	277.9	0.43	1.22	0.56	0.88	1.17	2.46	87.84	0	100	0	0.00	45.00	2.90	1.18	1.71	17.59	87.84	1.71	1.71	1.71	1.71	1.71
T100D2_3	223.6	0.35	0.71	0.11	0.06	0.06	2.46	95.00	0	100	100	100.00	52.34	15.17	1.02	14.15	17.59	17.59	45.30	38.88	35.22	31.45	24.61
CIB_01_Upd	746.4	1.17	1.65	0.82	0.06	0.09	2.46	5.14	0	100	95	0.00	4.72	27.87	8.77	19.10	17.59	5.14	60.56	52.05	47.19	42.18	33.08
320Ac	327.7	0.51	1.15	0.52	0.10	0.01	2.46	92.10	0	100	0	0.00	51.02	5.79	3.45	2.34	17.59	92.10	2.34	2.34	2.34	2.34	2.34

Appendix 10 - Peak flow calculation using Site Runoff Curves.

$Q=bA^m$ Where: Q = peak Discharge (cfs)
A = drainage area (acres)
m = 1.0 for 1 to 20 acres and 0.823 (0.786 for ATLAS 14) for more than 20acres up to 640 acres
b = variable dependent on impervious cover

T100D1_2

Drainage Area = 101.7 Ac. 0.16 Sq. Mile
m = 0.786 for ATLAS 14 100 Year, 0.823 for 2-, 10-, 100-, 500-Year

		b					Q (cfs)				
	% Impervious	2-yr	10-yr	100-yr	500-yr	ATLAS100-yr	2-yr	10-yr	100-yr	500-yr	Atlas100-yr
Existing	0.0%	1.20	2.10	3.40	4.80	4.60	**53.9**	**94.2**	**152.6**	**215.4**	**174.0**
Proposed	39.1%	2.37	4.54	7.22	10.56	8.80	**106.6**	**203.8**	**324.2**	**474.1**	**332.8**

T100D2_2

Drainage Area = 277.9 0.43 Sq. Mile
m = 0.786 for ATLAS 14 100 Year, 0.823 for 2-, 10-, 100-, 500-Year

		b					Q (cfs)				
	% Impervious	2-yr	10-yr	100-yr	500-yr	ATLAS100-yr	2-yr	10-yr	100-yr	500-yr	Atlas100-yr
Existing	6.2%	1.39	2.41	3.96	5.48	5.16	**142.3**	**247.5**	**406.4**	**562.9**	**430.0**
Proposed	45.0%	2.54	4.74	7.46	10.86	9.12	**261.2**	**487.0**	**765.2**	**1114.2**	**760.3**

T100D2_3

Drainage Area = 223.6 0.35 Sq. Mile
m = 0.786 for ATLAS 14 100 Year, 0.823 for 2-, 10-, 100-, 500-Year

		b					Q (cfs)				
	% Impervious	2-yr	10-yr	100-yr	500-yr	ATLAS100-yr	2-yr	10-yr	100-yr	500-yr	Atlas100-yr
Existing	13%*	1.59	2.75	4.60	6.32	5.80	**136.5**	**236.0**	**394.8**	**542.4**	**407.5**
Proposed	13%*	1.59	2.75	4.60	6.32	5.80	**136.5**	**236.0**	**394.8**	**542.4**	**407.5**

** % impervious Pre-development of Lakehouse used*

320AC

Drainage Area = 327.7 0.51 Sq. Mile
m = 0.786 for ATLAS 14 100 Year, 0.823 for 2-, 10-, 100-, 500-Year

		b					Q (cfs)				
	% Impervious	2-yr	10-yr	100-yr	500-yr	ATLAS100-yr	2-yr	10-yr	100-yr	500-yr	Atlas100-yr
Existing	-	-	-	-	-	-	**-**	**-**	**-**	**-**	-
Proposed	51.0%	2.72	4.92	7.64	11.04	9.39	**319.5**	**578.1**	**898.4**	**1298.1**	**890.8**

Appendix 11 – Percentage Impervious Calculations-Existing Condition

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area
CIB_01	Undeveloped	0	Unimproved, natural, or agricultural	898.26	0.00
CIB_01	Light Industrial/ Commercial	65	Nurseries, warehouses, or manufacturing with nonpaved areas	27.77	1805.05
CIB_01	Residential Rural Lot	5	≥ 5 acre ranch or farm land	136.48	682.40
CIB_01	Water	100	Detention basins, lakes, and channels	11.58	1158.00
			Total	**1074.09**	**3645.45**
			% Impervious (Weighted Average)		**3.39**

Appendix 12 – Percentage Impervious Calculations-Proposed Condition

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area_Ac
T100D1_1	Developed Green Area	15	Developed Green Areas	95.53	1432.99
T100D1_1	High Density	85	Commercial, business	8.93	759.05
T100D1_1	Light Industrial	65	Light Industrial	13.47	875.62
T100D1_1	Residential–Rural Lot	5	≥ 5 acre ranch or farm land	0.00	0.01
T100D1_1	Residential-Small Lot	40	≤ ¼ acre	435.76	17430.24
T100D1_1	Transportation	80	Transportation	6.27	501.66
T100D1_1	Undeveloped	0	Unimproved, natural, or agricultural	17.67	0.00
T100D1_1	Water	100	Detention basins, lakes, and channels	92.28	9227.94
			Total	**669.91**	**30227.51**
			% Impervious (Weighted Average)		**45.12**

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area_Ac
T100D1_2	Developed Green Area	15	Developed Green Areas	15.68	235.20
T100D1_2	Residential–Rural Lot	5	≥ 5 acre ranch or farm land	5.37	26.84
T100D1_2	Residential-Small Lot	40	≤ ¼ acre	54.96	2198.40
T100D1_2	Transportation	80	Transportation	0.53	42.50
T100D1_2	Undeveloped	0	Unimproved, natural, or agricultural	10.48	0.00
T100D1_2	Water	100	Detention basins, lakes, and channels	14.77	1476.80
			Total	**101.79**	**3979.74**
			% Impervious (Weighted Average)		**39.10**

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area_Ac
T100D2_1	Developed Green Area	15	Developed Green Areas	99.24	1488.64
T100D2_1	High Density	85	Commercial, business	12.11	1028.93
T100D2_1	Residential–Rural Lot	5	≥ 5 acre ranch or farm land	21.20	106.00
T100D2_1	Residential-Small Lot	40	≤ ¼ acre	640.76	25630.56
T100D2_1	Schools	40	Schools with non paved areas	10.98	439.37
T100D2_1	Transportation	80	Transportation	9.02	721.80
T100D2_1	Undeveloped	0	Unimproved, natural, or agricultural	14.80	0.00
T100D2_1	Water	100	Detention basins, lakes, and channels	163.33	16332.73
			Total	**971.44**	**45748.02**
			% Impervious (Weighted Average)		**47.09**

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area_Ac
T100D2_2	Developed Green Area	15	Developed Green Areas	67.58	1013.75
T100D2_2	Light Industrial	65	Light Industrial	4.80	312.08
T100D2_2	Residential-Small Lot	40	≤ ¼ acre	155.33	6213.08
T100D2_2	Transportation	80	Transportation	3.22	257.37
T100D2_2	Water	100	Detention basins, lakes, and channels	47.05	4705.22
			Total	**277.98**	**12501.51**
			% Impervious (Weighted Average)		**44.97**

Subbasin	Land Use	% Impervious	Description	Area (Acre)	Pct_Impv X Area_Ac
320AC	Developed Green Areas	15	Developed Green Areas	23.68	355.21
320AC	High Density	85	Commercial, business	37.45	3182.83
320AC	Residential-Small Lot	40	≤ ¼ acre	197.31	7892.24
320AC	Schools	40	Schools with non paved areas	14.72	588.93
320AC	Transportation	80	Transportation	4.93	394.25
320AC	Undeveloped	0	Unimproved, natural, or agricultural	6.61	0.00
320AC	Water	100	Detention basins, lakes, and channels	43.02	4302.10
			Total	**327.71**	**16715.56**
			% Impervious (Weighted Average)		**51.01**

Overall % impervious of the development: 46.5%

Appendix 4
HEC-HMS Results

Existing 2-year Run Results

Hydrologic Element	Drainage Area (mi2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
Brook_Trib1_01	3.20156	1087.375	04Jul2020, 13:45	554.83
Brook_03	1.91875	245.88	04Jul2020, 15:15	335.91
Brook_04	1.53906	400.351	04Jul2020, 14:15	253.18
Brook_05	1.83125	508.25	04Jul2020, 14:30	311.6
Brook_06	2.471623	554.301	04Jul2020, 15:00	441.11
Brook_07	2.802653	593.387	04Jul2020, 15:30	545.62
Brook_08	9.38281	640.865	04Jul2020, 17:45	1522.96
CIB_01	1.17	116.861	04Jul2020, 17:00	159.3
CIB_02a	1.25875	204.717	04Jul2020, 15:30	189.69
CIB_02b	1.06125	150.301	04Jul2020, 15:45	162.57
CIB_03	0.506621	105.016	04Jul2020, 14:30	70.63
CIB_05	1.935249	316.929	04Jul2020, 15:30	285.92
CIB_06	1.717482	395.252	04Jul2020, 14:45	297.98
CIB_07	1.686221	397.409	04Jul2020, 14:45	286.41
CIB_08	0.7003	327.206	04Jul2020, 13:15	120.78
CIB_09	0.3679	149.123	04Jul2020, 13:30	59.78
SC_01	3.1095	332.635	04Jul2020, 16:45	427.28
SC_02	1.5057	204.546	04Jul2020, 15:30	205.42
SC_03	1.9928	248.942	04Jul2020, 16:00	276.08
SC_04	2.5815	289.211	04Jul2020, 16:30	354.9
SC_05	0.9092	146.403	04Jul2020, 15:00	120.51
SC_06	1.99	253.365	04Jul2020, 16:15	286.34
SC_07	1.171268	205.293	04Jul2020, 15:00	164.58
SC_08	1.9654	257.692	04Jul2020, 15:45	268.32
SC_09	1.8776	315.609	04Jul2020, 15:15	272.15
SC_10	1.11358	264.111	04Jul2020, 14:30	186.45
SC_11	1.855	595.64	04Jul2020, 14:00	316.58
T100D1_1	1.05	304.055	04Jul2020, 15:45	191.34
T100D1_2	0.16	179.124	04Jul2020, 13:00	28.06
T100D2_J	3.325371	382.254	04Jul2020, 16:15	521.54
T100D2_1	1.521	421.698	04Jul2020, 15:45	280.58
T100D2_2	0.43	396.793	04Jul2020, 13:00	78.28
T100D2_3	0.35	176.86	04Jul2020, 13:15	66.66
WF_01	2.7287	313.276	04Jul2020, 16:15	370.44
WF_02	1.8965	234.914	04Jul2020, 16:00	250.2
WF_03	1.793	239.877	04Jul2020, 15:45	256.31
WF_04	2.0836	281.294	04Jul2020, 15:45	286.86
WF_05	2.5962	334.048	04Jul2020, 16:00	356.57
WF_06	1.4612	357.947	04Jul2020, 15:00	332.41
WF_07	2.7601	522.597	04Jul2020, 15:45	513.75
WF_08	2.4763	437.765	04Jul2020, 15:30	407.9
WF_09	1.7003	602.064	04Jul2020, 13:45	301.75
WF_10	2.4511	535.625	04Jul2020, 14:45	411.32
WF_11	0.8253	336.108	04Jul2020, 13:30	140.97
320AC	0.51	466.673	04Jul2020, 13:00	96.37

Existing 10-year Run Results

Hydrologic Element	Drainage Area (mi2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
Brook_Trib1_01	3.20156	1799.582	04Jul2020, 13:45	1089.15
Brook_03	1.91875	430.537	04Jul2020, 15:30	656.78
Brook_04	1.53906	680.751	04Jul2020, 14:15	507.46
Brook_05	1.83125	860.718	04Jul2020, 14:30	616.13
Brook_06	2.471623	948.738	04Jul2020, 15:15	856.03
Brook_07	2.802653	1004.013	04Jul2020, 15:30	1024.75
Brook_08	9.38281	1181.728	04Jul2020, 18:15	3069.28
CIB_01	1.17	222.534	04Jul2020, 17:00	323.21
CIB_02a	1.25875	370.301	04Jul2020, 15:30	373.52
CIB_02b	1.06125	273.838	04Jul2020, 16:00	318.64
CIB_03	0.506621	187.616	04Jul2020, 14:30	142.28
CIB_05	1.935249	574.797	04Jul2020, 15:30	566.2
CIB_06	1.717482	680.863	04Jul2020, 15:00	564.83
CIB_07	1.686221	686.604	04Jul2020, 14:45	545.88
CIB_08	0.7003	531.796	04Jul2020, 13:15	229.28
CIB_09	0.3679	248.111	04Jul2020, 13:30	115.28
SC_01	3.1095	629.482	04Jul2020, 17:00	864.5
SC_02	1.5057	380.657	04Jul2020, 15:45	416.53
SC_03	1.9928	464.408	04Jul2020, 16:15	557.2
SC_04	2.5815	545.046	04Jul2020, 16:45	717.95
SC_05	0.9092	268.558	04Jul2020, 15:00	246.54
SC_06	1.99	470.218	04Jul2020, 16:15	571.42
SC_07	1.171268	373.229	04Jul2020, 15:15	330.75
SC_08	1.9654	480.529	04Jul2020, 16:00	543.95
SC_09	1.8776	572.276	04Jul2020, 15:15	541.95
SC_10	1.11358	456.47	04Jul2020, 14:45	356.7
SC_11	1.855	1003.277	04Jul2020, 14:00	602.63
T100D1_1	1.05	521.406	04Jul2020, 15:45	359.92
T100D1_2	0.16	270.723	04Jul2020, 13:00	53.33
T100D2_J	3.325371	705.918	04Jul2020, 16:00	1006.87
T100D2_1	1.521	722.699	04Jul2020, 15:45	526.1
T100D2_2	0.43	608.931	04Jul2020, 13:00	147.3
T100D2_3	0.35	282.406	04Jul2020, 13:15	123.96
WF_01	2.7287	591.305	04Jul2020, 16:30	752.27
WF_02	1.8965	442.402	04Jul2020, 16:00	512.6
WF_03	1.793	443.077	04Jul2020, 16:00	512.49
WF_04	2.0836	522.311	04Jul2020, 16:00	580.05
WF_05	2.5962	623.211	04Jul2020, 16:00	721.54
WF_06	1.4612	588.32	04Jul2020, 15:15	591.7
WF_07	2.7601	905.938	04Jul2020, 15:45	956.84
WF_08	2.4763	776.538	04Jul2020, 15:45	783.74
WF_09	1.7003	1000.553	04Jul2020, 14:00	568.68
WF_10	2.4511	929.463	04Jul2020, 14:45	786.44
WF_11	0.8253	553.984	04Jul2020, 13:30	268.29
320AC	0.51	712.639	04Jul2020, 13:00	179.57

Existing 100-year Run Results

Hydrologic Element	Drainage Area (mi2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
Brook_Trib1_01	3.20156	3369.464	04Jul2020, 14:00	2418.45
Brook_03	1.91875	878.536	04Jul2020, 16:00	1453.77
Brook_04	1.53906	1319.126	04Jul2020, 14:30	1145.2
Brook_05	1.83125	1651.907	04Jul2020, 14:45	1375.93
Brook_06	2.471623	1854.5	04Jul2020, 15:15	1883.47
Brook_07	2.802653	1955.4	04Jul2020, 15:45	2194.1
Brook_08	9.38281	2522.563	04Jul2020, 19:00	6955.28
CIB_01	1.17	483.644	04Jul2020, 17:30	789.59
CIB_02a	1.25875	763.095	04Jul2020, 15:45	879.55
CIB_02b	1.06125	569.363	04Jul2020, 16:15	745.9
CIB_03	0.506621	380.622	04Jul2020, 14:45	344.62
CIB_05	1.935249	1189.278	04Jul2020, 16:00	1342.86
CIB_06	1.717482	1338.799	04Jul2020, 15:00	1264.43
CIB_07	1.686221	1348.015	04Jul2020, 15:00	1231.31
CIB_08	0.7003	955.473	04Jul2020, 13:30	514.37
CIB_09	0.3679	457.088	04Jul2020, 13:30	264.2
SC_01	3.1095	1359.873	04Jul2020, 17:15	2104.91
SC_02	1.5057	805.62	04Jul2020, 16:15	1016.82
SC_03	1.9928	989.172	04Jul2020, 16:30	1352.68
SC_04	2.5815	1172.901	04Jul2020, 17:00	1747.78
SC_05	0.9092	562.394	04Jul2020, 15:30	608.19
SC_06	1.99	995.648	04Jul2020, 16:45	1368.26
SC_07	1.171268	770.292	04Jul2020, 15:30	798.83
SC_08	1.9654	1020.721	04Jul2020, 16:15	1327.56
SC_09	1.8776	1180.388	04Jul2020, 15:30	1294.25
SC_10	1.11358	896.543	04Jul2020, 14:45	808.73
SC_11	1.855	1896.524	04Jul2020, 14:00	1357.02
T100D1_1	1.05	1010.273	04Jul2020, 15:45	792.14
T100D1_2	0.16	430.184	04Jul2020, 13:00	118.97
T100D2_J	3.325371	1506.142	04Jul2020, 17:30	2299.22
T100D2_1	1.521	1401.935	04Jul2020, 15:45	1152.88
T100D2_2	0.43	995.156	04Jul2020, 13:00	324.29
T100D2_3	0.35	497.938	04Jul2020, 13:15	268.6
WF_01	2.7287	1270.545	04Jul2020, 17:00	1839.72
WF_02	1.8965	948.864	04Jul2020, 16:30	1266.71
WF_03	1.793	933.934	04Jul2020, 16:15	1230.05
WF_04	2.0836	1106.797	04Jul2020, 16:15	1411.34
WF_05	2.5962	1327.014	04Jul2020, 16:30	1757.15
WF_06	1.4612	1109.533	04Jul2020, 15:15	1205.34
WF_07	2.7601	1796.224	04Jul2020, 16:00	2089.3
WF_08	2.4763	1573.959	04Jul2020, 16:00	1787.36
WF_09	1.7003	1872.162	04Jul2020, 14:00	1262.86
WF_10	2.4511	1841.634	04Jul2020, 15:00	1781.62
WF_11	0.8253	1013.246	04Jul2020, 13:30	603.95
320AC	0.51	1165.788	04Jul2020, 13:00	390.18

Appendix 5
Hurricane Harvey High Water Mark Gauge Data

Cane Island Branch - Sta 2040 - HWY 90
Hurricane Harvey High Water Mark Data

Sensor	Reading Date	Elevation (ft)
2043	8/28/2017 23:52	138.01
2043	8/28/2017 22:44	138.12
2043	8/28/2017 21:12	138.22
2043	8/28/2017 20:13	138.29
2043	8/28/2017 17:12	138.4
2043	8/28/2017 15:07	138.46
2043	8/28/2017 13:11	138.56
2043	8/28/2017 12:46	138.52
2043	8/28/2017 11:38	138.65
2043	8/28/2017 10:58	138.75
2043	8/28/2017 9:10	138.85
2043	8/28/2017 8:34	138.92
2043	8/28/2017 7:28	139.04
2043	8/28/2017 6:09	139.15
2043	8/28/2017 5:09	139.25
2043	8/28/2017 5:04	139.24
2043	8/28/2017 1:08	139.34
2043	8/28/2017 0:43	139.32
2043	8/27/2017 23:49	139.22
2043	8/27/2017 23:04	139.1
2043	8/27/2017 22:44	139
2043	8/27/2017 22:24	138.9
2043	8/27/2017 22:10	138.78
2043	8/27/2017 21:50	138.67
2043	8/27/2017 21:33	138.57
2043	8/27/2017 21:22	138.46
2043	8/27/2017 21:07	138.33
2043	8/27/2017 20:57	138.25
2043	8/27/2017 20:45	138.11
2043	8/27/2017 20:34	138
2043	8/27/2017 20:26	137.9
2043	8/27/2017 20:14	137.79
2043	8/27/2017 20:03	137.67
2043	8/27/2017 19:54	137.57
2043	8/27/2017 19:46	137.46
2043	8/27/2017 19:29	137.34
2043	8/27/2017 19:23	137.24
2043	8/27/2017 19:06	137.11
2043	8/27/2017 18:52	137
2043	8/27/2017 18:40	136.9
2043	8/27/2017 18:26	136.77
2043	8/27/2017 18:03	136.65
2043	8/27/2017 17:43	136.53
2043	8/27/2017 17:26	136.43
2043	8/27/2017 17:06	136.32
2043	8/27/2017 16:59	136.29
2043	8/27/2017 16:19	136.17
2043	8/27/2017 15:56	136.06
2043	8/27/2017 15:42	135.96

Source: Harris County Flood Warning System

Cane Island Branch - Sta 2040 - HWY 90
Hurricane Harvey High Water Mark Data

2043	8/27/2017 15:28	135.84
2043	8/27/2017 13:06	135.74
2043	8/27/2017 10:36	135.7
2043	8/27/2017 10:16	135.6
2043	8/27/2017 10:07	135.49
2043	8/27/2017 9:39	135.38
2043	8/27/2017 9:05	135.27
2043	8/27/2017 8:54	135.17
2043	8/27/2017 8:34	135.06
2043	8/27/2017 8:17	134.95
2043	8/27/2017 8:09	134.82
2043	8/27/2017 8:03	134.71
2043	8/27/2017 7:57	134.58
2043	8/27/2017 7:49	134.44
2043	8/27/2017 7:37	134.3
2043	8/27/2017 7:23	134.18
2043	8/27/2017 7:18	134.06
2043	8/27/2017 5:04	133.94
2043	8/27/2017 5:02	133.93
2043	8/27/2017 4:45	133.81
2043	8/27/2017 4:36	133.71
2043	8/27/2017 4:28	133.6
2043	8/27/2017 4:22	133.49
2043	8/27/2017 4:16	133.31
2043	8/27/2017 4:14	133.2
2043	8/27/2017 4:11	133.09
2043	8/27/2017 4:05	132.88
2043	8/27/2017 3:59	132.77
2043	8/27/2017 3:54	132.6
2043	8/27/2017 3:48	132.47
2043	8/27/2017 3:42	132.36
2043	8/27/2017 3:37	132.25
2043	8/27/2017 3:31	132.08
2043	8/27/2017 3:28	131.98
2043	8/27/2017 3:25	131.86
2043	8/27/2017 3:22	131.76
2043	8/27/2017 3:20	131.62
2043	8/27/2017 3:17	131.46
2043	8/27/2017 3:14	131.31
2043	8/27/2017 2:31	131.12
2043	8/27/2017 1:26	131.22
2043	8/27/2017 1:03	131.32
2043	8/27/2017 0:52	131.37
2043	8/27/2017 0:24	131.47
2043	8/27/2017 0:04	131.57

Source: Harris County Flood Warning System

Cane Island Branch - Sta 2050 - Clay Road
Hurricane Harvey High Water Mark Data

Sensor	Reading Date	Elevation (ft)
2049	8/28/2017 23:59	156.495
2049	8/28/2017 23:04	156.5201
2049	8/28/2017 22:50	156.4838
2049	8/28/2017 20:49	156.6185
2049	8/28/2017 20:27	156.6614
2049	8/28/2017 20:23	156.6918
2049	8/28/2017 20:21	156.5676
2049	8/28/2017 20:01	156.6779
2049	8/28/2017 19:12	156.6782
2049	8/28/2017 18:38	156.6615
2049	8/28/2017 17:19	156.7906
2049	8/28/2017 16:49	156.6844
2049	8/28/2017 16:07	156.7525
2049	8/28/2017 15:47	156.6507
2049	8/28/2017 13:15	156.7683
2049	8/28/2017 12:49	156.875
2049	8/28/2017 12:45	156.8505
2049	8/28/2017 12:13	156.8255
2049	8/28/2017 11:47	156.9449
2049	8/28/2017 11:35	156.916
2049	8/28/2017 11:06	156.908
2049	8/28/2017 11:04	157.1201
2049	8/28/2017 10:52	156.9179
2049	8/28/2017 9:40	157.0324
2049	8/28/2017 8:49	157.1018
2049	8/28/2017 8:19	157.051
2049	8/28/2017 7:31	157.1548
2049	8/28/2017 6:10	157.2574
2049	8/28/2017 5:19	157.3767
2049	8/28/2017 4:49	157.4827
2049	8/28/2017 0:49	157.4963
2049	8/27/2017 23:45	157.5475
2049	8/27/2017 22:02	157.4301
2049	8/27/2017 21:40	157.3158
2049	8/27/2017 21:17	157.2146
2049	8/27/2017 20:59	157.104
2049	8/27/2017 20:49	156.9943
2049	8/27/2017 20:35	156.9223
2049	8/27/2017 20:15	156.7681
2049	8/27/2017 19:57	156.6433
2049	8/27/2017 19:45	156.5428
2049	8/27/2017 19:18	156.4263
2049	8/27/2017 19:16	156.3144
2049	8/27/2017 19:08	156.4147
2049	8/27/2017 18:34	156.2975
2049	8/27/2017 18:04	156.1588
2049	8/27/2017 17:58	156.0267
2049	8/27/2017 17:54	156.1524
2049	8/27/2017 17:36	155.9965

Source: Harris County Flood Warning System

Cane Island Branch - Sta 2050 - Clay Road
Hurricane Harvey High Water Mark Data

2049	8/27/2017 17:34	155.8333
2049	8/27/2017 17:31	155.9769
2049	8/27/2017 17:27	155.8143
2049	8/27/2017 17:25	155.9213
2049	8/27/2017 17:13	155.8087
2049	8/27/2017 17:03	155.6714
2049	8/27/2017 17:01	155.4687
2049	8/27/2017 16:59	155.6693
2049	8/27/2017 16:57	155.5343
2049	8/27/2017 16:51	155.6548
2049	8/27/2017 16:49	155.4805
2049	8/27/2017 16:44	155.5527
2049	8/27/2017 16:37	155.4392
2049	8/27/2017 16:35	155.556
2049	8/27/2017 16:33	155.3312
2049	8/27/2017 16:25	155.4819
2049	8/27/2017 16:13	155.3731
2049	8/27/2017 16:11	155.2385
2049	8/27/2017 15:57	155.3486
2049	8/27/2017 15:55	155.0189
2049	8/27/2017 15:53	155.4548
2049	8/27/2017 15:45	155.2947
2049	8/27/2017 15:19	155.1689
2049	8/27/2017 15:13	155.0647
2049	8/27/2017 15:07	155.2539
2049	8/27/2017 15:05	155.0639
2049	8/27/2017 15:03	155.2415
2049	8/27/2017 15:01	155.0397
2049	8/27/2017 14:57	155.2173
2049	8/27/2017 14:44	155.1094
2049	8/27/2017 14:38	155.2257
2049	8/27/2017 14:30	155.1131
2049	8/27/2017 14:28	155.2431
2049	8/27/2017 13:33	155.1337
2049	8/27/2017 13:31	155.0003
2049	8/27/2017 13:11	155.1512
2049	8/27/2017 13:09	155.0451
2049	8/27/2017 13:01	155.1557
2049	8/27/2017 12:59	154.9454
2049	8/27/2017 12:57	155.0982
2049	8/27/2017 12:51	155.2209
2049	8/27/2017 12:49	155.0739
2049	8/27/2017 12:45	155.231
2049	8/27/2017 12:41	155.0039
2049	8/27/2017 12:31	155.1746
2049	8/27/2017 12:29	154.9961
2049	8/27/2017 12:25	155.1474
2049	8/27/2017 12:23	154.9042
2049	8/27/2017 11:57	155.1746
2049	8/27/2017 11:51	155.0456

Source: Harris County Flood Warning System

Cane Island Branch - Sta 2050 - Clay Road
Hurricane Harvey High Water Mark Data

2049	8/27/2017 11:49	155.1909
2049	8/27/2017 11:47	155.0798
2049	8/27/2017 11:45	155.1986
2049	8/27/2017 11:20	155.066
2049	8/27/2017 11:18	154.958
2049	8/27/2017 11:16	155.2089
2049	8/27/2017 11:10	154.8976
2049	8/27/2017 11:08	155.0996
2049	8/27/2017 11:06	154.8988
2049	8/27/2017 10:54	155.0261
2049	8/27/2017 10:52	154.9118
2049	8/27/2017 10:46	155.0432
2049	8/27/2017 10:36	154.9421
2049	8/27/2017 10:22	154.8403
2049	8/27/2017 10:08	154.7168
2049	8/27/2017 10:02	154.6047
2049	8/27/2017 10:00	154.722
2049	8/27/2017 9:21	154.5759
2049	8/27/2017 9:15	154.4033
2049	8/27/2017 9:13	154.51
2049	8/27/2017 9:11	154.2996
2049	8/27/2017 9:07	154.4348
2049	8/27/2017 9:01	154.2881
2049	8/27/2017 8:49	154.4266
2049	8/27/2017 8:41	154.3649
2049	8/27/2017 8:39	154.0913
2049	8/27/2017 8:31	154.2811
2049	8/27/2017 8:27	154.1368
2049	8/27/2017 8:23	154.325
2049	8/27/2017 8:13	154.2137
2049	8/27/2017 7:30	154.0946
2049	8/27/2017 6:34	153.9525
2049	8/27/2017 5:15	153.8489
2049	8/27/2017 4:49	153.7298
2049	8/27/2017 4:47	153.6811
2049	8/27/2017 4:33	153.5697
2049	8/27/2017 4:21	153.465
2049	8/27/2017 4:13	153.3596
2049	8/27/2017 3:59	153.2104
2049	8/27/2017 3:49	153.1018
2049	8/27/2017 3:34	152.9907
2049	8/27/2017 3:26	152.8734
2049	8/27/2017 3:14	152.7699
2049	8/27/2017 0:49	152.6649
2049	8/27/2017 0:09	152.688

Source: Harris County Flood Warning System

Willow Fork - Sta 2060 - Texas Heritage Parkway
Hurricane Harvey High Water Mark Data

Sensor	Reading Date	Elevation (ft)
2059	8/27/2017 20:37	148.39
2059	8/27/2017 20:11	148.29
2059	8/27/2017 19:59	148.18
2059	8/27/2017 19:36	148.07
2059	8/27/2017 19:24	147.97
2059	8/27/2017 19:15	147.86
2059	8/27/2017 19:03	147.71
2059	8/27/2017 18:54	147.52
2059	8/27/2017 18:19	147.41
2059	8/27/2017 17:44	147.31
2059	8/27/2017 17:00	147.19
2059	8/27/2017 16:15	147.07
2059	8/27/2017 15:59	146.97
2059	8/27/2017 15:45	146.91
2059	8/27/2017 15:31	146.8
2059	8/27/2017 15:17	146.69
2059	8/27/2017 14:56	146.59
2059	8/27/2017 14:26	146.48
2059	8/27/2017 13:16	146.37
2059	8/27/2017 11:59	146.48
2059	8/27/2017 8:29	146.52
2059	8/27/2017 7:58	146.4
2059	8/27/2017 5:20	146.35
2059	8/27/2017 4:28	146.24
2059	8/27/2017 4:12	146.13
2059	8/27/2017 3:58	146.03
2059	8/27/2017 3:47	145.92
2059	8/27/2017 3:38	145.81
2059	8/27/2017 3:28	145.69
2059	8/27/2017 3:21	145.58
2059	8/27/2017 3:14	145.46
2059	8/27/2017 3:07	145.35
2059	8/27/2017 3:03	145.25
2059	8/27/2017 2:53	145.12
2059	8/27/2017 0:54	145.01
2059	8/26/2017 23:58	145.12
2059	8/26/2017 23:37	145.15
2059	8/26/2017 22:24	145.26
2059	8/26/2017 20:16	145.36
2059	8/26/2017 19:57	145.26
2059	8/26/2017 19:46	145.21
2059	8/26/2017 19:36	145.1
2059	8/26/2017 19:29	144.99
2059	8/26/2017 19:22	144.86
2059	8/26/2017 19:18	144.76
2059	8/26/2017 19:11	144.6
2059	8/26/2017 19:04	144.5
2059	8/26/2017 18:57	144.4
2059	8/26/2017 18:50	144.28

Source: Harris County Flood Warning System

Willow Fork - Sta 2060 - Texas Heritage Parkway
Hurricane Harvey High Water Mark Data

2059	8/26/2017 18:43	144.17
2059	8/26/2017 18:38	144.06
2059	8/26/2017 18:31	143.94
2059	8/26/2017 17:56	143.84
2059	8/26/2017 15:57	143.95
2059	8/26/2017 12:57	143.91
2059	8/26/2017 12:27	143.8
2059	8/26/2017 11:57	143.7
2059	8/26/2017 10:40	143.76
2059	8/26/2017 9:11	143.86
2059	8/26/2017 7:56	143.96
2059	8/26/2017 6:44	144.04
2059	8/26/2017 5:57	144.15
2059	8/26/2017 5:48	144.02
2059	8/26/2017 5:41	143.88
2059	8/26/2017 5:36	143.76
2059	8/26/2017 5:32	143.65
2059	8/26/2017 5:27	143.49
2059	8/26/2017 5:22	143.3
2059	8/26/2017 5:20	143.2
2059	8/26/2017 5:18	143.06
2059	8/26/2017 5:15	142.89
2059	8/26/2017 5:13	142.74
2059	8/26/2017 5:11	142.58
2059	8/26/2017 5:08	142.43
2059	8/26/2017 5:06	142.27
2059	8/26/2017 5:04	142.09
2059	8/26/2017 5:01	141.94
2059	8/26/2017 4:59	141.8
2059	8/26/2017 4:57	141.64
2059	8/26/2017 4:54	141.5
2059	8/26/2017 4:52	141.34
2059	8/26/2017 4:50	141.22
2059	8/26/2017 4:45	141.08
2059	8/26/2017 3:56	140.94
2059	8/26/2017 3:14	140.86
2059	8/26/2017 3:02	140.74
2059	8/26/2017 2:55	140.63
2059	8/26/2017 2:48	140.51
2059	8/26/2017 2:44	140.35
2059	8/26/2017 2:39	140.17
2059	8/26/2017 2:34	139.96
2059	8/26/2017 2:32	139.84
2059	8/26/2017 2:30	139.72
2059	8/26/2017 2:27	139.6
2059	8/26/2017 2:25	139.5
2059	8/26/2017 2:23	139.33
2059	8/26/2017 2:20	139.18
2059	8/26/2017 2:18	139.06
2059	8/26/2017 2:16	138.94

Source: Harris County Flood Warning System

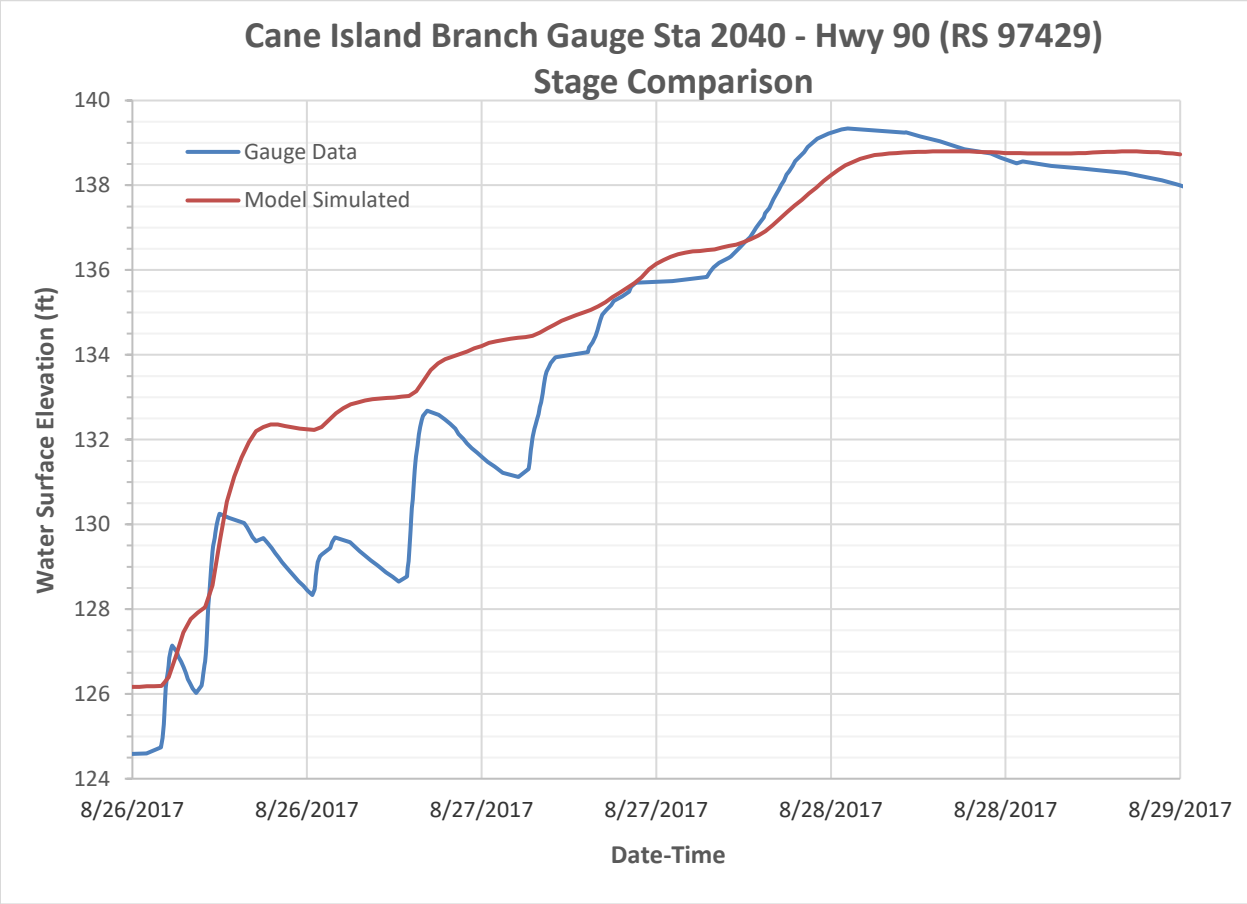
Willow Fork - Sta 2060 - Texas Heritage Parkway
Hurricane Harvey High Water Mark Data

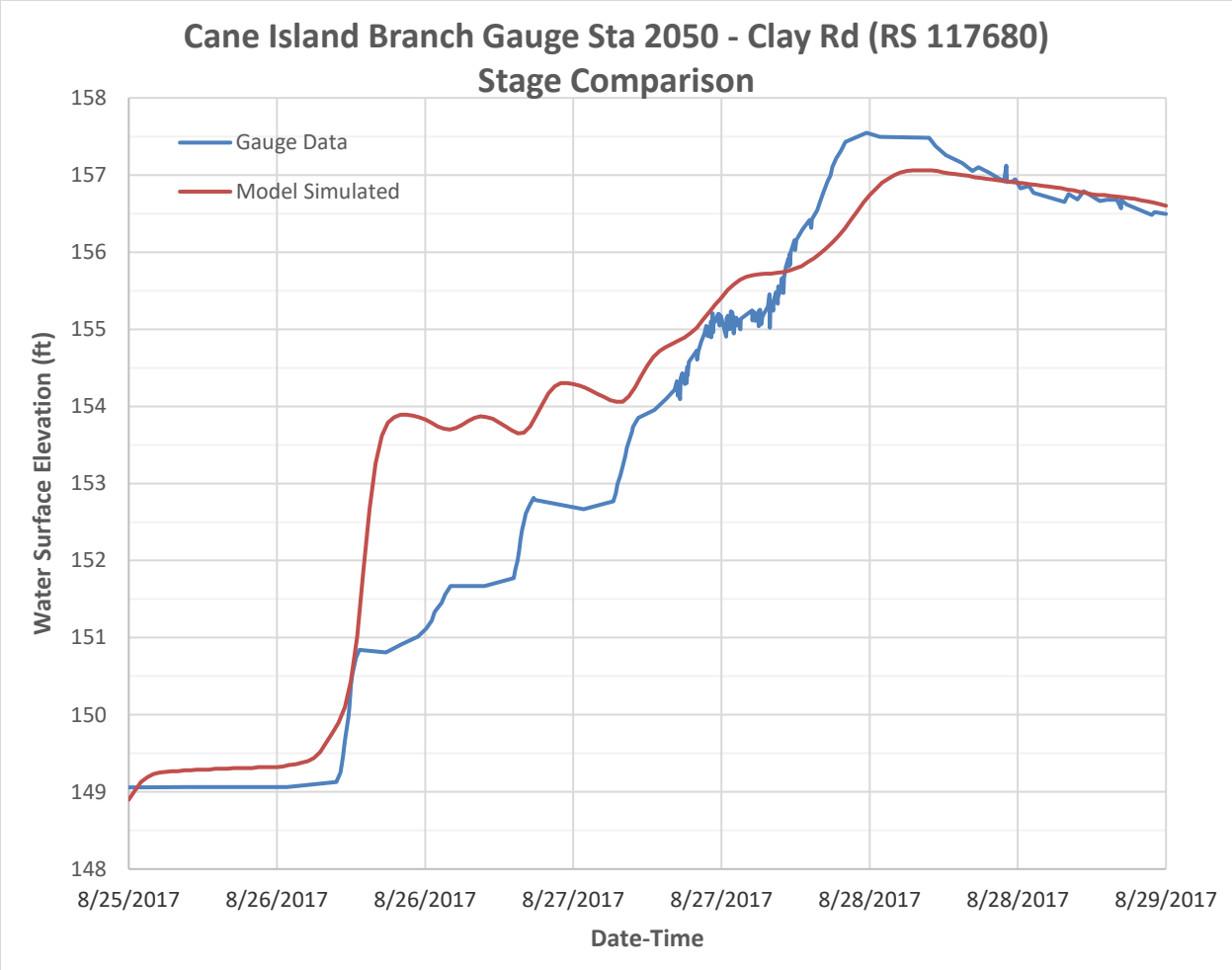
2059	8/26/2017 2:11	138.78
2059	8/26/2017 2:04	138.6
2059	8/26/2017 1:57	138.45
2059	8/26/2017 1:52	138.34
2059	8/26/2017 1:45	138.2
2059	8/26/2017 1:41	138.08
2059	8/26/2017 1:34	137.96
2059	8/26/2017 0:33	137.85
2059	8/26/2017 0:17	137.75
2059	8/26/2017 0:05	137.63

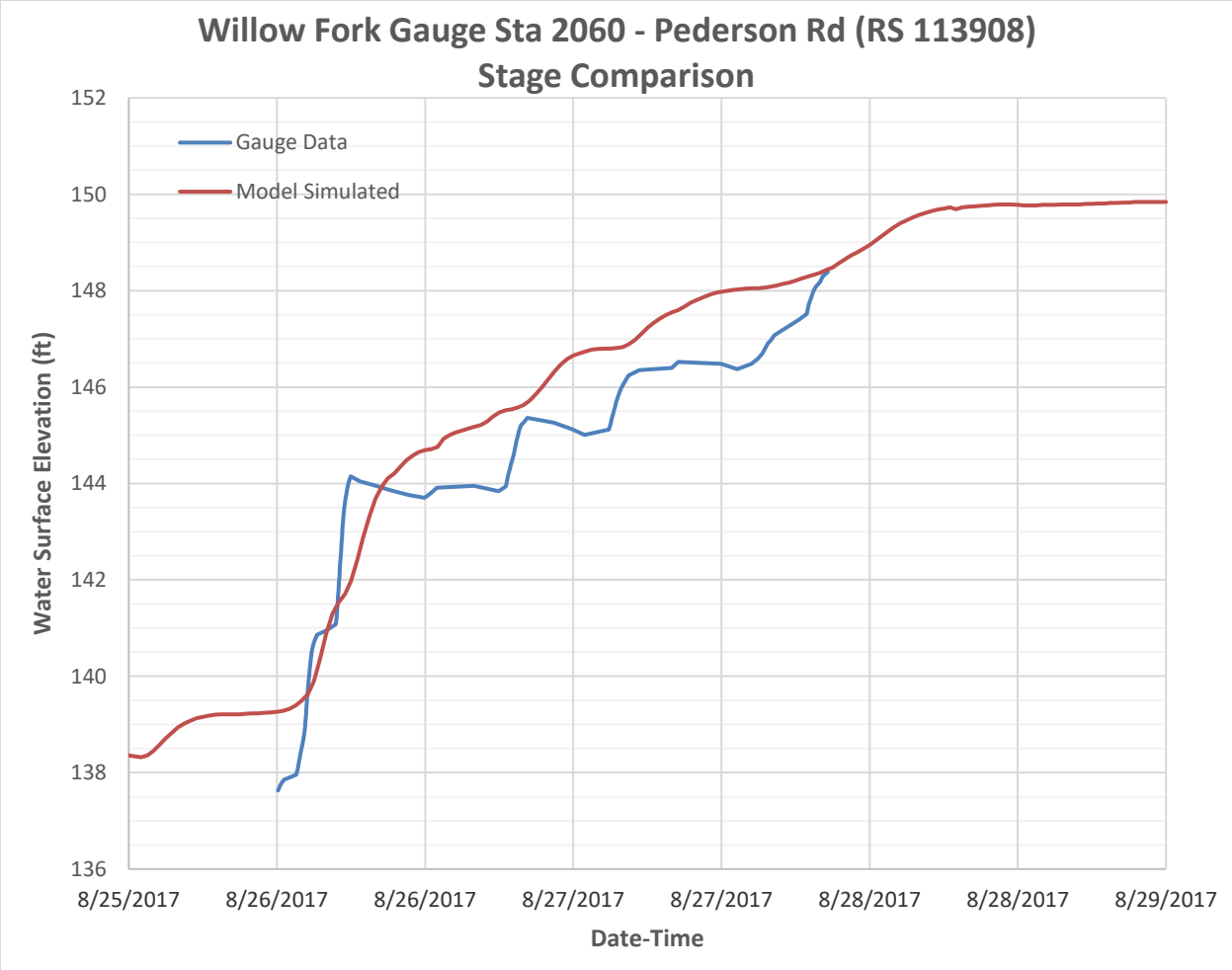
Source: Harris County Flood Warning System

Appendix 6
HEC-RAS Results

Recorded High Water Mark Data versus Modeled High Water Mark Data for Cane Island Branch and Willow Fork




Cane Island Branch Gauge Sta 2050 - Clay Rd (RS 117680)
Stage Comparison
Gauge Data
Model Simulated
Water Surface Elevation (ft)
158
157
156
155
154
153
152
151
150
149
148
8/25/2017
8/26/2017
8/26/2017
8/27/2017
8/27/2017
8/28/2017
8/28/2017
8/29/2017
Date-Time


Willow Fork Gauge Sta 2060 - Pederson Rd (RS 113908)
Stage Comparison
Gauge Data
Model Simulated
Water Surface Elevation (ft)
152
150
148
146
144
142
140
138
136
8/25/2017
8/26/2017
8/26/2017
8/27/2017
8/27/2017
8/28/2017
8/28/2017
8/29/2017
Date-Time

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	137462	Max WS	169.41	163.67
Willow Fork	Reach 1	137425		Lat Struct	
Willow Fork	Reach 1	137424		Lat Struct	
Willow Fork	Reach 1	137151	Max WS	113.71	163.36
Willow Fork	Reach 1	136840	Max WS	113.41	163.1
Willow Fork	Reach 1	136469	Max WS	86.5	162.91
Willow Fork	Reach 1	136098	Max WS	87.26	162.69
Willow Fork	Reach 1	135726	Max WS	94.32	162.46
Willow Fork	Reach 1	135354	Max WS	97.95	162.27
Willow Fork	Reach 1	134980	Max WS	103.99	161.98
Willow Fork	Reach 1	134606	Max WS	100.6	161.65
Willow Fork	Reach 1	134604		Lat Struct	
Willow Fork	Reach 1	134603		Lat Struct	
Willow Fork	Reach 1	134232	Max WS	109.12	161.31
Willow Fork	Reach 1	133858	Max WS	105.15	160.95
Willow Fork	Reach 1	133485	Max WS	103.01	160.61
Willow Fork	Reach 1	133113	Max WS	113.09	160.21
Willow Fork	Reach 1	132739	Max WS	118.25	159.8
Willow Fork	Reach 1	132365	Max WS	128.1	159.35
Willow Fork	Reach 1	131993	Max WS	83.54	159.14
Willow Fork	Reach 1	131622	Max WS	96.41	159
Willow Fork	Reach 1	131249	Max WS	85.6	158.86
Willow Fork	Reach 1	130877	Max WS	96.13	158.58
Willow Fork	Reach 1	130874		Lat Struct	
Willow Fork	Reach 1	130873		Lat Struct	
Willow Fork	Reach 1	130504	Max WS	106.7	158.29
Willow Fork	Reach 1	130132	Max WS	108.12	158.09
Willow Fork	Reach 1	129759	Max WS	115.55	157.83
Willow Fork	Reach 1	129386	Max WS	125.7	157.53
Willow Fork	Reach 1	129015	Max WS	135.67	157.2
Willow Fork	Reach 1	128644	Max WS	110.8	156.97
Willow Fork	Reach 1	128273	Max WS	132.17	156.76
Willow Fork	Reach 1	127903	Max WS	162.49	156.59
Willow Fork	Reach 1	127810	Max WS	184.6	156.57
Willow Fork	Reach 1	127717	Max WS	202.67	156.54
Willow Fork	Reach 1	127633		Lat Struct	
Willow Fork	Reach 1	127624	Max WS	241.27	156.52
Willow Fork	Reach 1	127543		Lat Struct	
Willow Fork	Reach 1	127531	Max WS	262.44	156.51
Willow Fork	Reach 1	127469	Max WS	262.49	156.51
Willow Fork	Reach 1	127399		Culvert	
Willow Fork	Reach 1	127365	Max WS	262.5	156.48
Willow Fork	Reach 1	127306	Max WS	259.59	156.47
Willow Fork	Reach 1	127285		Lat Struct	
Willow Fork	Reach 1	127252	Max WS	260.52	156.45
Willow Fork	Reach 1	127224		Lat Struct	
Willow Fork	Reach 1	127159	Max WS	276.27	156.41
Willow Fork	Reach 1	126785	Max WS	264.27	156.23
Willow Fork	Reach 1	126412	Max WS	264.23	156.01
Willow Fork	Reach 1	126038	Max WS	264.18	155.79
Willow Fork	Reach 1	125665	Max WS	264.12	155.54
Willow Fork	Reach 1	125292	Max WS	263.64	155.32
Willow Fork	Reach 1	124919	Max WS	224.92	155.13
Willow Fork	Reach 1	124545	Max WS	223.61	154.89

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	124171	Max WS	222.99	154.63
Willow Fork	Reach 1	124124		Lat Struct	
Willow Fork	Reach 1	124062		Lat Struct	
Willow Fork	Reach 1	123946	Max WS	251.78	154.42
Willow Fork	Reach 1	123871	Max WS	241.73	154.4
Willow Fork	Reach 1	123807 RR ADJACENT TO U		Bridge	
Willow Fork	Reach 1	123796	Max WS	241.73	154.33
Willow Fork	Reach 1	123742	Max WS	241.01	154.32
Willow Fork	Reach 1	123693		Bridge	
Willow Fork	Reach 1	123687	Max WS	241.07	154.31
Willow Fork	Reach 1	123501		Lat Struct	
Willow Fork	Reach 1	123423	Max WS	256.24	154.19
Willow Fork	Reach 1	123051	Max WS	286.96	153.88
Willow Fork	Reach 1	122680	Max WS	315.07	153.6
Willow Fork	Reach 1	122308	Max WS	343.56	153.34
Willow Fork	Reach 1	121937	Max WS	372.09	153.01
Willow Fork	Reach 1	121565	Max WS	401.18	152.7
Willow Fork	Reach 1	121194	Max WS	431.98	152.32
Willow Fork	Reach 1	121122		Lat Struct	
Willow Fork	Reach 1	120821	Max WS	450.11	151.96
Willow Fork	Reach 1	120448	Max WS	481.98	151.6
Willow Fork	Reach 1	120199	Max WS	497.11	151.23
Willow Fork	Reach 1	119950	Max WS	503.37	150.71
Willow Fork	Reach 1	119795	Max WS	504.64	150.41
Willow Fork	Reach 1	119503 I10		Bridge	
Willow Fork	Reach 1	119310	Max WS	502.69	150.35
Willow Fork	Reach 1	119203	Max WS	496.02	150.17
Willow Fork	Reach 1	118955	Max WS	405.92	149.78
Willow Fork	Reach 1	118719		Lat Struct	
Willow Fork	Reach 1	118584	Max WS	384.92	149.52
Willow Fork	Reach 1	118419		Lat Struct	
Willow Fork	Reach 1	118220		Lat Struct	
Willow Fork	Reach 1	118214	Max WS	385.7	149.43
Willow Fork	Reach 1	118120		Lat Struct	
Willow Fork	Reach 1	117921		Lat Struct	
Willow Fork	Reach 1	117842	Max WS	422.69	149.23
Willow Fork	Reach 1	117470	Max WS	440.74	148.97
Willow Fork	Reach 1	117419		Lat Struct	
Willow Fork	Reach 1	117098	Max WS	458.04	148.74
Willow Fork	Reach 1	117019		Lat Struct	
Willow Fork	Reach 1	116819		Lat Struct	
Willow Fork	Reach 1	116727	Max WS	476.06	148.49
Willow Fork	Reach 1	116518		Lat Struct	
Willow Fork	Reach 1	116353	Max WS	494.07	148.23
Willow Fork	Reach 1	115979	Max WS	512.35	147.92
Willow Fork	Reach 1	115610	Max WS	530.55	147.56
Willow Fork	Reach 1	115242	Max WS	549	147.13
Willow Fork	Reach 1	115019		Lat Struct	
Willow Fork	Reach 1	114869	Max WS	567.79	146.73
Willow Fork	Reach 1	114497	Max WS	586.65	146.46
Willow Fork	Reach 1	113979	Max WS	612.34	146.17
Willow Fork	Reach 1	113875		Culvert	
Willow Fork	Reach 1	113768	Max WS	612.32	146.13
Willow Fork	Reach 1	113382	Max WS	616.04	146.01

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	113010	Max WS	619.54	145.79
Willow Fork	Reach 1	112637	Max WS	623	145.46
Willow Fork	Reach 1	112264	Max WS	626.87	145.12
Willow Fork	Reach 1	111890	Max WS	629.6	144.69
Willow Fork	Reach 1	111517	Max WS	632.52	144.25
Willow Fork	Reach 1	111420		Lat Struct	
Willow Fork	Reach 1	111419		Lat Struct	
Willow Fork	Reach 1	111231	Max WS	634.69	143.99
Willow Fork	Reach 1	110945	Max WS	634.85	143.39
Willow Fork	Reach 1	110659	Max WS	634.05	142.96
Willow Fork	Reach 1	110486	Max WS	582.54	142.86
Willow Fork	Reach 1	110130	Max WS	585.43	142.53
Willow Fork	Reach 1	109775	Max WS	588.28	142.12
Willow Fork	Reach 1	109438	Max WS	590.94	141.74
Willow Fork	Reach 1	109101	Max WS	592.51	141.35
Willow Fork	Reach 1	108764	Max WS	595.09	140.85
Willow Fork	Reach 1	108698		Bridge	
Willow Fork	Reach 1	108627	Max WS	595.05	140.72
Willow Fork	Reach 1	108316	Max WS	597.17	140.26
Willow Fork	Reach 1	108006	Max WS	599.06	139.81
Willow Fork	Reach 1	107696	Max WS	600.91	139.38
Willow Fork	Reach 1	107386	Max WS	602.59	138.95
Willow Fork	Reach 1	107020	Max WS	604.67	138.65
Willow Fork	Reach 1	106654	Max WS	606.98	138.53
Willow Fork	Reach 1	106520		Lat Struct	
Willow Fork	Reach 1	106519		Lat Struct	
Willow Fork	Reach 1	106288	Max WS	609.26	138.43
Willow Fork	Reach 1	105904	Max WS	609.45	137.99
Willow Fork	Reach 1	105521	Max WS	609.21	137.58
Willow Fork	Reach 1	105138	Max WS	732.75	137.35
Willow Fork	Reach 1	104608	Max WS	736.06	137.11
Willow Fork	Reach 1	104514 FIRETHORNE PEDES		Bridge	
Willow Fork	Reach 1	104466	Max WS	736.07	137.06
Willow Fork	Reach 1	104124	Max WS	738.21	136.88
Willow Fork	Reach 1	103782	Max WS	740.35	136.55
Willow Fork	Reach 1	103441	Max WS	742.49	136.27
Willow Fork	Reach 1	103048	Max WS	744.96	136.07
Willow Fork	Reach 1	102656	Max WS	665.78	135.95
Willow Fork	Reach 1	102263	Max WS	668.24	135.86
Willow Fork	Reach 1	101871	Max WS	670.7	135.8
Willow Fork	Reach 1	101801		Lat Struct	
Willow Fork	Reach 1	101558	Max WS	672.67	135.74
Willow Fork	Reach 1	101246	Max WS	674.46	135.7
Willow Fork	Reach 1	101002		Lat Struct	
Willow Fork	Reach 1	100933	Max WS	676.43	135.52
Willow Fork	Reach 1	100621	Max WS	678.53	135.13
Willow Fork	Reach 1	100372	Max WS	680.11	134.89
Willow Fork	Reach 1	100306		Bridge	
Willow Fork	Reach 1	100241	Max WS	680.09	134.86
Willow Fork	Reach 1	99619	Max WS	683.99	134.54
Willow Fork	Reach 1	99515	Max WS	684.67	134.49
Willow Fork	Reach 1	99232	Max WS	686.42	134.24
Willow Fork	Reach 1	98950	Max WS	688.07	133.88
Willow Fork	Reach 1	98667	Max WS	689.79	133.45

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	98164	Max WS	668.75	132.82
Willow Fork	Reach 1	97661	Max WS	695.41	132.19
Willow Fork	Reach 1	97643 BRYANTS RD		Bridge	
Willow Fork	Reach 1	97598	Max WS	695.09	132.05
Willow Fork	Reach 1	97330	Max WS	696.27	131.66
Willow Fork	Reach 1	97062	Max WS	697.3	131.37
Willow Fork	Reach 1	96794	Max WS	697.91	131.09
Willow Fork	Reach 1	96435	Max WS	698.3	130.81
Willow Fork	Reach 1	96076	Max WS	698.27	130.58
Willow Fork	Reach 1	95749		Lat Struct	
Willow Fork	Reach 1	95708	Max WS	697.73	130.33
Willow Fork	Reach 1	95644		Lat Struct	
Willow Fork	Reach 1	95341	Max WS	1104.3	129.85
Willow Fork	Reach 1	95298		Lat Struct	
Willow Fork	Reach 1	95004	Max WS	1109.63	129.54
Willow Fork	Reach 1	94998		Lat Struct	
Willow Fork	Reach 1	94699	Max WS	1108.99	129.31
Willow Fork	Reach 1	94589	Max WS	1108.98	129.25
Willow Fork	Reach 1	94542	Max WS	1108.97	129.25
Willow Fork	Reach 1	94499 FM1463		Bridge	
Willow Fork	Reach 1	94477	Max WS	1108.97	129.2
Willow Fork	Reach 1	94449	Max WS	1108.94	129.17
Willow Fork	Reach 1	94171	Max WS	1105.46	129.01
Willow Fork	Reach 1	93892	Max WS	1105.43	128.7
Willow Fork	Reach 1	93614	Max WS	1105.37	128.34
Willow Fork	Reach 1	93517		Bridge	
Willow Fork	Reach 1	93464	Max WS	1105.37	128.13
Willow Fork	Reach 1	92831	Max WS	962.66	127.41
Willow Fork	Reach 1	92444	Max WS	923.88	127.01
Willow Fork	Reach 1	92099		Lat Struct	
Willow Fork	Reach 1	92098		Lat Struct	
Willow Fork	Reach 1	92058		Lat Struct	
Willow Fork	Reach 1	92056	Max WS	896.64	126.58
Willow Fork	Reach 1	91901		Lat Struct	
Willow Fork	Reach 1	91806		Lat Struct	
Willow Fork	Reach 1	91669	Max WS	970.58	126.07
Willow Fork	Reach 1	91362	Max WS	955.4	125.63
Willow Fork	Reach 1	90983	Max WS	953.52	125.15
Willow Fork	Reach 1	90605	Max WS	952.61	124.78
Willow Fork	Reach 1	90570		Lat Struct	
Willow Fork	Reach 1	90297	Max WS	949.87	124.45
Willow Fork	Reach 1	90228		Lat Struct	
Willow Fork	Reach 1	90128		Lat Struct	
Willow Fork	Reach 1	90101	Max WS	1531.41	124.26
Willow Fork	Reach 1	90092 KINGSLAND		Bridge	
Willow Fork	Reach 1	89954	Max WS	1531.41	124.07
Willow Fork	Reach 1	89712	Max WS	1531.41	123.9
Snake Creek	Reach-1	120371	Max WS	7.06	160.37
Snake Creek	Reach-1	120369		Lat Struct	
Snake Creek	Reach-1	120360		Lat Struct	
Snake Creek	Reach-1	120006	Max WS	6.88	160.15
Snake Creek	Reach-1	119641	Max WS	6.38	160.12
Snake Creek	Reach-1	119263	Max WS	11.97	160.05
Snake Creek	Reach-1	118886	Max WS	18.96	159.91

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	118558	Max WS	24.5	159.73
Snake Creek	Reach-1	118230	Max WS	7.61	159.63
Snake Creek	Reach-1	117949	Max WS	9.3	159.61
Snake Creek	Reach-1	117669	Max WS	16.68	159.56
Snake Creek	Reach-1	117389	Max WS	23.45	159.4
Snake Creek	Reach-1	117010	Max WS	33.96	158.97
Snake Creek	Reach-1	116631	Max WS	18.13	158.67
Snake Creek	Reach-1	116256	Max WS	7.39	158.6
Snake Creek	Reach-1	115881	Max WS	-2.38	158.6
Snake Creek	Reach-1	115499	Max WS	6.26	158.07
Snake Creek	Reach-1	115117	Max WS	11.24	157.48
Snake Creek	Reach-1	115108		Lat Struct	
Snake Creek	Reach-1	115107		Lat Struct	
Snake Creek	Reach-1	114742	Max WS	18.25	157.33
Snake Creek	Reach-1	114367	Max WS	25.27	157.21
Snake Creek	Reach-1	113992	Max WS	32.29	157.04
Snake Creek	Reach-1	113617	Max WS	39.28	156.79
Snake Creek	Reach-1	113239	Max WS	46.23	156.57
Snake Creek	Reach-1	112862	Max WS	53.24	156.13
Snake Creek	Reach-1	112425	Max WS	61.9	155.55
Snake Creek	Reach-1	112381 Schlipf Rd		Culvert	
Snake Creek	Reach-1	112341	Max WS	61.9	155.56
Snake Creek	Reach-1	112111	Max WS	66.15	155.42
Snake Creek	Reach-1	112103		Lat Struct	
Snake Creek	Reach-1	112102		Lat Struct	
Snake Creek	Reach-1	111736	Max WS	73.08	155.07
Snake Creek	Reach-1	111523	Max WS	77.02	154.9
Snake Creek	Reach-1	111507		Culvert	
Snake Creek	Reach-1	111469	Max WS	77.02	154.4
Snake Creek	Reach-1	111361	Max WS	79.02	154.31
Snake Creek	Reach-1	110984	Max WS	85.97	153.99
Snake Creek	Reach-1	110608	Max WS	92.92	153.56
Snake Creek	Reach-1	110233	Max WS	99.85	153.07
Snake Creek	Reach-1	109858	Max WS	106.76	152.55
Snake Creek	Reach-1	109483	Max WS	113.66	152
Snake Creek	Reach-1	109108	Max WS	120.53	151.47
Snake Creek	Reach-1	108734	Max WS	127.38	150.93
Snake Creek	Reach-1	108360	Max WS	134.2	150.52
Snake Creek	Reach-1	107985	Max WS	141.04	150.2
Snake Creek	Reach-1	107611	Max WS	147.87	149.92
Snake Creek	Reach-1	107211	Max WS	145.39	149.6
Snake Creek	Reach-1	106911	Max WS	161.61	149.14
Snake Creek	Reach-1	106861		Culvert	
Snake Creek	Reach-1	106811	Max WS	160.63	147.91
Snake Creek	Reach-1	106810		Lat Struct	
Snake Creek	Reach-1	106809		Lat Struct	
Snake Creek	Reach-1	106460	Max WS	167.02	147.54
Snake Creek	Reach-1	106110	Max WS	173.4	146.96
Snake Creek	Reach-1	105735	Max WS	173.36	146.53
Snake Creek	Reach-1	105360	Max WS	173.2	146.16
Snake Creek	Reach-1	104985	Max WS	190.7	145.74
Snake Creek	Reach-1	104610	Max WS	208.45	145.42
Snake Creek	Reach-1	104227	Max WS	226.73	145.1
Snake Creek	Reach-1	104184 Century Plant Br		Bridge	

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	104144	Max WS	226.7	145.04
Snake Creek	Reach-1	103859	Max WS	240.36	144.82
Snake Creek	Reach-1	103484	Max WS	258.38	144.34
Snake Creek	Reach-1	103109	Max WS	276.52	143.84
Snake Creek	Reach-1	102734	Max WS	294.7	143.35
Snake Creek	Reach-1	102359	Max WS	312.96	142.45
Snake Creek	Reach-1	102171		Lat Struct	
Snake Creek	Reach-1	102170		Lat Struct	
Snake Creek	Reach-1	102169	Max WS	322.24	142.06
Snake Creek	Reach-1	102106		Bridge	
Snake Creek	Reach-1	102078	Max WS	322.23	141.98
Snake Creek	Reach-1	102014	Max WS	325.37	141.86
Snake Creek	Reach-1	101987		Bridge	
Snake Creek	Reach-1	101936	Max WS	325.33	141.57
Snake Creek	Reach-1	101609	Max WS	341.41	140.84
Snake Creek	Reach-1	101291	Max WS	333.89	140.07
Snake Creek	Reach-1	101191	Max WS	338.81	139.58
Snake Creek	Reach-1	101091	Max WS	343.77	139.28
Snake Creek	Reach-1	100991	Max WS	348.74	138.94
Snake Creek	Reach-1	100891	Max WS	276.32	138.63
Snake Creek	Reach-1	100859	Max WS	302.53	138.5
Snake Creek	Reach-1	100741	Max WS	366.56	138.32
Snake Creek	Reach-1	100701 RR ADJACENT TO U		Bridge	
Snake Creek	Reach-1	100649	Max WS	366.52	137.9
Snake Creek	Reach-1	100617	Max WS	366.49	137.9
Snake Creek	Reach-1	100559 US 90		Bridge	
Snake Creek	Reach-1	100514	Max WS	366.44	137.54
Snake Creek	Reach-1	100279	Max WS	345.23	137.2
Snake Creek	Reach-1	100222		Bridge	
Snake Creek	Reach-1	100187	Max WS	345.23	137.19
Snake Creek	Reach-1	100156	Max WS	346.46	137.17
Snake Creek	Reach-1	100120		Bridge	
Snake Creek	Reach-1	100069	Max WS	346.54	137.17
Snake Creek	Reach-1	99714	Max WS	360.89	136.83
Snake Creek	Reach-1	99358	Max WS	375.39	136.51
Snake Creek	Reach-1	98983	Max WS	379.28	136.18
Snake Creek	Reach-1	98608	Max WS	378.75	135.86
Snake Creek	Reach-1	98358	Max WS	526.09	135.3
Snake Creek	Reach-1	98072	Max WS	527.78	134.73
Snake Creek	Reach-1	98071		Lat Struct	
Snake Creek	Reach-1	98070		Lat Struct	
Snake Creek	Reach-1	97859	Max WS	533.55	134.23
Snake Creek	Reach-1	97484	Max WS	566.07	133.43
Snake Creek	Reach-1	97109	Max WS	558.33	132.66
Snake Creek	Reach-1	96734	Max WS	583.22	131.6
Snake Creek	Reach-1	96359	Max WS	586.76	130.93
Snake Creek	Reach-1	96300 I10		Bridge	
Snake Creek	Reach-1	96003	Max WS	574.43	130.53
Snake Creek	Reach-1	95977	Max WS	573.66	130.53
CaneIslandBranch	Upper	136675	Max WS	5	165.37
CaneIslandBranch	Upper	136674		Lat Struct	
CaneIslandBranch	Upper	136673		Lat Struct	
CaneIslandBranch	Upper	136379	Max WS	5	165.37
CaneIslandBranch	Upper	136084	Max WS	16.95	165.37

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	135788	Max WS	28.9	165.36
CaneIslandBranch	Upper	135493	Max WS	40.86	165.34
CaneIslandBranch	Upper	135197	Max WS	52.81	165.32
CaneIslandBranch	Upper	134902	Max WS	64.75	165.3
CaneIslandBranch	Upper	134606	Max WS	76.66	165.26
CaneIslandBranch	Upper	134311	Max WS	88.53	165.22
CaneIslandBranch	Upper	134016	Max WS	100.37	165.17
CaneIslandBranch	Upper	133720	Max WS	112.14	165.12
CaneIslandBranch	Upper	133425	Max WS	123.77	165.07
CaneIslandBranch	Upper	133129	Max WS	135.26	165
CaneIslandBranch	Upper	132834	Max WS	144.7	164.94
CaneIslandBranch	Upper	132538	Max WS	149.82	164.89
CaneIslandBranch	Upper	132243	Max WS	98.71	164.87
CaneIslandBranch	Upper	131946	Max WS	85.42	164.86
CaneIslandBranch	Upper	131703	Max WS	59.11	164.85
CaneIslandBranch	Upper	131559		Culvert	
CaneIslandBranch	Upper	131417	Max WS	51.78	163.94
CaneIslandBranch	Upper	131387	Max WS	52.18	163.93
CaneIslandBranch	Upper	131297		Lat Struct	
CaneIslandBranch	Upper	131061	Max WS	56.57	163.85
CaneIslandBranch	Upper	130766	Max WS	60.43	163.8
CaneIslandBranch	Upper	130312	Max WS	65.95	163.67
CaneIslandBranch	Upper	129858	Max WS	71.91	163.47
CaneIslandBranch	Upper	129404	Max WS	70.89	163.25
CaneIslandBranch	Upper	128916	Max WS	97.9	162.86
CaneIslandBranch	Upper	128857	Max WS	97.89	162.79
CaneIslandBranch	Upper	128798	Max WS	97.88	162.73
CaneIslandBranch	Upper	128765		Culvert	
CaneIslandBranch	Upper	128739	Max WS	97.89	162.7
CaneIslandBranch	Upper	128279	Max WS	97.81	162.28
CaneIslandBranch	Upper	127819	Max WS	97.76	161.91
CaneIslandBranch	Upper	127304	Max WS	97.71	161.38
CaneIslandBranch	Upper	126789	Max WS	97.61	160.6
CaneIslandBranch	Upper	126128	Max WS	94.47	159.43
CaneIslandBranch	Upper	126038		Culvert	
CaneIslandBranch	Upper	125947	Max WS	92.86	159.3
CaneIslandBranch	Upper	125946		Lat Struct	
CaneIslandBranch	Upper	125620	Max WS	83.84	158.96
CaneIslandBranch	Upper	125228	Max WS	132.29	158.8
CaneIslandBranch	Upper	124703	Max WS	132.06	158.51
CaneIslandBranch	Upper	124179	Max WS	131.71	158.17
CaneIslandBranch	Upper	123627	Max WS	129.58	157.81
CaneIslandBranch	Upper	123076	Max WS	130.69	157.47
CaneIslandBranch	Upper	123075		Lat Struct	
CaneIslandBranch	Upper	122570	Max WS	130.64	157.2
CaneIslandBranch	Upper	122064	Max WS	130.61	156.94
CaneIslandBranch	Upper	121554	Max WS	130.57	156.54
CaneIslandBranch	Upper	121045	Max WS	45.07	156.4
CaneIslandBranch	Upper	120807	Max WS	65.84	156.37
CaneIslandBranch	Upper	120806		Lat Struct	
CaneIslandBranch	Upper	120293	Max WS	108.5	156.13
CaneIslandBranch	Upper	119780	Max WS	149.73	154.64
CaneIslandBranch	Upper	119685	Max WS	144.56	154.46
CaneIslandBranch	Upper	119647 PITTS RD		Culvert	

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	119625	Max WS	144.5	154.43
CaneIslandBranch	Upper	119605		Lat Struct	
CaneIslandBranch	Upper	119589.2		Lat Struct	
CaneIslandBranch	Upper	119494	Max WS	139.58	154.34
CaneIslandBranch	Upper	118961	Max WS	152.25	154.08
CaneIslandBranch	Upper	118640	Max WS	163.17	153.94
CaneIslandBranch	Upper	118223	Max WS	177.73	153.66
CaneIslandBranch	Upper	117807	Max WS	192.5	153.41
CaneIslandBranch	Upper	117739		Lat Struct	
CaneIslandBranch	Upper	117738		Lat Struct	
CaneIslandBranch	Upper	117737	Max WS	195.02	153.39
CaneIslandBranch	Upper	117710.5 Clay Rd		Culvert	
CaneIslandBranch	Upper	117680	Max WS	195.01	153.33
CaneIslandBranch	Upper	117535	Max WS	200.54	153.26
CaneIslandBranch	Upper	117209	Max WS	212.26	153.06
CaneIslandBranch	Upper	117021	Max WS	219.49	152.95
CaneIslandBranch	Upper	116834	Max WS	221.9	152.85
CaneIslandBranch	Upper	116647	Max WS	229.11	152.75
CaneIslandBranch	Upper	116459	Max WS	236.3	152.65
CaneIslandBranch	Upper	116271	Max WS	242.73	152.55
CaneIslandBranch	Upper	116084	Max WS	249.76	152.44
CaneIslandBranch	Upper	115897	Max WS	257	152.3
CaneIslandBranch	Upper	115710	Max WS	264.24	152.11
CaneIslandBranch	Upper	115349	Max WS	277.75	151.72
CaneIslandBranch	Upper	114989	Max WS	286.69	151.34
CaneIslandBranch	Upper	114653	Max WS	284.08	150.6
CaneIslandBranch	Upper	114652		Lat Struct	
CaneIslandBranch	Upper	114651		Lat Struct	
CaneIslandBranch	Upper	114144	Max WS	173.84	149.7
CaneIslandBranch	Upper	113554	Max WS	215.22	149.38
CaneIslandBranch	Upper	113553		Lat Struct	
CaneIslandBranch	Upper	112964	Max WS	226.83	148.92
CaneIslandBranch	Upper	112963		Lat Struct	
CaneIslandBranch	Upper	112583	Max WS	234.42	148.48
CaneIslandBranch	Upper	112582		Lat Struct	
CaneIslandBranch	Upper	112250		Lat Struct	
CaneIslandBranch	Upper	112203	Max WS	241.46	147.71
CaneIslandBranch	Upper	111833	Max WS	248.07	147.04
CaneIslandBranch	Upper	111464	Max WS	236.23	146.64
CaneIslandBranch	Upper	111339		Lat Struct	
CaneIslandBranch	Upper	111338		Lat Struct	
CaneIslandBranch	Upper	111305	Max WS	239.54	146.51
CaneIslandBranch	Upper	111238 MORTON		Bridge	
CaneIslandBranch	Upper	111211	Max WS	238.33	146.41
CaneIslandBranch	Upper	110710	Max WS	246.29	146.1
CaneIslandBranch	Upper	110335	Max WS	366.65	145.69
CaneIslandBranch	Upper	109960	Max WS	375.39	145.1
CaneIslandBranch	Upper	109586	Max WS	383.57	144.55
CaneIslandBranch	Upper	109213	Max WS	392.2	143.95
CaneIslandBranch	Upper	108837	Max WS	400.66	143.16
CaneIslandBranch	Upper	108461	Max WS	408.48	142.23
CaneIslandBranch	Upper	108086	Max WS	415.86	141.62
CaneIslandBranch	Upper	107741		Lat Struct	
CaneIslandBranch	Upper	107711	Max WS	420.42	141.24

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)
CaneIslandBranch	Upper	107642		Lat Struct	
CaneIslandBranch	Upper	107336	Max WS	433.25	140.81
CaneIslandBranch	Upper	106961	Max WS	436.97	140.38
CaneIslandBranch	Upper	106580	Max WS	443.8	140.01
CaneIslandBranch	Upper	106200	Max WS	412.27	139.75
CaneIslandBranch	Upper	105824	Max WS	407.28	139.6
CaneIslandBranch	Upper	105449	Max WS	394.22	139.46
CaneIslandBranch	Upper	104816	Max WS	402.48	139.26
CaneIslandBranch	Upper	104743 BRACE RIDGE LN		Bridge	
CaneIslandBranch	Upper	104701	Max WS	402.52	139.22
CaneIslandBranch	Upper	104408	Max WS	406.41	139.14
CaneIslandBranch	Upper	103962	Max WS	412.38	138.93
CaneIslandBranch	Upper	103940 FRANZ		Bridge	
CaneIslandBranch	Upper	103864	Max WS	412.37	138.83
CaneIslandBranch	Upper	103841		Lat Struct	
CaneIslandBranch	Upper	103840		Lat Struct	
CaneIslandBranch	Upper	103440	Max WS	419.45	138.52
CaneIslandBranch	Upper	103199	Max WS	426.27	138.41
CaneIslandBranch	Upper	102758	Max WS	481.55	138.19
CaneIslandBranch	Upper	102460	Max WS	492.55	137.98
CaneIslandBranch	Upper	102029	Max WS	503.08	137.67
CaneIslandBranch	Upper	101747	Max WS	511.13	137.45
CaneIslandBranch	Upper	101688 10TH ST		Bridge	
CaneIslandBranch	Upper	101667	Max WS	511.12	137.18
CaneIslandBranch	Upper	101316	Max WS	510.71	136.86
CaneIslandBranch	Upper	100965	Max WS	449.9	136.57
CaneIslandBranch	Upper	100597	Max WS	466.65	136.24
CaneIslandBranch	Upper	100229	Max WS	479.55	135.97
CaneIslandBranch	Upper	99862	Max WS	496.26	135.79
CaneIslandBranch	Upper	99495	Max WS	512.24	135.61
CaneIslandBranch	Upper	99441		Lat Struct	
CaneIslandBranch	Upper	99340		Lat Struct	
CaneIslandBranch	Upper	99123	Max WS	527.78	135.43
CaneIslandBranch	Upper	98750	Max WS	533.68	135.19
CaneIslandBranch	Upper	98374	Max WS	539.4	134.99
CaneIslandBranch	Upper	97998	Max WS	558.65	134.82
CaneIslandBranch	Upper	97765	Max WS	575.78	134.73
CaneIslandBranch	Upper	97741 1ST ST		Bridge	
CaneIslandBranch	Upper	97693	Max WS	575.76	134.7
CaneIslandBranch	Upper	97661	Max WS	576.07	134.69
CaneIslandBranch	Upper	97642 MKT RAILROAD		Bridge	
CaneIslandBranch	Upper	97585	Max WS	576.06	133.81
CaneIslandBranch	Upper	97559	Max WS	577.06	133.81
CaneIslandBranch	Upper	97442 US 90		Bridge	
CaneIslandBranch	Upper	97429	Max WS	577.07	132.76
CaneIslandBranch	Upper	97247	Max WS	581.44	132.6
CaneIslandBranch	Upper	96872	Max WS	590.19	132.29
CaneIslandBranch	Upper	96497	Max WS	598.25	132.04
CaneIslandBranch	Upper	96124	Max WS	603.72	131.74
CaneIslandBranch	Upper	95750	Max WS	613.9	131.44
CaneIslandBranch	Upper	95571	Max WS	617.96	131.28
CaneIslandBranch	Upper	95002	Max WS	630.33	130.57
CaneIslandBranch	Upper	94964 Stockdick Rd		Bridge	
CaneIslandBranch	Upper	94921	Max WS	630.26	130.46

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	94671	Max WS	634.3	130.15
CaneIslandBranch	Upper	94382	Max WS	641.53	129.79
CaneIslandBranch	Upper	94241 I10		Bridge	
CaneIslandBranch	Upper	93996	Max WS	640.81	128.3
CaneIslandBranch	Upper	93987		Lat Struct	
CaneIslandBranch	Upper	93966		Lat Struct	
CaneIslandBranch	Upper	93874	Max WS	641.33	128.07
CaneIslandBranch	Upper	93445	Max WS	643.09	127.29
CaneIslandBranch	Upper	93242	Max WS	643.51	126.91
CaneIslandBranch	Upper	92961	Max WS	642.54	126.12
CaneIslandBranch	Upper	92626	Max WS	568.43	125.56
CaneIslandBranch	Upper	92617		Lat Struct	
CaneIslandBranch	Upper	92324	Max WS	570.51	125.41
CaneIslandBranch	Upper	92092		Lat Struct	
CaneIslandBranch	Upper	91990	Max WS	519.06	125.28
CaneIslandBranch	Upper	91607	Max WS	521.68	125.1
CaneIslandBranch	Upper	91224	Max WS	572.91	124.97
CaneIslandBranch	Upper	90826	Max WS	579.68	124.82
CaneIslandBranch	Upper	90804		Lat Struct	
CaneIslandBranch	Upper	90472	Max WS	581.73	124.67
CaneIslandBranch	Upper	90374	Max WS	582.38	124.64
CaneIslandBranch	Upper	90284	Max WS	582.11	124.6
Brookshire Creek	Reach 1	34313	Max WS	232.58	145.62
Brookshire Creek	Reach 1	34312.8		Lat Struct	
Brookshire Creek	Reach 1	34312.6		Lat Struct	
Brookshire Creek	Reach 1	33828	Max WS	230.1	145.42
Brookshire Creek	Reach 1	33312	Max WS	269.98	145.29
Brookshire Creek	Reach 1	32795	Max WS	309.4	145.21
Brookshire Creek	Reach 1	32278	Max WS	346.76	145.14
Brookshire Creek	Reach 1	32277		Lat Struct	
Brookshire Creek	Reach 1	32276		Lat Struct	
Brookshire Creek	Reach 1	31844	Max WS	377.18	145.08
Brookshire Creek	Reach 1	31548 I-10		Bridge	
Brookshire Creek	Reach 1	31259	Max WS	377.18	135.33
Brookshire Creek	Reach 1	30921	Max WS	403.1	135.23
Brookshire Creek	Reach 1	30469	Max WS	437.46	134.98
Brookshire Creek	Reach 1	29909	Max WS	480.62	134.45
Brookshire Creek	Reach 1	29409	Max WS	516.41	133.81
Brookshire Creek	Reach 1	28880	Max WS	559.11	133.02
Brookshire Creek	Reach 1	28394	Max WS	598.17	132.43
Brookshire Creek	Reach 1	28393.6		Lat Struct	
Brookshire Creek	Reach 1	28393.5		Lat Struct	
Brookshire Creek	Reach 1	27920	Max WS	635.81	131.74
Brookshire Creek	Reach 1	27324	Max WS	684.68	130.99
Brookshire Creek	Reach 1	26880	Max WS	721.1	130.27
Brookshire Creek	Reach 1	26364	Max WS	721.01	129.53
Brookshire Creek	Reach 1	25866	Max WS	745.35	128.83
Brookshire Creek	Reach 1	25365	Max WS	769.85	128.09
Brookshire Creek	Reach 1	24855	Max WS	794.91	127.68
Brookshire Creek	Reach 1	24854.5		Lat Struct	
Brookshire Creek	Reach 1	24834.2		Lat Struct	
Brookshire Creek	Reach 1	24349	Max WS	819.05	127.11
Brookshire Creek	Reach 1	23841	Max WS	844.04	126.01
Brookshire Creek	Reach 1	23338	Max WS	868.81	125.24

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	22834	Max WS	893.61	124.52
Brookshire Creek	Reach 1	22326	Max WS	918.51	123.61
Brookshire Creek	Reach 1	21820	Max WS	943.09	123.03
Brookshire Creek	Reach 1	21318	Max WS	967.48	122.68
Brookshire Creek	Reach 1	20926	Max WS	985.83	122.23
Brookshire Creek	Reach 1	20853	Max WS	989.48	122.26
Brookshire Creek	Reach 1	20817 FM 359/Waller Av		Bridge	
Brookshire Creek	Reach 1	20785	Max WS	989.47	122.21
Brookshire Creek	Reach 1	20724.5		Lat Struct	
Brookshire Creek	Reach 1	20724.2		Lat Struct	
Brookshire Creek	Reach 1	20650	Max WS	996	122.15
Brookshire Creek	Reach 1	20328	Max WS	1011.7	121.92
Brookshire Creek	Reach 1	19828	Max WS	1035.99	121.28
Brookshire Creek	Reach 1	19328	Max WS	1060.26	120.4
Brookshire Creek	Reach 1	18826	Max WS	1084.33	119.54
Brookshire Creek	Reach 1	18325	Max WS	1104.47	118.92
Brookshire Creek	Reach 1	17930	Max WS	1126.08	118.49
Brookshire Creek	Reach 1	17891		Bridge	
Brookshire Creek	Reach 1	17839	Max WS	1126.09	118.48
Brookshire Creek	Reach 1	17330	Max WS	1090.09	117.98
Brookshire Creek	Reach 1	16864	Max WS	1033.34	117.46
Brookshire Creek	Reach 1	16832	Max WS	1049.83	117.19
Brookshire Creek	Reach 1	16733	Max WS	1049.73	117.14
Brookshire Creek	Reach 1	16732.5		Lat Struct	
Brookshire Creek	Reach 1	16732		Lat Struct	
Brookshire Creek	Reach 1	16696	Max WS	1051.7	117.11
Brookshire Creek	Reach 1	16367	Max WS	1029.12	116.7
Brookshire Creek	Reach 1	16067	Max WS	944.21	116.33
Brookshire Creek	Reach 1	15741	Max WS	872.12	116.02
Brookshire Creek	Reach 1	15467	Max WS	831.05	115.84
Brookshire Creek	Reach 1	15167	Max WS	804.26	115.43
Brookshire Creek	Reach 1	15166		Lat Struct	
Brookshire Creek	Reach 1	14906	Max WS	744.02	115.22
Brookshire Creek	Reach 1	14700	Max WS	725.56	115.08
Brookshire Creek	Reach 1	14698		Lat Struct	
Brookshire Creek	Reach 1	14632	Max WS	706.71	115.03
Brookshire Creek	Reach 1	14630		Lat Struct	
Brookshire Creek	Reach 1	14544	Max WS	671.14	114.96
Brookshire Creek	Reach 1	14426	Max WS	669.88	114.82
Brookshire Creek	Reach 1	14244	Max WS	660.55	114.59
Brookshire Creek	Reach 1	14243		Lat Struct	
Brookshire Creek	Reach 1	13944	Max WS	655.21	114.34
Brookshire Creek	Reach 1	13644	Max WS	556.66	114.18
Brookshire Creek	Reach 1	13344	Max WS	572.71	114
Brookshire Creek	Reach 1	13148	Max WS	700.72	113.83
Brookshire Creek	Reach 1	13044	Max WS	742.2	113.73
Brookshire Creek	Reach 1	12744	Max WS	650.69	113.46
Brookshire Creek	Reach 1	12623	Max WS	591.22	113.37
Brookshire Creek	Reach 1	12446	Max WS	554.53	113.27
Brookshire Creek	Reach 1	12408	Max WS	551.2	113.28
Brookshire Creek	Reach 1	12386 Pecan Hill Dr		Culvert	
Brookshire Creek	Reach 1	12356	Max WS	548.99	113.13
Brookshire Creek	Reach 1	12355		Lat Struct	
Brookshire Creek	Reach 1	12354		Lat Struct	

2-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	12302	Max WS	541.51	113.08
Brookshire Creek	Reach 1	12144	Max WS	544.36	112.98
Brookshire Creek	Reach 1	11831	Max WS	487.8	112.8
Brookshire Creek	Reach 1	11544	Max WS	555.32	112.65
Brookshire Creek	Reach 1	11244	Max WS	585.28	112.49
Brookshire Creek	Reach 1	11123	Max WS	607.9	112.4
Brookshire Creek	Reach 1	11091	Max WS	628.01	112.39
Brookshire Creek	Reach 1	11089		Lat Struct	
Brookshire Creek	Reach 1	11050	Max WS	718.48	112.39
Brookshire Creek	Reach 1	11049		Lat Struct	
Brookshire Creek	Reach 1	11002	Max WS	859.71	112.31
Brookshire Creek	Reach 1	10943	Max WS	874.51	112.24
Brookshire Creek	Reach 1	10643	Max WS	836.93	112.07
Brookshire Creek	Reach 1	10343	Max WS	885.99	111.88
Brookshire Creek	Reach 1	10039	Max WS	930.47	111.66
Brookshire Creek	Reach 1	9985	Max WS	944.27	111.68
Brookshire Creek	Reach 1	9959 Pool Hill Rd		Culvert	
Brookshire Creek	Reach 1	9931	Max WS	938.74	111.41
Brookshire Creek	Reach 1	9930		Lat Struct	
Brookshire Creek	Reach 1	9929		Lat Struct	
Brookshire Creek	Reach 1	9889	Max WS	941.35	111.37
Brookshire Creek	Reach 1	9743	Max WS	940.81	111.25
Brookshire Creek	Reach 1	9443	Max WS	933.73	111.05
Brookshire Creek	Reach 1	9143	Max WS	916.82	110.84
Brookshire Creek	Reach 1	8984	Max WS	922.55	110.72
Brookshire Creek	Reach 1	8843	Max WS	929.33	110.63
Brookshire Creek	Reach 1	8715	Max WS	934.17	110.52
Brookshire Creek	Reach 1	8593	Max WS	945.49	110.45
Brookshire Creek	Reach 1	8469	Max WS	973.72	110.35
Brookshire Creek	Reach 1	8243	Max WS	1006.3	110.15
Brookshire Creek	Reach 1	7951	Max WS	1091.32	109.93
Brookshire Creek	Reach 1	7846	Max WS	1146.52	109.89
Brookshire Creek	Reach 1	7814 Hunt Rd		Bridge	
Brookshire Creek	Reach 1	7790	Max WS	1146.5	109.74
Brookshire Creek	Reach 1	7789		Lat Struct	
Brookshire Creek	Reach 1	7788		Lat Struct	
Brookshire Creek	Reach 1	7736	Max WS	1123.15	109.69
Brookshire Creek	Reach 1	7575	Max WS	1122.81	109.57
Brookshire Creek	Reach 1	7301	Max WS	1074.73	109.35
Brookshire Creek	Reach 1	7077	Max WS	1076.01	109.11
Brookshire Creek	Reach 1	6904	Max WS	1076.94	108.99
Brookshire Creek	Reach 1	6742	Max WS	1077.8	108.82
Brookshire Creek	Reach 1	6442	Max WS	1079.37	108.55
Brookshire Creek	Reach 1	6243	Max WS	1080.34	108.36
Brookshire Creek	Reach 1	6141	Max WS	1080.97	108.25
Brookshire Creek	Reach 1	6066	Max WS	1081.38	108.2
Brookshire Creek	Reach 1	6025	Max WS	1081.59	108.16
Brookshire Creek	Reach 1	6003 Private Crossing		Bridge	
Brookshire Creek	Reach 1	5988	Max WS	1081.6	108.14
Brookshire Creek	Reach 1	5987		Lat Struct	
Brookshire Creek	Reach 1	5986		Lat Struct	
Brookshire Creek	Reach 1	5940	Max WS	1081.85	108.09
Brookshire Creek	Reach 1	5872	Max WS	1082.21	108.02
Brookshire Creek	Reach 1	5737	Max WS	1082.21	107.86

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	137462	Max WS	320.15	164.47
Willow Fork	Reach 1	137425		Lat Struct	
Willow Fork	Reach 1	137424		Lat Struct	
Willow Fork	Reach 1	137151	Max WS	175.41	163.95
Willow Fork	Reach 1	136840	Max WS	167.9	163.56
Willow Fork	Reach 1	136469	Max WS	112.51	163.29
Willow Fork	Reach 1	136098	Max WS	111.48	163.03
Willow Fork	Reach 1	135726	Max WS	127.65	162.74
Willow Fork	Reach 1	135354	Max WS	121.65	162.47
Willow Fork	Reach 1	134980	Max WS	117.62	162.14
Willow Fork	Reach 1	134606	Max WS	103.68	161.8
Willow Fork	Reach 1	134604		Lat Struct	
Willow Fork	Reach 1	134603		Lat Struct	
Willow Fork	Reach 1	134232	Max WS	117.99	161.44
Willow Fork	Reach 1	133858	Max WS	108.45	161.09
Willow Fork	Reach 1	133485	Max WS	104.46	160.76
Willow Fork	Reach 1	133113	Max WS	92.35	160.53
Willow Fork	Reach 1	132739	Max WS	114.51	160.3
Willow Fork	Reach 1	132365	Max WS	159.52	159.88
Willow Fork	Reach 1	131993	Max WS	129.62	159.6
Willow Fork	Reach 1	131622	Max WS	125.57	159.45
Willow Fork	Reach 1	131249	Max WS	111.06	159.29
Willow Fork	Reach 1	130877	Max WS	117.29	158.96
Willow Fork	Reach 1	130874		Lat Struct	
Willow Fork	Reach 1	130873		Lat Struct	
Willow Fork	Reach 1	130504	Max WS	124.96	158.63
Willow Fork	Reach 1	130132	Max WS	121.2	158.45
Willow Fork	Reach 1	129759	Max WS	103.54	158.3
Willow Fork	Reach 1	129386	Max WS	103.79	158.18
Willow Fork	Reach 1	129015	Max WS	113.5	158.09
Willow Fork	Reach 1	128644	Max WS	140.73	158
Willow Fork	Reach 1	128273	Max WS	207.19	157.85
Willow Fork	Reach 1	127903	Max WS	297.66	157.7
Willow Fork	Reach 1	127810	Max WS	327.33	157.67
Willow Fork	Reach 1	127717	Max WS	358.71	157.64
Willow Fork	Reach 1	127633		Lat Struct	
Willow Fork	Reach 1	127624	Max WS	405.77	157.62
Willow Fork	Reach 1	127543		Lat Struct	
Willow Fork	Reach 1	127531	Max WS	408.36	157.61
Willow Fork	Reach 1	127469	Max WS	357.5	157.61
Willow Fork	Reach 1	127399		Culvert	
Willow Fork	Reach 1	127365	Max WS	356.32	157.58
Willow Fork	Reach 1	127306	Max WS	404.12	157.55
Willow Fork	Reach 1	127285		Lat Struct	
Willow Fork	Reach 1	127252	Max WS	439.79	157.51
Willow Fork	Reach 1	127224		Lat Struct	
Willow Fork	Reach 1	127159	Max WS	460.36	157.46
Willow Fork	Reach 1	126785	Max WS	336.25	157.3
Willow Fork	Reach 1	126412	Max WS	352.66	157.14
Willow Fork	Reach 1	126038	Max WS	313.1	156.94
Willow Fork	Reach 1	125665	Max WS	281.94	156.81
Willow Fork	Reach 1	125292	Max WS	347.15	156.67
Willow Fork	Reach 1	124919	Max WS	330.11	156.52
Willow Fork	Reach 1	124545	Max WS	367.48	156.31

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	124171	Max WS	393.72	156.09
Willow Fork	Reach 1	124124		Lat Struct	
Willow Fork	Reach 1	124062		Lat Struct	
Willow Fork	Reach 1	123946	Max WS	537.2	155.86
Willow Fork	Reach 1	123871	Max WS	571.72	155.84
Willow Fork	Reach 1	123807 RR ADJACENT TO U		Bridge	
Willow Fork	Reach 1	123796	Max WS	571.45	155.67
Willow Fork	Reach 1	123742	Max WS	565.71	155.64
Willow Fork	Reach 1	123693		Bridge	
Willow Fork	Reach 1	123687	Max WS	565.67	155.62
Willow Fork	Reach 1	123501		Lat Struct	
Willow Fork	Reach 1	123423	Max WS	497.73	155.41
Willow Fork	Reach 1	123051	Max WS	535.31	154.95
Willow Fork	Reach 1	122680	Max WS	435.85	154.71
Willow Fork	Reach 1	122308	Max WS	465.59	154.52
Willow Fork	Reach 1	121937	Max WS	496.83	154.23
Willow Fork	Reach 1	121565	Max WS	533.11	153.96
Willow Fork	Reach 1	121194	Max WS	592.95	153.63
Willow Fork	Reach 1	121122		Lat Struct	
Willow Fork	Reach 1	120821	Max WS	587.61	153.35
Willow Fork	Reach 1	120448	Max WS	611.33	153.13
Willow Fork	Reach 1	120199	Max WS	645.08	152.87
Willow Fork	Reach 1	119950	Max WS	662.95	152.54
Willow Fork	Reach 1	119795	Max WS	691.52	152.37
Willow Fork	Reach 1	119503 I10		Bridge	
Willow Fork	Reach 1	119310	Max WS	691.71	152.35
Willow Fork	Reach 1	119203	Max WS	679.73	152.24
Willow Fork	Reach 1	118955	Max WS	671.56	151.97
Willow Fork	Reach 1	118719		Lat Struct	
Willow Fork	Reach 1	118584	Max WS	625.46	151.77
Willow Fork	Reach 1	118419		Lat Struct	
Willow Fork	Reach 1	118220		Lat Struct	
Willow Fork	Reach 1	118214	Max WS	700.18	151.68
Willow Fork	Reach 1	118120		Lat Struct	
Willow Fork	Reach 1	117921		Lat Struct	
Willow Fork	Reach 1	117842	Max WS	697.44	151.51
Willow Fork	Reach 1	117470	Max WS	735.14	151.29
Willow Fork	Reach 1	117419		Lat Struct	
Willow Fork	Reach 1	117098	Max WS	764.53	151.06
Willow Fork	Reach 1	117019		Lat Struct	
Willow Fork	Reach 1	116819		Lat Struct	
Willow Fork	Reach 1	116727	Max WS	803.3	150.81
Willow Fork	Reach 1	116518		Lat Struct	
Willow Fork	Reach 1	116353	Max WS	848.76	150.55
Willow Fork	Reach 1	115979	Max WS	838.45	150.25
Willow Fork	Reach 1	115610	Max WS	902.58	149.87
Willow Fork	Reach 1	115242	Max WS	939.54	149.41
Willow Fork	Reach 1	115019		Lat Struct	
Willow Fork	Reach 1	114869	Max WS	972.04	148.97
Willow Fork	Reach 1	114497	Max WS	985.1	148.69
Willow Fork	Reach 1	113979	Max WS	1062.5	148.32
Willow Fork	Reach 1	113875		Culvert	
Willow Fork	Reach 1	113768	Max WS	1062.52	148.24
Willow Fork	Reach 1	113382	Max WS	1071.03	148.07

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	113010	Max WS	1077.6	147.8
Willow Fork	Reach 1	112637	Max WS	1078.66	147.42
Willow Fork	Reach 1	112264	Max WS	1054.42	147.08
Willow Fork	Reach 1	111890	Max WS	1099.84	146.73
Willow Fork	Reach 1	111517	Max WS	1059.39	146.29
Willow Fork	Reach 1	111420		Lat Struct	
Willow Fork	Reach 1	111419		Lat Struct	
Willow Fork	Reach 1	111231	Max WS	1003.84	146.07
Willow Fork	Reach 1	110945	Max WS	1044.56	145.58
Willow Fork	Reach 1	110659	Max WS	1042.05	145.23
Willow Fork	Reach 1	110486	Max WS	1062.68	145.11
Willow Fork	Reach 1	110130	Max WS	1061.47	144.73
Willow Fork	Reach 1	109775	Max WS	1059.33	144.32
Willow Fork	Reach 1	109438	Max WS	1062.64	143.96
Willow Fork	Reach 1	109101	Max WS	1052.23	143.58
Willow Fork	Reach 1	108764	Max WS	1055.43	143.08
Willow Fork	Reach 1	108698		Bridge	
Willow Fork	Reach 1	108627	Max WS	1055.12	142.95
Willow Fork	Reach 1	108316	Max WS	1031.28	142.47
Willow Fork	Reach 1	108006	Max WS	1033.17	142.02
Willow Fork	Reach 1	107696	Max WS	1062.92	141.6
Willow Fork	Reach 1	107386	Max WS	1063.25	141.18
Willow Fork	Reach 1	107020	Max WS	1054.1	140.9
Willow Fork	Reach 1	106654	Max WS	1060.72	140.77
Willow Fork	Reach 1	106520		Lat Struct	
Willow Fork	Reach 1	106519		Lat Struct	
Willow Fork	Reach 1	106288	Max WS	1077.71	140.65
Willow Fork	Reach 1	105904	Max WS	1082.71	140.27
Willow Fork	Reach 1	105521	Max WS	1088.69	139.96
Willow Fork	Reach 1	105138	Max WS	1399.91	139.76
Willow Fork	Reach 1	104608	Max WS	1406.81	139.49
Willow Fork	Reach 1	104514 FIRETHORNE PEDES		Bridge	
Willow Fork	Reach 1	104466	Max WS	1406.71	139.41
Willow Fork	Reach 1	104124	Max WS	1410.76	139.18
Willow Fork	Reach 1	103782	Max WS	1350.61	138.77
Willow Fork	Reach 1	103441	Max WS	1342.38	138.41
Willow Fork	Reach 1	103048	Max WS	1337.92	138.15
Willow Fork	Reach 1	102656	Max WS	1240.3	137.99
Willow Fork	Reach 1	102263	Max WS	1180.56	137.86
Willow Fork	Reach 1	101871	Max WS	1175.03	137.77
Willow Fork	Reach 1	101801		Lat Struct	
Willow Fork	Reach 1	101558	Max WS	1223.2	137.69
Willow Fork	Reach 1	101246	Max WS	1295.39	137.61
Willow Fork	Reach 1	101002		Lat Struct	
Willow Fork	Reach 1	100933	Max WS	1295.9	137.45
Willow Fork	Reach 1	100621	Max WS	1326.73	137.15
Willow Fork	Reach 1	100372	Max WS	1338.51	136.84
Willow Fork	Reach 1	100306		Bridge	
Willow Fork	Reach 1	100241	Max WS	1338.68	136.82
Willow Fork	Reach 1	99619	Max WS	1301.19	136.41
Willow Fork	Reach 1	99515	Max WS	1294.19	136.33
Willow Fork	Reach 1	99232	Max WS	1266.2	136.13
Willow Fork	Reach 1	98950	Max WS	1245.27	135.89
Willow Fork	Reach 1	98667	Max WS	1081.52	135.65

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	98164	Max WS	1043.91	135.25
Willow Fork	Reach 1	97661	Max WS	1252.53	134.78
Willow Fork	Reach 1	97643 BRYANTS RD		Bridge	
Willow Fork	Reach 1	97598	Max WS	1251.97	134.59
Willow Fork	Reach 1	97330	Max WS	1244.84	134.13
Willow Fork	Reach 1	97062	Max WS	1269.09	133.8
Willow Fork	Reach 1	96794	Max WS	1285.23	133.42
Willow Fork	Reach 1	96435	Max WS	1146.45	133.02
Willow Fork	Reach 1	96076	Max WS	1126.59	132.72
Willow Fork	Reach 1	95749		Lat Struct	
Willow Fork	Reach 1	95708	Max WS	1171.86	132.34
Willow Fork	Reach 1	95644		Lat Struct	
Willow Fork	Reach 1	95341	Max WS	1913.21	131.57
Willow Fork	Reach 1	95298		Lat Struct	
Willow Fork	Reach 1	95004	Max WS	1909.93	131.18
Willow Fork	Reach 1	94998		Lat Struct	
Willow Fork	Reach 1	94699	Max WS	1741.04	130.93
Willow Fork	Reach 1	94589	Max WS	1704.52	130.85
Willow Fork	Reach 1	94542	Max WS	1701.03	130.85
Willow Fork	Reach 1	94499 FM1463		Bridge	
Willow Fork	Reach 1	94477	Max WS	1701.02	130.79
Willow Fork	Reach 1	94449	Max WS	1692.51	130.75
Willow Fork	Reach 1	94171	Max WS	1509.8	130.61
Willow Fork	Reach 1	93892	Max WS	1448.74	130.31
Willow Fork	Reach 1	93614	Max WS	1422.31	129.94
Willow Fork	Reach 1	93517		Bridge	
Willow Fork	Reach 1	93464	Max WS	1420.99	129.58
Willow Fork	Reach 1	92831	Max WS	1246.49	128.82
Willow Fork	Reach 1	92444	Max WS	1152.58	128.41
Willow Fork	Reach 1	92099		Lat Struct	
Willow Fork	Reach 1	92098		Lat Struct	
Willow Fork	Reach 1	92058		Lat Struct	
Willow Fork	Reach 1	92056	Max WS	1067.28	128.07
Willow Fork	Reach 1	91901		Lat Struct	
Willow Fork	Reach 1	91806		Lat Struct	
Willow Fork	Reach 1	91669	Max WS	1310.96	127.55
Willow Fork	Reach 1	91362	Max WS	1263.75	127.11
Willow Fork	Reach 1	90983	Max WS	1095.62	126.74
Willow Fork	Reach 1	90605	Max WS	1095.18	126.5
Willow Fork	Reach 1	90570		Lat Struct	
Willow Fork	Reach 1	90297	Max WS	848.85	126.38
Willow Fork	Reach 1	90228		Lat Struct	
Willow Fork	Reach 1	90128		Lat Struct	
Willow Fork	Reach 1	90101	Max WS	1963.47	126.19
Willow Fork	Reach 1	90092 KINGSLAND		Bridge	
Willow Fork	Reach 1	89954	Max WS	1963.48	125.99
Willow Fork	Reach 1	89712	Max WS	1963.47	125.82
Snake Creek	Reach-1	120371	Max WS	8.21	160.63
Snake Creek	Reach-1	120369		Lat Struct	
Snake Creek	Reach-1	120360		Lat Struct	
Snake Creek	Reach-1	120006	Max WS	8.2	160.51
Snake Creek	Reach-1	119641	Max WS	7.17	160.5
Snake Creek	Reach-1	119263	Max WS	18.44	160.44
Snake Creek	Reach-1	118886	Max WS	31.35	160.25

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	118558	Max WS	38.14	160.01
Snake Creek	Reach-1	118230	Max WS	-0.32	159.9
Snake Creek	Reach-1	117949	Max WS	13.68	159.88
Snake Creek	Reach-1	117669	Max WS	21.96	159.82
Snake Creek	Reach-1	117389	Max WS	34.91	159.66
Snake Creek	Reach-1	117010	Max WS	53.33	159.18
Snake Creek	Reach-1	116631	Max WS	32.77	158.74
Snake Creek	Reach-1	116256	Max WS	7.39	158.6
Snake Creek	Reach-1	115881	Max WS	-2.38	158.6
Snake Creek	Reach-1	115499	Max WS	11.47	158.46
Snake Creek	Reach-1	115117	Max WS	0.33	158.37
Snake Creek	Reach-1	115108		Lat Struct	
Snake Creek	Reach-1	115107		Lat Struct	
Snake Creek	Reach-1	114742	Max WS	48.76	158.2
Snake Creek	Reach-1	114367	Max WS	55.04	157.98
Snake Creek	Reach-1	113992	Max WS	57.07	157.79
Snake Creek	Reach-1	113617	Max WS	62.85	157.59
Snake Creek	Reach-1	113239	Max WS	59.05	157.49
Snake Creek	Reach-1	112862	Max WS	80.31	157.24
Snake Creek	Reach-1	112425	Max WS	111.39	156.78
Snake Creek	Reach-1	112381 Schlipf Rd		Culvert	
Snake Creek	Reach-1	112341	Max WS	111.39	156.75
Snake Creek	Reach-1	112111	Max WS	114.05	156.59
Snake Creek	Reach-1	112103		Lat Struct	
Snake Creek	Reach-1	112102		Lat Struct	
Snake Creek	Reach-1	111736	Max WS	119.2	156.28
Snake Creek	Reach-1	111523	Max WS	109.85	156.15
Snake Creek	Reach-1	111507		Culvert	
Snake Creek	Reach-1	111469	Max WS	109.83	155.52
Snake Creek	Reach-1	111361	Max WS	137.09	155.42
Snake Creek	Reach-1	110984	Max WS	148.92	155.13
Snake Creek	Reach-1	110608	Max WS	154.5	154.67
Snake Creek	Reach-1	110233	Max WS	155.54	154.18
Snake Creek	Reach-1	109858	Max WS	157.89	153.8
Snake Creek	Reach-1	109483	Max WS	160.15	153.49
Snake Creek	Reach-1	109108	Max WS	162.41	153.25
Snake Creek	Reach-1	108734	Max WS	164.58	153.06
Snake Creek	Reach-1	108360	Max WS	167.18	152.92
Snake Creek	Reach-1	107985	Max WS	352.84	152.55
Snake Creek	Reach-1	107611	Max WS	371.4	152.17
Snake Creek	Reach-1	107211	Max WS	292.42	151.95
Snake Creek	Reach-1	106911	Max WS	297	151.75
Snake Creek	Reach-1	106861		Culvert	
Snake Creek	Reach-1	106811	Max WS	296.97	150.26
Snake Creek	Reach-1	106810		Lat Struct	
Snake Creek	Reach-1	106809		Lat Struct	
Snake Creek	Reach-1	106460	Max WS	332.26	149.98
Snake Creek	Reach-1	106110	Max WS	416.57	149.41
Snake Creek	Reach-1	105735	Max WS	440.52	148.9
Snake Creek	Reach-1	105360	Max WS	439.3	148.33
Snake Creek	Reach-1	104985	Max WS	442.5	147.71
Snake Creek	Reach-1	104610	Max WS	444.37	147.25
Snake Creek	Reach-1	104227	Max WS	449.63	146.78
Snake Creek	Reach-1	104184 Century Plant Br		Bridge	

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	104144	Max WS	449.57	146.48
Snake Creek	Reach-1	103859	Max WS	450.05	146.17
Snake Creek	Reach-1	103484	Max WS	407.58	145.61
Snake Creek	Reach-1	103109	Max WS	400.18	145.2
Snake Creek	Reach-1	102734	Max WS	435.94	144.87
Snake Creek	Reach-1	102359	Max WS	534.08	144.23
Snake Creek	Reach-1	102171		Lat Struct	
Snake Creek	Reach-1	102170		Lat Struct	
Snake Creek	Reach-1	102169	Max WS	584.7	143.9
Snake Creek	Reach-1	102106		Bridge	
Snake Creek	Reach-1	102078	Max WS	584.52	143.69
Snake Creek	Reach-1	102014	Max WS	601.9	143.58
Snake Creek	Reach-1	101987		Bridge	
Snake Creek	Reach-1	101936	Max WS	601.48	143.15
Snake Creek	Reach-1	101609	Max WS	590.34	142.39
Snake Creek	Reach-1	101291	Max WS	550.21	141.65
Snake Creek	Reach-1	101191	Max WS	566.66	141.2
Snake Creek	Reach-1	101091	Max WS	570.09	141.04
Snake Creek	Reach-1	100991	Max WS	595.47	140.83
Snake Creek	Reach-1	100891	Max WS	650.06	140.55
Snake Creek	Reach-1	100859	Max WS	707.91	140.4
Snake Creek	Reach-1	100741	Max WS	834.6	140.26
Snake Creek	Reach-1	100701 RR ADJACENT TO U		Bridge	
Snake Creek	Reach-1	100649	Max WS	833.71	139.61
Snake Creek	Reach-1	100617	Max WS	847.68	139.66
Snake Creek	Reach-1	100559 US 90		Bridge	
Snake Creek	Reach-1	100514	Max WS	847.68	139.17
Snake Creek	Reach-1	100279	Max WS	808.14	138.72
Snake Creek	Reach-1	100222		Bridge	
Snake Creek	Reach-1	100187	Max WS	808.08	138.55
Snake Creek	Reach-1	100156	Max WS	808.89	138.51
Snake Creek	Reach-1	100120		Bridge	
Snake Creek	Reach-1	100069	Max WS	808.96	138.57
Snake Creek	Reach-1	99714	Max WS	812.17	138.12
Snake Creek	Reach-1	99358	Max WS	829.4	137.65
Snake Creek	Reach-1	98983	Max WS	715.86	137.19
Snake Creek	Reach-1	98608	Max WS	441.6	136.99
Snake Creek	Reach-1	98358	Max WS	882.92	136.34
Snake Creek	Reach-1	98072	Max WS	765.69	135.83
Snake Creek	Reach-1	98071		Lat Struct	
Snake Creek	Reach-1	98070		Lat Struct	
Snake Creek	Reach-1	97859	Max WS	706.52	135.45
Snake Creek	Reach-1	97484	Max WS	787.25	134.91
Snake Creek	Reach-1	97109	Max WS	762.07	134.5
Snake Creek	Reach-1	96734	Max WS	872.86	133.85
Snake Creek	Reach-1	96359	Max WS	1189.72	133.12
Snake Creek	Reach-1	96300 I10		Bridge	
Snake Creek	Reach-1	96003	Max WS	1100.88	132.68
Snake Creek	Reach-1	95977	Max WS	1100.6	132.67
CaneIslandBranch	Upper	136675	Max WS	5	166.21
CaneIslandBranch	Upper	136674		Lat Struct	
CaneIslandBranch	Upper	136673		Lat Struct	
CaneIslandBranch	Upper	136379	Max WS	5	166.21
CaneIslandBranch	Upper	136084	Max WS	27.67	166.21

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	135788	Max WS	50.35	166.2
CaneIslandBranch	Upper	135493	Max WS	73.03	166.18
CaneIslandBranch	Upper	135197	Max WS	95.69	166.15
CaneIslandBranch	Upper	134902	Max WS	118.33	166.12
CaneIslandBranch	Upper	134606	Max WS	140.94	166.06
CaneIslandBranch	Upper	134311	Max WS	163.42	166
CaneIslandBranch	Upper	134016	Max WS	185.81	165.93
CaneIslandBranch	Upper	133720	Max WS	207.92	165.85
CaneIslandBranch	Upper	133425	Max WS	229.68	165.75
CaneIslandBranch	Upper	133129	Max WS	249.27	165.64
CaneIslandBranch	Upper	132834	Max WS	261.5	165.53
CaneIslandBranch	Upper	132538	Max WS	251.68	165.46
CaneIslandBranch	Upper	132243	Max WS	157.94	165.44
CaneIslandBranch	Upper	131946	Max WS	109.62	165.43
CaneIslandBranch	Upper	131703	Max WS	55.48	165.42
CaneIslandBranch	Upper	131559		Culvert	
CaneIslandBranch	Upper	131417	Max WS	50.31	164.65
CaneIslandBranch	Upper	131387	Max WS	50.91	164.64
CaneIslandBranch	Upper	131297		Lat Struct	
CaneIslandBranch	Upper	131061	Max WS	61.26	164.6
CaneIslandBranch	Upper	130766	Max WS	67.24	164.57
CaneIslandBranch	Upper	130312	Max WS	75.87	164.49
CaneIslandBranch	Upper	129858	Max WS	89.44	164.33
CaneIslandBranch	Upper	129404	Max WS	65.47	164.2
CaneIslandBranch	Upper	128916	Max WS	145.91	163.84
CaneIslandBranch	Upper	128857	Max WS	153.57	163.75
CaneIslandBranch	Upper	128798	Max WS	154.36	163.69
CaneIslandBranch	Upper	128765		Culvert	
CaneIslandBranch	Upper	128739	Max WS	154.35	163.65
CaneIslandBranch	Upper	128279	Max WS	154.3	163.21
CaneIslandBranch	Upper	127819	Max WS	154.25	162.8
CaneIslandBranch	Upper	127304	Max WS	154.22	162.23
CaneIslandBranch	Upper	126789	Max WS	154.12	161.44
CaneIslandBranch	Upper	126128	Max WS	134.81	160.3
CaneIslandBranch	Upper	126038		Culvert	
CaneIslandBranch	Upper	125947	Max WS	130.83	160.12
CaneIslandBranch	Upper	125946		Lat Struct	
CaneIslandBranch	Upper	125620	Max WS	121.6	159.87
CaneIslandBranch	Upper	125228	Max WS	242.01	159.71
CaneIslandBranch	Upper	124703	Max WS	241.62	159.41
CaneIslandBranch	Upper	124179	Max WS	241.27	159.09
CaneIslandBranch	Upper	123627	Max WS	241.64	158.75
CaneIslandBranch	Upper	123076	Max WS	245.01	158.42
CaneIslandBranch	Upper	123075		Lat Struct	
CaneIslandBranch	Upper	122570	Max WS	245	158.15
CaneIslandBranch	Upper	122064	Max WS	244.97	157.89
CaneIslandBranch	Upper	121554	Max WS	244.82	157.57
CaneIslandBranch	Upper	121045	Max WS	206.48	157.35
CaneIslandBranch	Upper	120807	Max WS	207.75	157.18
CaneIslandBranch	Upper	120806		Lat Struct	
CaneIslandBranch	Upper	120293	Max WS	170.6	156.63
CaneIslandBranch	Upper	119780	Max WS	203.97	155.62
CaneIslandBranch	Upper	119685	Max WS	200.03	155.51
CaneIslandBranch	Upper	119647 PITTS RD		Culvert	

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	119625	Max WS	199.13	155.47
CaneIslandBranch	Upper	119605		Lat Struct	
CaneIslandBranch	Upper	119589.2		Lat Struct	
CaneIslandBranch	Upper	119494	Max WS	194.08	155.39
CaneIslandBranch	Upper	118961	Max WS	214.91	155.18
CaneIslandBranch	Upper	118640	Max WS	236.67	155.08
CaneIslandBranch	Upper	118223	Max WS	264.31	154.83
CaneIslandBranch	Upper	117807	Max WS	290.2	154.58
CaneIslandBranch	Upper	117739		Lat Struct	
CaneIslandBranch	Upper	117738		Lat Struct	
CaneIslandBranch	Upper	117737	Max WS	291.67	154.56
CaneIslandBranch	Upper	117710.5 Clay Rd		Culvert	
CaneIslandBranch	Upper	117680	Max WS	290.81	154.42
CaneIslandBranch	Upper	117535	Max WS	290.84	154.35
CaneIslandBranch	Upper	117209	Max WS	310.06	154.15
CaneIslandBranch	Upper	117021	Max WS	322.14	154.02
CaneIslandBranch	Upper	116834	Max WS	334.71	153.91
CaneIslandBranch	Upper	116647	Max WS	341.48	153.81
CaneIslandBranch	Upper	116459	Max WS	353.44	153.69
CaneIslandBranch	Upper	116271	Max WS	366.25	153.58
CaneIslandBranch	Upper	116084	Max WS	379.02	153.45
CaneIslandBranch	Upper	115897	Max WS	391.77	153.27
CaneIslandBranch	Upper	115710	Max WS	404.47	153.04
CaneIslandBranch	Upper	115349	Max WS	408.72	152.58
CaneIslandBranch	Upper	114989	Max WS	403.88	152.17
CaneIslandBranch	Upper	114653	Max WS	423.95	151.46
CaneIslandBranch	Upper	114652		Lat Struct	
CaneIslandBranch	Upper	114651		Lat Struct	
CaneIslandBranch	Upper	114144	Max WS	-213.51	151.01
CaneIslandBranch	Upper	113554	Max WS	409.4	151.01
CaneIslandBranch	Upper	113553		Lat Struct	
CaneIslandBranch	Upper	112964	Max WS	436.16	150.66
CaneIslandBranch	Upper	112963		Lat Struct	
CaneIslandBranch	Upper	112583	Max WS	465.33	150.35
CaneIslandBranch	Upper	112582		Lat Struct	
CaneIslandBranch	Upper	112250		Lat Struct	
CaneIslandBranch	Upper	112203	Max WS	471	149.82
CaneIslandBranch	Upper	111833	Max WS	489.57	149.23
CaneIslandBranch	Upper	111464	Max WS	514.74	148.85
CaneIslandBranch	Upper	111339		Lat Struct	
CaneIslandBranch	Upper	111338		Lat Struct	
CaneIslandBranch	Upper	111305	Max WS	522.46	148.72
CaneIslandBranch	Upper	111238 MORTON		Bridge	
CaneIslandBranch	Upper	111211	Max WS	521.95	148.56
CaneIslandBranch	Upper	110710	Max WS	529.63	148.17
CaneIslandBranch	Upper	110335	Max WS	721.14	147.66
CaneIslandBranch	Upper	109960	Max WS	715.22	147.02
CaneIslandBranch	Upper	109586	Max WS	737.24	146.4
CaneIslandBranch	Upper	109213	Max WS	731.78	145.71
CaneIslandBranch	Upper	108837	Max WS	743.44	144.99
CaneIslandBranch	Upper	108461	Max WS	757.94	144.11
CaneIslandBranch	Upper	108086	Max WS	772.55	143.49
CaneIslandBranch	Upper	107741		Lat Struct	
CaneIslandBranch	Upper	107711	Max WS	724.14	143.16

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)
CaneIslandBranch	Upper	107642		Lat Struct	
CaneIslandBranch	Upper	107336	Max WS	743.28	142.89
CaneIslandBranch	Upper	106961	Max WS	672.58	142.68
CaneIslandBranch	Upper	106580	Max WS	404.83	142.59
CaneIslandBranch	Upper	106200	Max WS	453.33	142.55
CaneIslandBranch	Upper	105824	Max WS	595.52	142.49
CaneIslandBranch	Upper	105449	Max WS	939.4	142.35
CaneIslandBranch	Upper	104816	Max WS	852.68	142.14
CaneIslandBranch	Upper	104743 BRACE RIDGE LN		Bridge	
CaneIslandBranch	Upper	104701	Max WS	852.62	142.1
CaneIslandBranch	Upper	104408	Max WS	860.91	142.02
CaneIslandBranch	Upper	103962	Max WS	856.22	141.82
CaneIslandBranch	Upper	103940 FRANZ		Bridge	
CaneIslandBranch	Upper	103864	Max WS	855.75	141.53
CaneIslandBranch	Upper	103841		Lat Struct	
CaneIslandBranch	Upper	103840		Lat Struct	
CaneIslandBranch	Upper	103440	Max WS	724.73	141.23
CaneIslandBranch	Upper	103199	Max WS	726.14	141.14
CaneIslandBranch	Upper	102758	Max WS	1004.09	140.9
CaneIslandBranch	Upper	102460	Max WS	1032.99	140.65
CaneIslandBranch	Upper	102029	Max WS	947.7	140.37
CaneIslandBranch	Upper	101747	Max WS	815.64	140.23
CaneIslandBranch	Upper	101688 10TH ST		Bridge	
CaneIslandBranch	Upper	101667	Max WS	811.8	139.69
CaneIslandBranch	Upper	101316	Max WS	854.07	139.44
CaneIslandBranch	Upper	100965	Max WS	940.75	139.17
CaneIslandBranch	Upper	100597	Max WS	1021.75	138.78
CaneIslandBranch	Upper	100229	Max WS	939.72	138.48
CaneIslandBranch	Upper	99862	Max WS	903.51	138.29
CaneIslandBranch	Upper	99495	Max WS	1083.72	138
CaneIslandBranch	Upper	99441		Lat Struct	
CaneIslandBranch	Upper	99340		Lat Struct	
CaneIslandBranch	Upper	99123	Max WS	1086.76	137.73
CaneIslandBranch	Upper	98750	Max WS	1083.23	137.44
CaneIslandBranch	Upper	98374	Max WS	988.36	137.22
CaneIslandBranch	Upper	97998	Max WS	1042.67	137.02
CaneIslandBranch	Upper	97765	Max WS	1148.66	136.87
CaneIslandBranch	Upper	97741 1ST ST		Bridge	
CaneIslandBranch	Upper	97693	Max WS	1148.39	136.76
CaneIslandBranch	Upper	97661	Max WS	1178.2	136.74
CaneIslandBranch	Upper	97642 MKT RAILROAD		Bridge	
CaneIslandBranch	Upper	97585	Max WS	1177.83	135.88
CaneIslandBranch	Upper	97559	Max WS	1178.16	135.88
CaneIslandBranch	Upper	97442 US 90		Bridge	
CaneIslandBranch	Upper	97429	Max WS	1177.36	135.01
CaneIslandBranch	Upper	97247	Max WS	1155.01	134.77
CaneIslandBranch	Upper	96872	Max WS	1135.99	134.33
CaneIslandBranch	Upper	96497	Max WS	1021.89	134.01
CaneIslandBranch	Upper	96124	Max WS	934.9	133.76
CaneIslandBranch	Upper	95750	Max WS	976.25	133.5
CaneIslandBranch	Upper	95571	Max WS	923.03	133.36
CaneIslandBranch	Upper	95002	Max WS	724.45	133
CaneIslandBranch	Upper	94964 Stockdick Rd		Bridge	
CaneIslandBranch	Upper	94921	Max WS	723.59	132.85

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	94671	Max WS	690.8	132.75
CaneIslandBranch	Upper	94382	Max WS	1172.46	132.4
CaneIslandBranch	Upper	94241 I10		Bridge	
CaneIslandBranch	Upper	93996	Max WS	1172.32	130.41
CaneIslandBranch	Upper	93987		Lat Struct	
CaneIslandBranch	Upper	93966		Lat Struct	
CaneIslandBranch	Upper	93874	Max WS	1173.12	130.1
CaneIslandBranch	Upper	93445	Max WS	1161.13	129.34
CaneIslandBranch	Upper	93242	Max WS	1153.01	129.08
CaneIslandBranch	Upper	92961	Max WS	1122.37	128.51
CaneIslandBranch	Upper	92626	Max WS	1102.3	127.84
CaneIslandBranch	Upper	92617		Lat Struct	
CaneIslandBranch	Upper	92324	Max WS	1102.89	127.58
CaneIslandBranch	Upper	92092		Lat Struct	
CaneIslandBranch	Upper	91990	Max WS	830.2	127.48
CaneIslandBranch	Upper	91607	Max WS	750.25	127.33
CaneIslandBranch	Upper	91224	Max WS	906.96	127.2
CaneIslandBranch	Upper	90826	Max WS	991.03	126.99
CaneIslandBranch	Upper	90804		Lat Struct	
CaneIslandBranch	Upper	90472	Max WS	1051.67	126.78
CaneIslandBranch	Upper	90374	Max WS	1084.05	126.73
CaneIslandBranch	Upper	90284	Max WS	1114.75	126.65
Brookshire Creek	Reach 1	34313	Max WS	396.48	148.18
Brookshire Creek	Reach 1	34312.8		Lat Struct	
Brookshire Creek	Reach 1	34312.6		Lat Struct	
Brookshire Creek	Reach 1	33828	Max WS	394.68	148.05
Brookshire Creek	Reach 1	33312	Max WS	465.52	147.98
Brookshire Creek	Reach 1	32795	Max WS	536.77	147.92
Brookshire Creek	Reach 1	32278	Max WS	608.45	147.85
Brookshire Creek	Reach 1	32277		Lat Struct	
Brookshire Creek	Reach 1	32276		Lat Struct	
Brookshire Creek	Reach 1	31844	Max WS	668.75	147.8
Brookshire Creek	Reach 1	31548 I-10		Bridge	
Brookshire Creek	Reach 1	31259	Max WS	668.66	137.92
Brookshire Creek	Reach 1	30921	Max WS	715.81	137.79
Brookshire Creek	Reach 1	30469	Max WS	778.87	137.53
Brookshire Creek	Reach 1	29909	Max WS	857.06	137
Brookshire Creek	Reach 1	29409	Max WS	927.17	136.47
Brookshire Creek	Reach 1	28880	Max WS	1001.36	135.74
Brookshire Creek	Reach 1	28394	Max WS	1069.61	135.15
Brookshire Creek	Reach 1	28393.6		Lat Struct	
Brookshire Creek	Reach 1	28393.5		Lat Struct	
Brookshire Creek	Reach 1	27920	Max WS	1136.29	134.42
Brookshire Creek	Reach 1	27324	Max WS	1220.12	133.67
Brookshire Creek	Reach 1	26880	Max WS	1282.59	132.87
Brookshire Creek	Reach 1	26364	Max WS	1282.53	132.09
Brookshire Creek	Reach 1	25866	Max WS	1324.98	131.36
Brookshire Creek	Reach 1	25365	Max WS	1367.66	130.67
Brookshire Creek	Reach 1	24855	Max WS	1409.67	130.22
Brookshire Creek	Reach 1	24854.5		Lat Struct	
Brookshire Creek	Reach 1	24834.2		Lat Struct	
Brookshire Creek	Reach 1	24349	Max WS	1442.84	129.44
Brookshire Creek	Reach 1	23841	Max WS	1353.34	128.44
Brookshire Creek	Reach 1	23338	Max WS	1430.02	127.8

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	22834	Max WS	1561.4	126.92
Brookshire Creek	Reach 1	22326	Max WS	1596.94	125.74
Brookshire Creek	Reach 1	21820	Max WS	1564.87	125.01
Brookshire Creek	Reach 1	21318	Max WS	1480.1	124.62
Brookshire Creek	Reach 1	20926	Max WS	1619.94	124.05
Brookshire Creek	Reach 1	20853	Max WS	1731.52	124.1
Brookshire Creek	Reach 1	20817 FM 359/Waller Av		Bridge	
Brookshire Creek	Reach 1	20785	Max WS	1731.51	124.03
Brookshire Creek	Reach 1	20724.5		Lat Struct	
Brookshire Creek	Reach 1	20724.2		Lat Struct	
Brookshire Creek	Reach 1	20650	Max WS	1731.3	123.93
Brookshire Creek	Reach 1	20328	Max WS	1739.02	123.66
Brookshire Creek	Reach 1	19828	Max WS	1761.8	122.94
Brookshire Creek	Reach 1	19328	Max WS	1761.29	121.93
Brookshire Creek	Reach 1	18826	Max WS	1806.16	120.88
Brookshire Creek	Reach 1	18325	Max WS	1881.01	120.12
Brookshire Creek	Reach 1	17930	Max WS	1942.31	119.68
Brookshire Creek	Reach 1	17891		Bridge	
Brookshire Creek	Reach 1	17839	Max WS	1942.31	119.67
Brookshire Creek	Reach 1	17330	Max WS	1770.74	119.16
Brookshire Creek	Reach 1	16864	Max WS	1474.6	118.55
Brookshire Creek	Reach 1	16832	Max WS	1535.42	118.24
Brookshire Creek	Reach 1	16733	Max WS	1535.4	118.22
Brookshire Creek	Reach 1	16732.5		Lat Struct	
Brookshire Creek	Reach 1	16732		Lat Struct	
Brookshire Creek	Reach 1	16696	Max WS	1525.94	118.19
Brookshire Creek	Reach 1	16367	Max WS	1361.93	117.79
Brookshire Creek	Reach 1	16067	Max WS	1226.09	117.46
Brookshire Creek	Reach 1	15741	Max WS	1195.29	117.14
Brookshire Creek	Reach 1	15467	Max WS	1198.59	116.93
Brookshire Creek	Reach 1	15167	Max WS	1178.14	116.46
Brookshire Creek	Reach 1	15166		Lat Struct	
Brookshire Creek	Reach 1	14906	Max WS	1180.38	116.21
Brookshire Creek	Reach 1	14700	Max WS	1078.81	116.04
Brookshire Creek	Reach 1	14698		Lat Struct	
Brookshire Creek	Reach 1	14632	Max WS	1043.77	115.99
Brookshire Creek	Reach 1	14630		Lat Struct	
Brookshire Creek	Reach 1	14544	Max WS	974.32	115.91
Brookshire Creek	Reach 1	14426	Max WS	943.37	115.77
Brookshire Creek	Reach 1	14244	Max WS	861.94	115.59
Brookshire Creek	Reach 1	14243		Lat Struct	
Brookshire Creek	Reach 1	13944	Max WS	873.08	115.37
Brookshire Creek	Reach 1	13644	Max WS	825.61	115.19
Brookshire Creek	Reach 1	13344	Max WS	758.4	115.03
Brookshire Creek	Reach 1	13148	Max WS	851.59	114.89
Brookshire Creek	Reach 1	13044	Max WS	904.18	114.82
Brookshire Creek	Reach 1	12744	Max WS	889.97	114.59
Brookshire Creek	Reach 1	12623	Max WS	835.85	114.5
Brookshire Creek	Reach 1	12446	Max WS	740.04	114.42
Brookshire Creek	Reach 1	12408	Max WS	724.53	114.44
Brookshire Creek	Reach 1	12386 Pecan Hill Dr		Culvert	
Brookshire Creek	Reach 1	12356	Max WS	721.14	114.17
Brookshire Creek	Reach 1	12355		Lat Struct	
Brookshire Creek	Reach 1	12354		Lat Struct	

10-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	12302	Max WS	714.47	114.12
Brookshire Creek	Reach 1	12144	Max WS	717.34	114.04
Brookshire Creek	Reach 1	11831	Max WS	638.23	113.92
Brookshire Creek	Reach 1	11544	Max WS	731.98	113.79
Brookshire Creek	Reach 1	11244	Max WS	831.02	113.62
Brookshire Creek	Reach 1	11123	Max WS	891.12	113.52
Brookshire Creek	Reach 1	11091	Max WS	916.26	113.51
Brookshire Creek	Reach 1	11089		Lat Struct	
Brookshire Creek	Reach 1	11050	Max WS	951.8	113.52
Brookshire Creek	Reach 1	11049		Lat Struct	
Brookshire Creek	Reach 1	11002	Max WS	1203.89	113.42
Brookshire Creek	Reach 1	10943	Max WS	1220.14	113.35
Brookshire Creek	Reach 1	10643	Max WS	1152.04	113.16
Brookshire Creek	Reach 1	10343	Max WS	1084.52	113.01
Brookshire Creek	Reach 1	10039	Max WS	1074.35	112.84
Brookshire Creek	Reach 1	9985	Max WS	1070.99	112.86
Brookshire Creek	Reach 1	9959 Pool Hill Rd		Culvert	
Brookshire Creek	Reach 1	9931	Max WS	1070.03	112.54
Brookshire Creek	Reach 1	9930		Lat Struct	
Brookshire Creek	Reach 1	9929		Lat Struct	
Brookshire Creek	Reach 1	9889	Max WS	1091.96	112.51
Brookshire Creek	Reach 1	9743	Max WS	1103.68	112.41
Brookshire Creek	Reach 1	9443	Max WS	1068.38	112.27
Brookshire Creek	Reach 1	9143	Max WS	1069.08	112.11
Brookshire Creek	Reach 1	8984	Max WS	1075	112.03
Brookshire Creek	Reach 1	8843	Max WS	1093.29	111.95
Brookshire Creek	Reach 1	8715	Max WS	1124.81	111.87
Brookshire Creek	Reach 1	8593	Max WS	1141.09	111.82
Brookshire Creek	Reach 1	8469	Max WS	1206.24	111.74
Brookshire Creek	Reach 1	8243	Max WS	1370.76	111.54
Brookshire Creek	Reach 1	7951	Max WS	1631.34	111.25
Brookshire Creek	Reach 1	7846	Max WS	1706.26	111.22
Brookshire Creek	Reach 1	7814 Hunt Rd		Bridge	
Brookshire Creek	Reach 1	7790	Max WS	1706.11	110.89
Brookshire Creek	Reach 1	7789		Lat Struct	
Brookshire Creek	Reach 1	7788		Lat Struct	
Brookshire Creek	Reach 1	7736	Max WS	1646.8	110.83
Brookshire Creek	Reach 1	7575	Max WS	1594.12	110.69
Brookshire Creek	Reach 1	7301	Max WS	1413.15	110.47
Brookshire Creek	Reach 1	7077	Max WS	1423.55	110.22
Brookshire Creek	Reach 1	6904	Max WS	1399.51	110.09
Brookshire Creek	Reach 1	6742	Max WS	1400.87	109.93
Brookshire Creek	Reach 1	6442	Max WS	1374.64	109.66
Brookshire Creek	Reach 1	6243	Max WS	1382.84	109.47
Brookshire Creek	Reach 1	6141	Max WS	1392.56	109.36
Brookshire Creek	Reach 1	6066	Max WS	1392.96	109.31
Brookshire Creek	Reach 1	6025	Max WS	1393.16	109.28
Brookshire Creek	Reach 1	6003 Private Crossing		Bridge	
Brookshire Creek	Reach 1	5988	Max WS	1393.15	109.2
Brookshire Creek	Reach 1	5987		Lat Struct	
Brookshire Creek	Reach 1	5986		Lat Struct	
Brookshire Creek	Reach 1	5940	Max WS	1393.36	109.14
Brookshire Creek	Reach 1	5872	Max WS	1393.72	109.07
Brookshire Creek	Reach 1	5737	Max WS	1392.22	108.91

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	137462	Max WS	489.78	165.15
Willow Fork	Reach 1	137425		Lat Struct	
Willow Fork	Reach 1	137424		Lat Struct	
Willow Fork	Reach 1	137151	Max WS	247.88	164.45
Willow Fork	Reach 1	136840	Max WS	216.92	163.94
Willow Fork	Reach 1	136469	Max WS	125.75	163.62
Willow Fork	Reach 1	136098	Max WS	133.09	163.34
Willow Fork	Reach 1	135726	Max WS	161.93	163
Willow Fork	Reach 1	135354	Max WS	141.34	162.69
Willow Fork	Reach 1	134980	Max WS	116.39	162.4
Willow Fork	Reach 1	134606	Max WS	115.34	162.1
Willow Fork	Reach 1	134604		Lat Struct	
Willow Fork	Reach 1	134603		Lat Struct	
Willow Fork	Reach 1	134232	Max WS	111.1	161.85
Willow Fork	Reach 1	133858	Max WS	114.52	161.62
Willow Fork	Reach 1	133485	Max WS	115.88	161.41
Willow Fork	Reach 1	133113	Max WS	129.94	161.19
Willow Fork	Reach 1	132739	Max WS	123.2	161.04
Willow Fork	Reach 1	132365	Max WS	216.43	160.59
Willow Fork	Reach 1	131993	Max WS	232.95	160.22
Willow Fork	Reach 1	131622	Max WS	174.8	160.06
Willow Fork	Reach 1	131249	Max WS	116.49	159.94
Willow Fork	Reach 1	130877	Max WS	127.85	159.77
Willow Fork	Reach 1	130874		Lat Struct	
Willow Fork	Reach 1	130873		Lat Struct	
Willow Fork	Reach 1	130504	Max WS	157.33	159.59
Willow Fork	Reach 1	130132	Max WS	182.7	159.45
Willow Fork	Reach 1	129759	Max WS	169.53	159.32
Willow Fork	Reach 1	129386	Max WS	183.83	159.2
Willow Fork	Reach 1	129015	Max WS	182.41	159.11
Willow Fork	Reach 1	128644	Max WS	198.63	159.04
Willow Fork	Reach 1	128273	Max WS	276.33	158.93
Willow Fork	Reach 1	127903	Max WS	339.39	158.83
Willow Fork	Reach 1	127810	Max WS	363.22	158.82
Willow Fork	Reach 1	127717	Max WS	385.11	158.8
Willow Fork	Reach 1	127633		Lat Struct	
Willow Fork	Reach 1	127624	Max WS	413.79	158.79
Willow Fork	Reach 1	127543		Lat Struct	
Willow Fork	Reach 1	127531	Max WS	425.33	158.79
Willow Fork	Reach 1	127469	Max WS	370.35	158.79
Willow Fork	Reach 1	127399		Culvert	
Willow Fork	Reach 1	127365	Max WS	369.85	158.76
Willow Fork	Reach 1	127306	Max WS	398.51	158.74
Willow Fork	Reach 1	127285		Lat Struct	
Willow Fork	Reach 1	127252	Max WS	414.66	158.73
Willow Fork	Reach 1	127224		Lat Struct	
Willow Fork	Reach 1	127159	Max WS	572.75	158.67
Willow Fork	Reach 1	126785	Max WS	291.26	158.61
Willow Fork	Reach 1	126412	Max WS	259.16	158.57
Willow Fork	Reach 1	126038	Max WS	254.04	158.54
Willow Fork	Reach 1	125665	Max WS	243.54	158.51
Willow Fork	Reach 1	125292	Max WS	229.44	158.48
Willow Fork	Reach 1	124919	Max WS	252.24	158.46
Willow Fork	Reach 1	124545	Max WS	341.05	158.42

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	124171	Max WS	471.08	158.35
Willow Fork	Reach 1	124124		Lat Struct	
Willow Fork	Reach 1	124062		Lat Struct	
Willow Fork	Reach 1	123946	Max WS	1272.15	158.13
Willow Fork	Reach 1	123871	Max WS	1576.49	158.06
Willow Fork	Reach 1	123807 RR ADJACENT TO U		Bridge	
Willow Fork	Reach 1	123796	Max WS	1576.37	157.38
Willow Fork	Reach 1	123742	Max WS	1443.38	157.35
Willow Fork	Reach 1	123693		Bridge	
Willow Fork	Reach 1	123687	Max WS	1443.36	157.1
Willow Fork	Reach 1	123501		Lat Struct	
Willow Fork	Reach 1	123423	Max WS	949.17	156.79
Willow Fork	Reach 1	123051	Max WS	879.39	156.25
Willow Fork	Reach 1	122680	Max WS	830.25	155.87
Willow Fork	Reach 1	122308	Max WS	639.52	155.67
Willow Fork	Reach 1	121937	Max WS	526.34	155.51
Willow Fork	Reach 1	121565	Max WS	572.52	155.37
Willow Fork	Reach 1	121194	Max WS	717.1	155.17
Willow Fork	Reach 1	121122		Lat Struct	
Willow Fork	Reach 1	120821	Max WS	679.92	155.02
Willow Fork	Reach 1	120448	Max WS	892.69	154.86
Willow Fork	Reach 1	120199	Max WS	1018.79	154.59
Willow Fork	Reach 1	119950	Max WS	1068.17	154.28
Willow Fork	Reach 1	119795	Max WS	1383.46	154.02
Willow Fork	Reach 1	119503 I10		Bridge	
Willow Fork	Reach 1	119310	Max WS	1383.45	153.99
Willow Fork	Reach 1	119203	Max WS	1326.87	153.83
Willow Fork	Reach 1	118955	Max WS	1254.06	153.39
Willow Fork	Reach 1	118719		Lat Struct	
Willow Fork	Reach 1	118584	Max WS	1084.98	153.04
Willow Fork	Reach 1	118419		Lat Struct	
Willow Fork	Reach 1	118220		Lat Struct	
Willow Fork	Reach 1	118214	Max WS	1025.62	152.92
Willow Fork	Reach 1	118120		Lat Struct	
Willow Fork	Reach 1	117921		Lat Struct	
Willow Fork	Reach 1	117842	Max WS	845.22	152.73
Willow Fork	Reach 1	117470	Max WS	975.11	152.51
Willow Fork	Reach 1	117419		Lat Struct	
Willow Fork	Reach 1	117098	Max WS	918.59	152.33
Willow Fork	Reach 1	117019		Lat Struct	
Willow Fork	Reach 1	116819		Lat Struct	
Willow Fork	Reach 1	116727	Max WS	1051.52	152.09
Willow Fork	Reach 1	116518		Lat Struct	
Willow Fork	Reach 1	116353	Max WS	1195.16	151.8
Willow Fork	Reach 1	115979	Max WS	1147.95	151.48
Willow Fork	Reach 1	115610	Max WS	1171.51	151.1
Willow Fork	Reach 1	115242	Max WS	1083.18	150.77
Willow Fork	Reach 1	115019		Lat Struct	
Willow Fork	Reach 1	114869	Max WS	963.07	150.54
Willow Fork	Reach 1	114497	Max WS	1102.63	150.38
Willow Fork	Reach 1	113979	Max WS	1641.81	149.89
Willow Fork	Reach 1	113875		Culvert	
Willow Fork	Reach 1	113768	Max WS	1641.45	149.68
Willow Fork	Reach 1	113382	Max WS	1501.93	149.49

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	113010	Max WS	1599.64	149.2
Willow Fork	Reach 1	112637	Max WS	1586.67	148.84
Willow Fork	Reach 1	112264	Max WS	1646.53	148.49
Willow Fork	Reach 1	111890	Max WS	1707.45	148.14
Willow Fork	Reach 1	111517	Max WS	1717.42	147.68
Willow Fork	Reach 1	111420		Lat Struct	
Willow Fork	Reach 1	111419		Lat Struct	
Willow Fork	Reach 1	111231	Max WS	1452.24	147.47
Willow Fork	Reach 1	110945	Max WS	1394.99	147.13
Willow Fork	Reach 1	110659	Max WS	1443.6	146.88
Willow Fork	Reach 1	110486	Max WS	1476.84	146.78
Willow Fork	Reach 1	110130	Max WS	1590.4	146.5
Willow Fork	Reach 1	109775	Max WS	1826.01	146.13
Willow Fork	Reach 1	109438	Max WS	1775.13	145.8
Willow Fork	Reach 1	109101	Max WS	1655.57	145.48
Willow Fork	Reach 1	108764	Max WS	1851.65	144.88
Willow Fork	Reach 1	108698		Bridge	
Willow Fork	Reach 1	108627	Max WS	1851.26	144.71
Willow Fork	Reach 1	108316	Max WS	1485.89	144.31
Willow Fork	Reach 1	108006	Max WS	1381.11	144.02
Willow Fork	Reach 1	107696	Max WS	1663.68	143.65
Willow Fork	Reach 1	107386	Max WS	1652.8	143.33
Willow Fork	Reach 1	107020	Max WS	1707.66	143.13
Willow Fork	Reach 1	106654	Max WS	1834.64	143
Willow Fork	Reach 1	106520		Lat Struct	
Willow Fork	Reach 1	106519		Lat Struct	
Willow Fork	Reach 1	106288	Max WS	1834.77	142.87
Willow Fork	Reach 1	105904	Max WS	1803.4	142.65
Willow Fork	Reach 1	105521	Max WS	1647.24	142.49
Willow Fork	Reach 1	105138	Max WS	2373.46	142.35
Willow Fork	Reach 1	104608	Max WS	2914.42	142.01
Willow Fork	Reach 1	104514 FIRETHORNE PEDES		Bridge	
Willow Fork	Reach 1	104466	Max WS	2912.13	141.81
Willow Fork	Reach 1	104124	Max WS	2892.8	141.45
Willow Fork	Reach 1	103782	Max WS	2822.78	140.93
Willow Fork	Reach 1	103441	Max WS	2794.32	140.53
Willow Fork	Reach 1	103048	Max WS	2595.61	140.24
Willow Fork	Reach 1	102656	Max WS	2557.16	140.04
Willow Fork	Reach 1	102263	Max WS	2395.88	139.86
Willow Fork	Reach 1	101871	Max WS	2436.91	139.73
Willow Fork	Reach 1	101801		Lat Struct	
Willow Fork	Reach 1	101558	Max WS	2783.54	139.54
Willow Fork	Reach 1	101246	Max WS	3096.99	139.37
Willow Fork	Reach 1	101002		Lat Struct	
Willow Fork	Reach 1	100933	Max WS	3038.36	139.18
Willow Fork	Reach 1	100621	Max WS	3226.19	138.94
Willow Fork	Reach 1	100372	Max WS	3389.86	138.69
Willow Fork	Reach 1	100306		Bridge	
Willow Fork	Reach 1	100241	Max WS	3389.68	138.6
Willow Fork	Reach 1	99619	Max WS	2713.4	138.15
Willow Fork	Reach 1	99515	Max WS	2687.21	138.07
Willow Fork	Reach 1	99232	Max WS	2751.85	137.85
Willow Fork	Reach 1	98950	Max WS	2665.31	137.63
Willow Fork	Reach 1	98667	Max WS	2293.11	137.44

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Willow Fork	Reach 1	98164	Max WS	2037.85	137.09
Willow Fork	Reach 1	97661	Max WS	2054.14	136.81
Willow Fork	Reach 1	97643 BRYANTS RD		Bridge	
Willow Fork	Reach 1	97598	Max WS	2054.11	136.76
Willow Fork	Reach 1	97330	Max WS	2037.91	136.58
Willow Fork	Reach 1	97062	Max WS	2429.75	136.38
Willow Fork	Reach 1	96794	Max WS	2347.36	136.13
Willow Fork	Reach 1	96435	Max WS	2356.9	135.75
Willow Fork	Reach 1	96076	Max WS	2448.65	135.35
Willow Fork	Reach 1	95749		Lat Struct	
Willow Fork	Reach 1	95708	Max WS	2844.75	134.61
Willow Fork	Reach 1	95644		Lat Struct	
Willow Fork	Reach 1	95341	Max WS	3961.18	133.52
Willow Fork	Reach 1	95298		Lat Struct	
Willow Fork	Reach 1	95004	Max WS	3942.83	132.96
Willow Fork	Reach 1	94998		Lat Struct	
Willow Fork	Reach 1	94699	Max WS	3222.37	132.68
Willow Fork	Reach 1	94589	Max WS	3009.44	132.55
Willow Fork	Reach 1	94542	Max WS	2966.68	132.54
Willow Fork	Reach 1	94499 FM1463		Bridge	
Willow Fork	Reach 1	94477	Max WS	2966.62	132.35
Willow Fork	Reach 1	94449	Max WS	2926.78	132.31
Willow Fork	Reach 1	94171	Max WS	2224.23	132.16
Willow Fork	Reach 1	93892	Max WS	1864.99	131.93
Willow Fork	Reach 1	93614	Max WS	1862.25	131.61
Willow Fork	Reach 1	93517		Bridge	
Willow Fork	Reach 1	93464	Max WS	1862.26	131.14
Willow Fork	Reach 1	92831	Max WS	1630.15	130.44
Willow Fork	Reach 1	92444	Max WS	1455.59	130.08
Willow Fork	Reach 1	92099		Lat Struct	
Willow Fork	Reach 1	92098		Lat Struct	
Willow Fork	Reach 1	92058		Lat Struct	
Willow Fork	Reach 1	92056	Max WS	1255.35	129.85
Willow Fork	Reach 1	91901		Lat Struct	
Willow Fork	Reach 1	91806		Lat Struct	
Willow Fork	Reach 1	91669	Max WS	1397.42	129.59
Willow Fork	Reach 1	91362	Max WS	1301.01	129.41
Willow Fork	Reach 1	90983	Max WS	1293.58	129.25
Willow Fork	Reach 1	90605	Max WS	1293.04	129.14
Willow Fork	Reach 1	90570		Lat Struct	
Willow Fork	Reach 1	90297	Max WS	91.09	129.15
Willow Fork	Reach 1	90228		Lat Struct	
Willow Fork	Reach 1	90128		Lat Struct	
Willow Fork	Reach 1	90101	Max WS	2684.11	128.95
Willow Fork	Reach 1	90092 KINGSLAND		Bridge	
Willow Fork	Reach 1	89954	Max WS	2684.15	128.74
Willow Fork	Reach 1	89712	Max WS	2608.75	128.58
Snake Creek	Reach-1	120371	Max WS	10.78	161.03
Snake Creek	Reach-1	120369		Lat Struct	
Snake Creek	Reach-1	120360		Lat Struct	
Snake Creek	Reach-1	120006	Max WS	10.75	160.98
Snake Creek	Reach-1	119641	Max WS	2.63	160.98
Snake Creek	Reach-1	119263	Max WS	26.26	160.93
Snake Creek	Reach-1	118886	Max WS	49.93	160.73

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	118558	Max WS	66.74	160.48
Snake Creek	Reach-1	118230	Max WS	-21.23	160.38
Snake Creek	Reach-1	117949	Max WS	28.36	160.32
Snake Creek	Reach-1	117669	Max WS	30.05	160.26
Snake Creek	Reach-1	117389	Max WS	58.4	160.11
Snake Creek	Reach-1	117010	Max WS	96.64	159.56
Snake Creek	Reach-1	116631	Max WS	58.67	159.04
Snake Creek	Reach-1	116256	Max WS	8.8	158.88
Snake Creek	Reach-1	115881	Max WS	6.24	158.87
Snake Creek	Reach-1	115499	Max WS	3.36	158.87
Snake Creek	Reach-1	115117	Max WS	-49.35	158.92
Snake Creek	Reach-1	115108		Lat Struct	
Snake Creek	Reach-1	115107		Lat Struct	
Snake Creek	Reach-1	114742	Max WS	87.36	158.8
Snake Creek	Reach-1	114367	Max WS	93.65	158.53
Snake Creek	Reach-1	113992	Max WS	89.73	158.31
Snake Creek	Reach-1	113617	Max WS	100.07	158.06
Snake Creek	Reach-1	113239	Max WS	80.49	157.94
Snake Creek	Reach-1	112862	Max WS	114.7	157.74
Snake Creek	Reach-1	112425	Max WS	132.25	157.36
Snake Creek	Reach-1	112381 Schlipf Rd		Culvert	
Snake Creek	Reach-1	112341	Max WS	132.16	157.29
Snake Creek	Reach-1	112111	Max WS	136.87	157.17
Snake Creek	Reach-1	112103		Lat Struct	
Snake Creek	Reach-1	112102		Lat Struct	
Snake Creek	Reach-1	111736	Max WS	150.98	156.9
Snake Creek	Reach-1	111523	Max WS	111.09	156.83
Snake Creek	Reach-1	111507		Culvert	
Snake Creek	Reach-1	111469	Max WS	111.02	156.51
Snake Creek	Reach-1	111361	Max WS	165.61	156.46
Snake Creek	Reach-1	110984	Max WS	201.72	156.25
Snake Creek	Reach-1	110608	Max WS	234.05	155.79
Snake Creek	Reach-1	110233	Max WS	230.04	155.34
Snake Creek	Reach-1	109858	Max WS	220.96	155.06
Snake Creek	Reach-1	109483	Max WS	237.54	154.81
Snake Creek	Reach-1	109108	Max WS	251.67	154.56
Snake Creek	Reach-1	108734	Max WS	264.11	154.33
Snake Creek	Reach-1	108360	Max WS	297.09	154.13
Snake Creek	Reach-1	107985	Max WS	534.84	153.71
Snake Creek	Reach-1	107611	Max WS	605.05	153.22
Snake Creek	Reach-1	107211	Max WS	481.19	152.94
Snake Creek	Reach-1	106911	Max WS	396.09	152.79
Snake Creek	Reach-1	106861		Culvert	
Snake Creek	Reach-1	106811	Max WS	396.04	152.49
Snake Creek	Reach-1	106810		Lat Struct	
Snake Creek	Reach-1	106809		Lat Struct	
Snake Creek	Reach-1	106460	Max WS	642.17	152.14
Snake Creek	Reach-1	106110	Max WS	835.52	151.53
Snake Creek	Reach-1	105735	Max WS	951.9	150.96
Snake Creek	Reach-1	105360	Max WS	828.36	150.47
Snake Creek	Reach-1	104985	Max WS	778.25	149.99
Snake Creek	Reach-1	104610	Max WS	882.04	149.57
Snake Creek	Reach-1	104227	Max WS	905.41	149.2
Snake Creek	Reach-1	104184 Century Plant Br		Bridge	

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Snake Creek	Reach-1	104144	Max WS	904.85	148.15
Snake Creek	Reach-1	103859	Max WS	965.63	147.67
Snake Creek	Reach-1	103484	Max WS	832.53	147.09
Snake Creek	Reach-1	103109	Max WS	874.03	146.45
Snake Creek	Reach-1	102734	Max WS	724.49	146.06
Snake Creek	Reach-1	102359	Max WS	724.9	145.62
Snake Creek	Reach-1	102171		Lat Struct	
Snake Creek	Reach-1	102170		Lat Struct	
Snake Creek	Reach-1	102169	Max WS	846.93	145.37
Snake Creek	Reach-1	102106		Bridge	
Snake Creek	Reach-1	102078	Max WS	846.73	145.06
Snake Creek	Reach-1	102014	Max WS	892.54	144.97
Snake Creek	Reach-1	101987		Bridge	
Snake Creek	Reach-1	101936	Max WS	891.61	144.29
Snake Creek	Reach-1	101609	Max WS	675.09	143.91
Snake Creek	Reach-1	101291	Max WS	604.72	143.68
Snake Creek	Reach-1	101191	Max WS	623.74	143.54
Snake Creek	Reach-1	101091	Max WS	697.81	143.48
Snake Creek	Reach-1	100991	Max WS	902.59	143.37
Snake Creek	Reach-1	100891	Max WS	1191.76	143.17
Snake Creek	Reach-1	100859	Max WS	1336.01	143.07
Snake Creek	Reach-1	100741	Max WS	1802.75	142.92
Snake Creek	Reach-1	100701 RR ADJACENT TO U		Bridge	
Snake Creek	Reach-1	100649	Max WS	1802.64	141.76
Snake Creek	Reach-1	100617	Max WS	1831.12	141.89
Snake Creek	Reach-1	100559 US 90		Bridge	
Snake Creek	Reach-1	100514	Max WS	1830.92	141.21
Snake Creek	Reach-1	100279	Max WS	1733.3	140.8
Snake Creek	Reach-1	100222		Bridge	
Snake Creek	Reach-1	100187	Max WS	1733	140.19
Snake Creek	Reach-1	100156	Max WS	1735.77	140.08
Snake Creek	Reach-1	100120		Bridge	
Snake Creek	Reach-1	100069	Max WS	1735.73	140.16
Snake Creek	Reach-1	99714	Max WS	1636.85	139.63
Snake Creek	Reach-1	99358	Max WS	1654.72	139.01
Snake Creek	Reach-1	98983	Max WS	1257.48	138.5
Snake Creek	Reach-1	98608	Max WS	847.66	138.23
Snake Creek	Reach-1	98358	Max WS	1387.21	137.49
Snake Creek	Reach-1	98072	Max WS	915.39	137.23
Snake Creek	Reach-1	98071		Lat Struct	
Snake Creek	Reach-1	98070		Lat Struct	
Snake Creek	Reach-1	97859	Max WS	784.64	137.08
Snake Creek	Reach-1	97484	Max WS	820.64	136.93
Snake Creek	Reach-1	97109	Max WS	794.09	136.82
Snake Creek	Reach-1	96734	Max WS	925	136.69
Snake Creek	Reach-1	96359	Max WS	1980.66	136.39
Snake Creek	Reach-1	96300 I10		Bridge	
Snake Creek	Reach-1	96003	Max WS	1910.5	135.24
Snake Creek	Reach-1	95977	Max WS	1909.92	135.23
CaneIslandBranch	Upper	136675	Max WS	3.43	167.5
CaneIslandBranch	Upper	136674		Lat Struct	
CaneIslandBranch	Upper	136673		Lat Struct	
CaneIslandBranch	Upper	136379	Max WS	3.44	167.5
CaneIslandBranch	Upper	136084	Max WS	51.17	167.5

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	135788	Max WS	98.92	167.49
CaneIslandBranch	Upper	135493	Max WS	161.64	167.46
CaneIslandBranch	Upper	135197	Max WS	208.02	167.42
CaneIslandBranch	Upper	134902	Max WS	253.43	167.37
CaneIslandBranch	Upper	134606	Max WS	300.94	167.29
CaneIslandBranch	Upper	134311	Max WS	347.92	167.19
CaneIslandBranch	Upper	134016	Max WS	393.77	167.08
CaneIslandBranch	Upper	133720	Max WS	440.63	166.94
CaneIslandBranch	Upper	133425	Max WS	485.98	166.76
CaneIslandBranch	Upper	133129	Max WS	526.52	166.53
CaneIslandBranch	Upper	132834	Max WS	512.73	166.36
CaneIslandBranch	Upper	132538	Max WS	466.77	166.25
CaneIslandBranch	Upper	132243	Max WS	323.7	166.21
CaneIslandBranch	Upper	131946	Max WS	185.77	166.19
CaneIslandBranch	Upper	131703	Max WS	60.48	166.19
CaneIslandBranch	Upper	131559		Culvert	
CaneIslandBranch	Upper	131417	Max WS	57.92	165.86
CaneIslandBranch	Upper	131387	Max WS	59.1	165.86
CaneIslandBranch	Upper	131297		Lat Struct	
CaneIslandBranch	Upper	131061	Max WS	139.11	165.8
CaneIslandBranch	Upper	130766	Max WS	171.92	165.71
CaneIslandBranch	Upper	130312	Max WS	165.15	165.5
CaneIslandBranch	Upper	129858	Max WS	176.04	165.21
CaneIslandBranch	Upper	129404	Max WS	147.48	164.94
CaneIslandBranch	Upper	128916	Max WS	158.26	164.65
CaneIslandBranch	Upper	128857	Max WS	170.99	164.59
CaneIslandBranch	Upper	128798	Max WS	180.33	164.54
CaneIslandBranch	Upper	128765		Culvert	
CaneIslandBranch	Upper	128739	Max WS	180.1	164.5
CaneIslandBranch	Upper	128279	Max WS	196.72	164.18
CaneIslandBranch	Upper	127819	Max WS	214.01	163.87
CaneIslandBranch	Upper	127304	Max WS	233.45	163.38
CaneIslandBranch	Upper	126789	Max WS	252.77	162.71
CaneIslandBranch	Upper	126128	Max WS	198.9	161.55
CaneIslandBranch	Upper	126038		Culvert	
CaneIslandBranch	Upper	125947	Max WS	198.84	161.32
CaneIslandBranch	Upper	125946		Lat Struct	
CaneIslandBranch	Upper	125620	Max WS	82.85	161.19
CaneIslandBranch	Upper	125228	Max WS	470.12	161.02
CaneIslandBranch	Upper	124703	Max WS	435.74	160.72
CaneIslandBranch	Upper	124179	Max WS	449.55	160.43
CaneIslandBranch	Upper	123627	Max WS	456.04	160.1
CaneIslandBranch	Upper	123076	Max WS	468.8	159.78
CaneIslandBranch	Upper	123075		Lat Struct	
CaneIslandBranch	Upper	122570	Max WS	468.38	159.5
CaneIslandBranch	Upper	122064	Max WS	424.89	159.27
CaneIslandBranch	Upper	121554	Max WS	395.17	159.06
CaneIslandBranch	Upper	121045	Max WS	365.86	158.91
CaneIslandBranch	Upper	120807	Max WS	365.48	158.76
CaneIslandBranch	Upper	120806		Lat Struct	
CaneIslandBranch	Upper	120293	Max WS	351.43	158.28
CaneIslandBranch	Upper	119780	Max WS	-138.89	158.12
CaneIslandBranch	Upper	119685	Max WS	480.41	158.02
CaneIslandBranch	Upper	119647 PITTS RD		Culvert	

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	119625	Max WS	479.09	157.7
CaneIslandBranch	Upper	119605		Lat Struct	
CaneIslandBranch	Upper	119589.2		Lat Struct	
CaneIslandBranch	Upper	119494	Max WS	501.56	157.57
CaneIslandBranch	Upper	118961	Max WS	560.92	157.2
CaneIslandBranch	Upper	118640	Max WS	619.36	157.01
CaneIslandBranch	Upper	118223	Max WS	650.34	156.59
CaneIslandBranch	Upper	117807	Max WS	535.28	156.26
CaneIslandBranch	Upper	117739		Lat Struct	
CaneIslandBranch	Upper	117738		Lat Struct	
CaneIslandBranch	Upper	117737	Max WS	433.3	156.25
CaneIslandBranch	Upper	117710.5 Clay Rd		Culvert	
CaneIslandBranch	Upper	117680	Max WS	432.88	156.06
CaneIslandBranch	Upper	117535	Max WS	452.28	156
CaneIslandBranch	Upper	117209	Max WS	447.52	155.83
CaneIslandBranch	Upper	117021	Max WS	532.63	155.73
CaneIslandBranch	Upper	116834	Max WS	680.88	155.58
CaneIslandBranch	Upper	116647	Max WS	686.06	155.44
CaneIslandBranch	Upper	116459	Max WS	656.46	155.3
CaneIslandBranch	Upper	116271	Max WS	663.98	155.15
CaneIslandBranch	Upper	116084	Max WS	671.96	154.96
CaneIslandBranch	Upper	115897	Max WS	652.56	154.75
CaneIslandBranch	Upper	115710	Max WS	599.33	154.55
CaneIslandBranch	Upper	115349	Max WS	690.5	154.13
CaneIslandBranch	Upper	114989	Max WS	644.72	153.77
CaneIslandBranch	Upper	114653	Max WS	984.15	152.73
CaneIslandBranch	Upper	114652		Lat Struct	
CaneIslandBranch	Upper	114651		Lat Struct	
CaneIslandBranch	Upper	114144	Max WS	-476.82	152.01
CaneIslandBranch	Upper	113554	Max WS	576.9	152.16
CaneIslandBranch	Upper	113553		Lat Struct	
CaneIslandBranch	Upper	112964	Max WS	559.88	151.95
CaneIslandBranch	Upper	112963		Lat Struct	
CaneIslandBranch	Upper	112583	Max WS	551.65	151.81
CaneIslandBranch	Upper	112582		Lat Struct	
CaneIslandBranch	Upper	112250		Lat Struct	
CaneIslandBranch	Upper	112203	Max WS	751.35	151.4
CaneIslandBranch	Upper	111833	Max WS	704.23	150.98
CaneIslandBranch	Upper	111464	Max WS	850.76	150.74
CaneIslandBranch	Upper	111339		Lat Struct	
CaneIslandBranch	Upper	111338		Lat Struct	
CaneIslandBranch	Upper	111305	Max WS	774.86	150.66
CaneIslandBranch	Upper	111238 MORTON		Bridge	
CaneIslandBranch	Upper	111211	Max WS	773.71	150.3
CaneIslandBranch	Upper	110710	Max WS	857.66	149.94
CaneIslandBranch	Upper	110335	Max WS	1261.89	149.36
CaneIslandBranch	Upper	109960	Max WS	1204.51	148.66
CaneIslandBranch	Upper	109586	Max WS	1213.46	148.02
CaneIslandBranch	Upper	109213	Max WS	969.48	147.49
CaneIslandBranch	Upper	108837	Max WS	1024.57	147.1
CaneIslandBranch	Upper	108461	Max WS	1377.11	146.45
CaneIslandBranch	Upper	108086	Max WS	1550.57	145.88
CaneIslandBranch	Upper	107741		Lat Struct	
CaneIslandBranch	Upper	107711	Max WS	1452.16	145.51

River	Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)
CaneIslandBranch	Upper	107642		Lat Struct	
CaneIslandBranch	Upper	107336	Max WS	1509.02	145.22
CaneIslandBranch	Upper	106961	Max WS	1389.39	144.98
CaneIslandBranch	Upper	106580	Max WS	873.77	144.88
CaneIslandBranch	Upper	106200	Max WS	908.69	144.81
CaneIslandBranch	Upper	105824	Max WS	967.35	144.75
CaneIslandBranch	Upper	105449	Max WS	1724.92	144.55
CaneIslandBranch	Upper	104816	Max WS	1811.41	144.18
CaneIslandBranch	Upper	104743 BRACE RIDGE LN		Bridge	
CaneIslandBranch	Upper	104701	Max WS	1811.4	143.99
CaneIslandBranch	Upper	104408	Max WS	1688.95	143.85
CaneIslandBranch	Upper	103962	Max WS	1289.4	143.65
CaneIslandBranch	Upper	103940 FRANZ		Bridge	
CaneIslandBranch	Upper	103864	Max WS	1287.88	143.05
CaneIslandBranch	Upper	103841		Lat Struct	
CaneIslandBranch	Upper	103840		Lat Struct	
CaneIslandBranch	Upper	103440	Max WS	1023.12	142.77
CaneIslandBranch	Upper	103199	Max WS	926.21	142.7
CaneIslandBranch	Upper	102758	Max WS	1474.2	142.45
CaneIslandBranch	Upper	102460	Max WS	1377.45	142.26
CaneIslandBranch	Upper	102029	Max WS	1299.02	142.04
CaneIslandBranch	Upper	101747	Max WS	1022.6	141.94
CaneIslandBranch	Upper	101688 10TH ST		Bridge	
CaneIslandBranch	Upper	101667	Max WS	1021.29	141.51
CaneIslandBranch	Upper	101316	Max WS	1112.12	141.33
CaneIslandBranch	Upper	100965	Max WS	1259.03	141.13
CaneIslandBranch	Upper	100597	Max WS	1442.11	140.85
CaneIslandBranch	Upper	100229	Max WS	1500.58	140.6
CaneIslandBranch	Upper	99862	Max WS	1433.6	140.42
CaneIslandBranch	Upper	99495	Max WS	1756.47	140.09
CaneIslandBranch	Upper	99441		Lat Struct	
CaneIslandBranch	Upper	99340		Lat Struct	
CaneIslandBranch	Upper	99123	Max WS	1889.55	139.75
CaneIslandBranch	Upper	98750	Max WS	1838.08	139.41
CaneIslandBranch	Upper	98374	Max WS	1749.15	139.13
CaneIslandBranch	Upper	97998	Max WS	2157.74	138.73
CaneIslandBranch	Upper	97765	Max WS	2572.26	138.38
CaneIslandBranch	Upper	97741 1ST ST		Bridge	
CaneIslandBranch	Upper	97693	Max WS	2564.74	138.06
CaneIslandBranch	Upper	97661	Max WS	2648.93	138.03
CaneIslandBranch	Upper	97642 MKT RAILROAD		Bridge	
CaneIslandBranch	Upper	97585	Max WS	2639.92	137.78
CaneIslandBranch	Upper	97559	Max WS	2639.77	137.78
CaneIslandBranch	Upper	97442 US 90		Bridge	
CaneIslandBranch	Upper	97429	Max WS	2636.12	137.64
CaneIslandBranch	Upper	97247	Max WS	2342.42	137.35
CaneIslandBranch	Upper	96872	Max WS	1881.49	136.94
CaneIslandBranch	Upper	96497	Max WS	1599.19	136.69
CaneIslandBranch	Upper	96124	Max WS	1352.69	136.52
CaneIslandBranch	Upper	95750	Max WS	1270.58	136.38
CaneIslandBranch	Upper	95571	Max WS	1240.42	136.31
CaneIslandBranch	Upper	95002	Max WS	981.86	136.13
CaneIslandBranch	Upper	94964 Stockdick Rd		Bridge	
CaneIslandBranch	Upper	94921	Max WS	981.69	136

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
CaneIslandBranch	Upper	94671	Max WS	1062.61	135.94
CaneIslandBranch	Upper	94382	Max WS	2135.34	135.67
CaneIslandBranch	Upper	94241 I10		Bridge	
CaneIslandBranch	Upper	93996	Max WS	2134.38	132.16
CaneIslandBranch	Upper	93987		Lat Struct	
CaneIslandBranch	Upper	93966		Lat Struct	
CaneIslandBranch	Upper	93874	Max WS	2218.41	131.92
CaneIslandBranch	Upper	93445	Max WS	2469.79	131.62
CaneIslandBranch	Upper	93242	Max WS	2531.6	131.5
CaneIslandBranch	Upper	92961	Max WS	2727.87	131.3
CaneIslandBranch	Upper	92626	Max WS	3509.47	130.96
CaneIslandBranch	Upper	92617		Lat Struct	
CaneIslandBranch	Upper	92324	Max WS	3511.22	130.77
CaneIslandBranch	Upper	92092		Lat Struct	
CaneIslandBranch	Upper	91990	Max WS	2595.1	130.64
CaneIslandBranch	Upper	91607	Max WS	2162.07	130.41
CaneIslandBranch	Upper	91224	Max WS	1898.43	130.28
CaneIslandBranch	Upper	90826	Max WS	1938.79	130.08
CaneIslandBranch	Upper	90804		Lat Struct	
CaneIslandBranch	Upper	90472	Max WS	2184.59	129.88
CaneIslandBranch	Upper	90374	Max WS	2361.14	129.8
CaneIslandBranch	Upper	90284	Max WS	2561.34	129.69
Brookshire Creek	Reach 1	34313	Max WS	1516.94	150.33
Brookshire Creek	Reach 1	34312.8		Lat Struct	
Brookshire Creek	Reach 1	34312.6		Lat Struct	
Brookshire Creek	Reach 1	33828	Max WS	1515.59	149.59
Brookshire Creek	Reach 1	33312	Max WS	1550.81	149.11
Brookshire Creek	Reach 1	32795	Max WS	1587.02	148.77
Brookshire Creek	Reach 1	32278	Max WS	1624.3	148.41
Brookshire Creek	Reach 1	32277		Lat Struct	
Brookshire Creek	Reach 1	32276		Lat Struct	
Brookshire Creek	Reach 1	31844	Max WS	1644.98	148.12
Brookshire Creek	Reach 1	31548 I-10		Bridge	
Brookshire Creek	Reach 1	31259	Max WS	1326.21	141.86
Brookshire Creek	Reach 1	30921	Max WS	1421.56	141.69
Brookshire Creek	Reach 1	30469	Max WS	1548.97	141.38
Brookshire Creek	Reach 1	29909	Max WS	1700.14	140.75
Brookshire Creek	Reach 1	29409	Max WS	1841.31	140.24
Brookshire Creek	Reach 1	28880	Max WS	1995.81	139.47
Brookshire Creek	Reach 1	28394	Max WS	2130.57	138.75
Brookshire Creek	Reach 1	28393.6		Lat Struct	
Brookshire Creek	Reach 1	28393.5		Lat Struct	
Brookshire Creek	Reach 1	27920	Max WS	2267.33	137.74
Brookshire Creek	Reach 1	27324	Max WS	2401.88	136.79
Brookshire Creek	Reach 1	26880	Max WS	2440.49	135.84
Brookshire Creek	Reach 1	26364	Max WS	2564.49	134.9
Brookshire Creek	Reach 1	25866	Max WS	2486.3	133.94
Brookshire Creek	Reach 1	25365	Max WS	2435.31	133.05
Brookshire Creek	Reach 1	24855	Max WS	2500.05	132.4
Brookshire Creek	Reach 1	24854.5		Lat Struct	
Brookshire Creek	Reach 1	24834.2		Lat Struct	
Brookshire Creek	Reach 1	24349	Max WS	2035.45	131.79
Brookshire Creek	Reach 1	23841	Max WS	2026.09	130.94
Brookshire Creek	Reach 1	23338	Max WS	2321.04	130.22

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	22834	Max WS	2666.71	129.08
Brookshire Creek	Reach 1	22326	Max WS	2338.75	128.09
Brookshire Creek	Reach 1	21820	Max WS	2192.11	127.6
Brookshire Creek	Reach 1	21318	Max WS	2077.71	127.32
Brookshire Creek	Reach 1	20926	Max WS	3071.57	126.32
Brookshire Creek	Reach 1	20853	Max WS	3521.69	126.4
Brookshire Creek	Reach 1	20817 FM 359/Waller Av		Bridge	
Brookshire Creek	Reach 1	20785	Max WS	3521.49	126.27
Brookshire Creek	Reach 1	20724.5		Lat Struct	
Brookshire Creek	Reach 1	20724.2		Lat Struct	
Brookshire Creek	Reach 1	20650	Max WS	3366.28	126.12
Brookshire Creek	Reach 1	20328	Max WS	3122.45	125.84
Brookshire Creek	Reach 1	19828	Max WS	3205.91	125.05
Brookshire Creek	Reach 1	19328	Max WS	3153.76	124
Brookshire Creek	Reach 1	18826	Max WS	3288.17	122.8
Brookshire Creek	Reach 1	18325	Max WS	3695.39	122.01
Brookshire Creek	Reach 1	17930	Max WS	3987.83	121.68
Brookshire Creek	Reach 1	17891		Bridge	
Brookshire Creek	Reach 1	17839	Max WS	3987.65	121.65
Brookshire Creek	Reach 1	17330	Max WS	3438.35	121.28
Brookshire Creek	Reach 1	16864	Max WS	2494.58	120.58
Brookshire Creek	Reach 1	16832	Max WS	2601.1	120.25
Brookshire Creek	Reach 1	16733	Max WS	2601.43	120.29
Brookshire Creek	Reach 1	16732.5		Lat Struct	
Brookshire Creek	Reach 1	16732		Lat Struct	
Brookshire Creek	Reach 1	16696	Max WS	2562.43	120.26
Brookshire Creek	Reach 1	16367	Max WS	2167.7	119.89
Brookshire Creek	Reach 1	16067	Max WS	1924.04	119.59
Brookshire Creek	Reach 1	15741	Max WS	1911.8	119.26
Brookshire Creek	Reach 1	15467	Max WS	1976.83	119.03
Brookshire Creek	Reach 1	15167	Max WS	1989.01	118.53
Brookshire Creek	Reach 1	15166		Lat Struct	
Brookshire Creek	Reach 1	14906	Max WS	2095.83	118.3
Brookshire Creek	Reach 1	14700	Max WS	1930.42	118.1
Brookshire Creek	Reach 1	14698		Lat Struct	
Brookshire Creek	Reach 1	14632	Max WS	1871.62	118.03
Brookshire Creek	Reach 1	14630		Lat Struct	
Brookshire Creek	Reach 1	14544	Max WS	1760.02	117.95
Brookshire Creek	Reach 1	14426	Max WS	1678.7	117.82
Brookshire Creek	Reach 1	14244	Max WS	1527.49	117.65
Brookshire Creek	Reach 1	14243		Lat Struct	
Brookshire Creek	Reach 1	13944	Max WS	1574.68	117.4
Brookshire Creek	Reach 1	13644	Max WS	1576.78	117.18
Brookshire Creek	Reach 1	13344	Max WS	1406.72	117
Brookshire Creek	Reach 1	13148	Max WS	1520.61	116.83
Brookshire Creek	Reach 1	13044	Max WS	1637	116.74
Brookshire Creek	Reach 1	12744	Max WS	1666.45	116.44
Brookshire Creek	Reach 1	12623	Max WS	1580.73	116.31
Brookshire Creek	Reach 1	12446	Max WS	1156.32	116.3
Brookshire Creek	Reach 1	12408	Max WS	1042.09	116.34
Brookshire Creek	Reach 1	12386 Pecan Hill Dr		Culvert	
Brookshire Creek	Reach 1	12356	Max WS	1040.63	115.86
Brookshire Creek	Reach 1	12355		Lat Struct	
Brookshire Creek	Reach 1	12354		Lat Struct	

100-year Existing Conditions Results

River	Reach	River Sta	Profile	Q Total	W.S. Elev
				(cfs)	(ft)
Brookshire Creek	Reach 1	12302	Max WS	1123.93	115.79
Brookshire Creek	Reach 1	12144	Max WS	1203.44	115.71
Brookshire Creek	Reach 1	11831	Max WS	1129.31	115.57
Brookshire Creek	Reach 1	11544	Max WS	1257.22	115.41
Brookshire Creek	Reach 1	11244	Max WS	1388.26	115.21
Brookshire Creek	Reach 1	11123	Max WS	1418.94	115.11
Brookshire Creek	Reach 1	11091	Max WS	1425.34	115.1
Brookshire Creek	Reach 1	11089		Lat Struct	
Brookshire Creek	Reach 1	11050	Max WS	1395.19	115.13
Brookshire Creek	Reach 1	11049		Lat Struct	
Brookshire Creek	Reach 1	11002	Max WS	2007.75	114.95
Brookshire Creek	Reach 1	10943	Max WS	2057.57	114.85
Brookshire Creek	Reach 1	10643	Max WS	2024.41	114.57
Brookshire Creek	Reach 1	10343	Max WS	1838.35	114.36
Brookshire Creek	Reach 1	10039	Max WS	1599.27	114.19
Brookshire Creek	Reach 1	9985	Max WS	1494.35	114.22
Brookshire Creek	Reach 1	9959 Pool Hill Rd		Culvert	
Brookshire Creek	Reach 1	9931	Max WS	1491.69	113.79
Brookshire Creek	Reach 1	9930		Lat Struct	
Brookshire Creek	Reach 1	9929		Lat Struct	
Brookshire Creek	Reach 1	9889	Max WS	1567.82	113.75
Brookshire Creek	Reach 1	9743	Max WS	1635.69	113.61
Brookshire Creek	Reach 1	9443	Max WS	1579.31	113.43
Brookshire Creek	Reach 1	9143	Max WS	1464.15	113.26
Brookshire Creek	Reach 1	8984	Max WS	1478.43	113.17
Brookshire Creek	Reach 1	8843	Max WS	1533.79	113.07
Brookshire Creek	Reach 1	8715	Max WS	1610.11	112.97
Brookshire Creek	Reach 1	8593	Max WS	1654.03	112.9
Brookshire Creek	Reach 1	8469	Max WS	1756.83	112.79
Brookshire Creek	Reach 1	8243	Max WS	1913.03	112.56
Brookshire Creek	Reach 1	7951	Max WS	2115.38	112.26
Brookshire Creek	Reach 1	7846	Max WS	2216.72	112.23
Brookshire Creek	Reach 1	7814 Hunt Rd		Bridge	
Brookshire Creek	Reach 1	7790	Max WS	2213.41	111.95
Brookshire Creek	Reach 1	7789		Lat Struct	
Brookshire Creek	Reach 1	7788		Lat Struct	
Brookshire Creek	Reach 1	7736	Max WS	2179.43	111.87
Brookshire Creek	Reach 1	7575	Max WS	2059.33	111.73
Brookshire Creek	Reach 1	7301	Max WS	1894.55	111.47
Brookshire Creek	Reach 1	7077	Max WS	1885.11	111.2
Brookshire Creek	Reach 1	6904	Max WS	1842.24	111.07
Brookshire Creek	Reach 1	6742	Max WS	1810.69	110.9
Brookshire Creek	Reach 1	6442	Max WS	1707.11	110.65
Brookshire Creek	Reach 1	6243	Max WS	1697.99	110.45
Brookshire Creek	Reach 1	6141	Max WS	1716.12	110.34
Brookshire Creek	Reach 1	6066	Max WS	1715.81	110.29
Brookshire Creek	Reach 1	6025	Max WS	1702.98	110.26
Brookshire Creek	Reach 1	6003 Private Crossing		Bridge	
Brookshire Creek	Reach 1	5988	Max WS	1702.93	110.13
Brookshire Creek	Reach 1	5987		Lat Struct	
Brookshire Creek	Reach 1	5986		Lat Struct	
Brookshire Creek	Reach 1	5940	Max WS	1695.44	110.08
Brookshire Creek	Reach 1	5872	Max WS	1700.38	110
Brookshire Creek	Reach 1	5737	Max WS	1737.28	109.83

Appendix 7
Results Compared to Previous Studies

100-year Flow Comparison at Downstream End of BKDD between BKDD Existing Conditions model, FEMA FIS Report Data, and Fort Bend County (FBC) Willow Fork model

Brookshire Creek		Willow Fork		Snake Creek		Cane Island Branch	
BKDD Existing Conditions (RS 31844, US I-10)	1645.0	BKDD Existing Conditions (RS 103782)	2822.8	BKDD Existing Conditions (RS 99358)	1733.0	BKDD Existing Conditions (RS 97559)	2639.8
FEMA (I-10)	5010.0	FEMA (1.74 mi upstream of FM 1463)	4400.0	FEMA (1200 ft downstream of HWY 90)	2700.0	FEMA (Upstream of HWY 90)	3380.0
		FBC Willow Fork Model (RS 103439)	3688.2	FBC Willow Fork Model (RS 99359)	1886.6	FBC Willow Fork Model (RS 97517)	3033.6

10-year Flow Comparison at Downstream End of BKDD between BKDD Existing Conditions model, FEMA FIS Report Data, and Fort Bend County (FBC) Willow Fork model

Brookshire Creek		Willow Fork		Snake Creek		Cane Island Branch	
BKDD Existing Conditions (RS 31844, US I-10)	668.8	BKDD Existing Conditions (RS 103782)	1350.6	BKDD Existing Conditions (RS 99358)	808.1	BKDD Existing Conditions (RS 97559)	1178.2
FEMA (I-10)	2837.0	FEMA (1.74 mi upstream of FM 1463)	2550.0	FEMA (1200 ft downstream of HWY 90)	1890.0	FEMA (Upstream of HWY 90)	1088.0
		FBC Willow Fork Model (RS 103439)	2502.0	FBC Willow Fork Model (RS 99359)	766.0	FBC Willow Fork Model (RS 97517)	1263.8

WSE Comparison between BKDD Existing Conditions Model and FEMA FIS Report Data Throughout BKDD

Stream	Existing Conditions	100-year WSE (ft)			10-year WSE (ft)		
Location	Model RS	Existing Conditions	FEMA	Delta	Existing Conditions	FEMA	Delta
Brookshire Creek							
Downstream HWY 90	34313	150.33	158	-7.67	148.18	157	-8.82
Upstream I-10	31844	148.12	152.25	-4.13	147.8	149.6	-1.8
Downstream I-10	31259	141.86	151.7	-9.84	137.92	149.2	-11.28
Upstream FM 359	20853	126.4	127.8	-1.4	124.1	126.1	-2
Downstream FM 359	20785	126.27	127	-0.73	124.03	125.4	-1.37
Willow Fork							
Upstream FM 1463	94542	132.54	133.95	-1.41	130.85	132.2	-1.35
Downstream FM 1463	94477	132.35	133.65	-1.3	130.79	132	-1.21
Cane Island Branch Confluence	90101	128.95	131.75	-2.8	126.19	130.15	-3.96
Snake Creek							
Upstream RR	100741	143.54	146.2	-2.66	141.2	143.9	-2.7
Upstream HWY 90	100617	143.17	143.6	-0.43	140.55	142.9	-2.35
Downstream HWY 90	100514	142.92	142.75	0.17	140.26	142.45	-2.19
Cane Island Branch							
Upstream of Pitts Rd	119685	158.02	158.35	-0.33	155.51	157.75	-2.24
Upstream of Clay Rd	117737	156.25	156.75	-0.5	154.56	155.4	-0.84
Upstream of Morton Rd	111305	150.66	151.2	-0.54	148.72	148.9	-0.18
Upstream of Franz Rd	103962	143.65	142.9	0.75	141.82	139.55	2.27
Upstream of Tenth St	101747	141.94	141.4	0.54	140.23	137.65	2.58
Upstream of First St	97765	138.38	137.7	0.68	136.87	134.35	2.52
Upstream RR	97661	138.03	137.45	0.58	136.74	134.3	2.44
Upstream HWY 90	97559	137.78	137.3	0.48	135.88	134.15	1.73
Downstream HWY 90	97429	137.64	137	0.64	135.01	134	1.01
Upstream of Stockdick Rd	95002	136.13	133.65	2.48	133	130.3	2.7
Upstream I-10	94382	135.67	133.2	2.47	132.4	130.3	2.1
Downstream I-10	93996	132.16	133.15	-0.99	130.41	130.3	0.11
Willow Fork Confluence	90284	129.69	131.7	-2.01	126.65	130.3	-3.65