

## Provided Services

- Collection of Survey Data
- Development of Seamless Terrain Dataset
- Hydrologic Analysis
- Hydraulic Analysis
- Flood Reduction Alternative Analysis
- Flood Damage Assessment
- Environmental Investigation

## Summary of Benefits

- Updated H&H and detailed flood elevations along Brazos River from Hempstead to Gulf of Mexico
- Flood inundation mapping
- Flood reduction alternative recommendations
- Reduced future flood damages
- Consistent flows and models across county boundaries
- Improved NWS flood forecasts
- Incorporation of 2009 Fort Bend County HEC-RAS model

## Schedule of Activities

- **Phase 1:**
  - **Currently Under Way – To Be Completed April 2017**
- **Phase 2:**
  - **TWDB Grant Awarded – Seeking Local Partners for Cost Share to begin work in January 2016**
  - **To Be Completed April 2018**

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# Lower Brazos River Floodplain Protection Planning Study



## Background

Communities on the Lower Brazos River (below the Hempstead Gage) have suffered from multiple floods over the last century. Although upstream flood control reservoirs have been constructed in the basin during that time, approximately 10,000 square miles of drainage area are below these projects. In addition, counties in the Lower Brazos region represent some of the fastest growing areas in the country. As recently as May-June 2015, significant rainfall across the Brazos River Basin resulted in flood levels along the lower Brazos River. Despite the flood levels and concerns, **the peak discharge from the May-June 2015 event at the Richmond Gage was only a 5-year to 10-year flood event.**



In 2014, the Brazos River Authority (BRA) applied for a Flood Protection Planning Grant (FPPG) from the Texas Water Development Board (TWDB) to perform a \$1.6 million detailed engineering study of the Brazos River below the Hempstead Gage to the Gulf of Mexico, including portions of Washington, Austin, Waller, Fort Bend, and Brazoria Counties. BRA retained the Texas firm of Half Associates, Inc., to perform the required services.

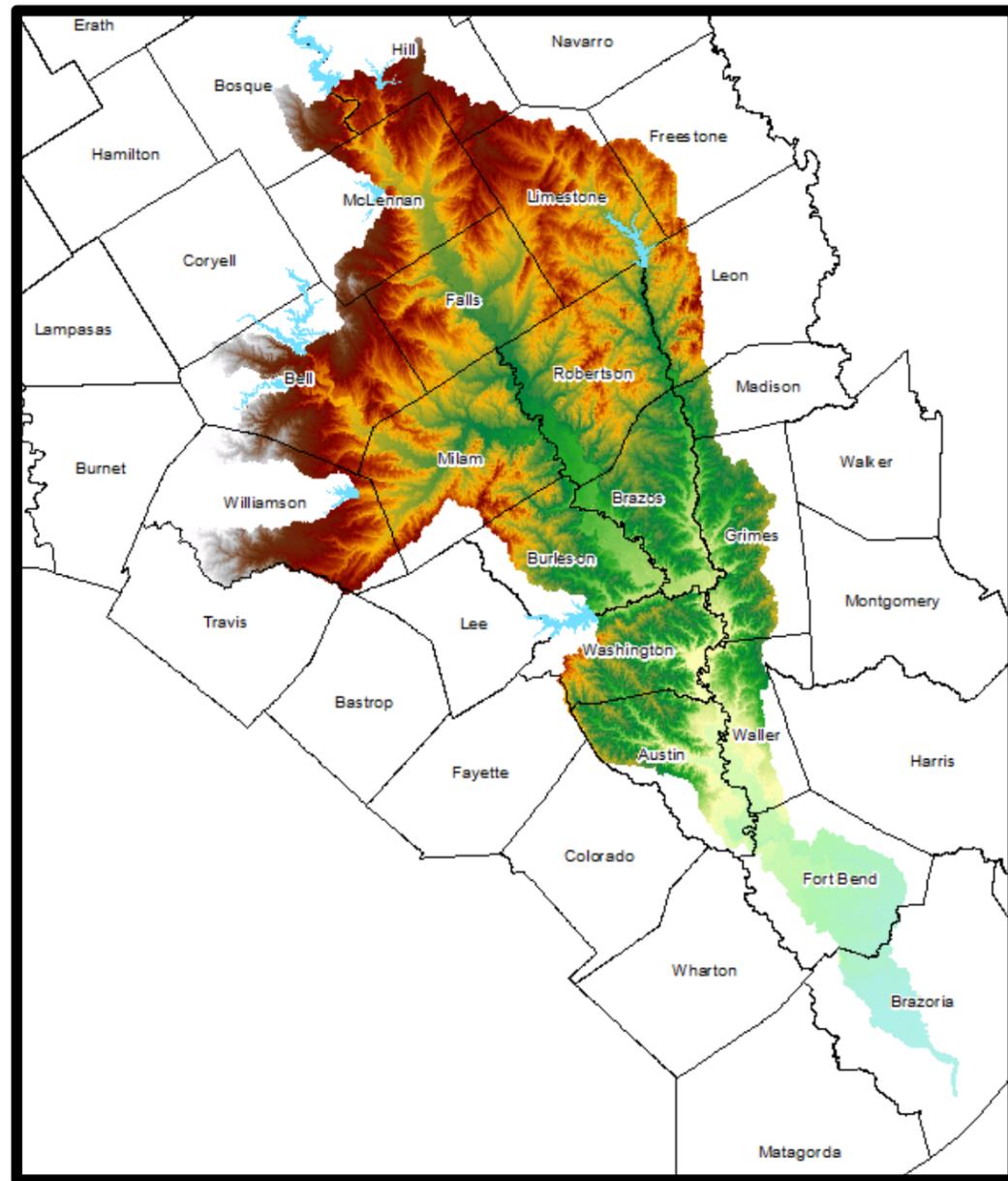
The study is being developed using:

- Available LiDAR data within the 10,000 square mile uncontrolled watershed
- Fort Bend County's Brazos River floodplain hydraulic model (2009) and information from applicable prior work and studies
- Channel and structure surveys (outside of Fort Bend County)
- Available TxDOT bridge data
- Calibrated GIS-based HEC-HMS hydrologic model of the watershed
- Calibrated unsteady HEC-RAS hydraulic model of the Brazos River
- Available county appraisal district property and structure values in the Brazos River floodplain

Existing floodplain information is limited and/or dated throughout much of the detailed study area, especially outside of Fort Bend County. Within Fort Bend County, the new study will provide a detailed hydrologic model and unsteady hydraulic model through the County. This updated and dynamic modeling will provide an analysis tool to assess levee interior drainage evacuation times and duration and loading of Brazos River flows on levees for both planning and design purposes. These models could be coupled in the future with real-time rainfall and/or NWS WGRFC forecasts for real-time flood operations and response along the Brazos River. Below is a county-by-county breakdown of existing Brazos River floodplain information. At the completion of the Lower Brazos River Flood Protection Planning Study, these counties will have consistent and updated flood elevation and flood damage information along the Brazos River, along with hydrologic and hydraulic models for community use. The results could also be taken to FEMA for revisions to floodmaps.



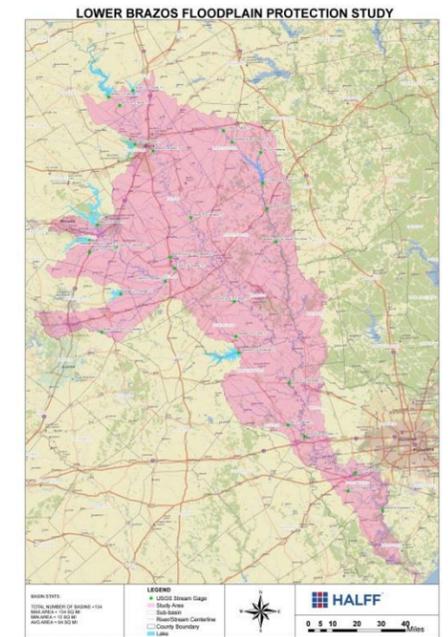
County	Existing Brazos River Data
Washington Co.	No detailed flows or water surface elevations (Zone A)
Austin Co.	Mix of Zone AE and Zone A – Mapping based on 1985 models
Waller Co.	Mix of Zone AE and Zone A – Mapping based on 1985 models
Fort Bend Co.	Steady state hydraulic model (2009) and Gage Frequency Analysis (2006) – Hydrologic model from 1985
Brazoria Co.	Mapping based on 1985 models



## Phase 1 – On-going

Phase 1 (\$1.1 million) was awarded grant funding in the spring of 2014 with the TWDB FPPG covering just under 50% of the costs and four local entities along with BRA covering the remaining amount. Phase I funding participants are shown in the table below.

Phase 1 includes a detailed hydrologic analysis for the study area with a period-of-record/gage frequency analysis as well as critical storm centering and development of a calibrated HEC-HMS hydrologic model of the watershed. A detailed unsteady HEC-RAS hydraulic model will also be developed from the Richmond Gage downstream to the Gulf of Mexico using field survey and available LiDAR. Phase 1 will include flood damage analysis and alternatives formulation for the Brazos River downstream of the Richmond Gage. Phase 1 is expected to be completed in April 2017.



## Phase 2 – TWDB Funding in Place – Looking for Local Funding

In the spring of 2015, BRA applied for another TWDB FPPG (\$550,468) for Phase 2 of the study and was awarded the grant in the summer of 2015. Phase 2 work is scheduled to begin in early 2016 and will include detailed survey, hydraulics, economics, and alternatives analysis for the Brazos River reach between Hempstead and Richmond. Currently, there are no local funding participants (\$260,666 needed) for Phase 2. BRA cannot execute the Phase 2 grant contract with the TWDB unless local funding participants are identified. **If the grant dollars are not accepted, this potentially jeopardizes completion of the Phase 2 tasks for this basinwide study which will benefit communities and entities in five counties. Local funding participation can be spread over multiple budget cycles as Phase 2 is not scheduled for completion until early 2018.**

PHASE 1	Study Costs	Committed Funding	Additional Funding Needed
TWDB FPPG		\$514,783.50	\$0.00
Brazoria County		\$300,000	\$0.00
Waller County		\$120,000	\$0.00
Velasco Drainage District		\$106,316.50	\$0.00
Pecan Grove MUD		\$7,500	\$0.00
BRA (In-Kind)		\$14,568	\$0.00
<b>Phase 1 Total</b>	<b>\$1,063,168</b>	<b>\$1,063,168</b>	<b>\$0.00</b>
<b>PHASE 2</b>			
TWDB FPPG		\$275,234	\$0.00
Local Funding Participants to Date		\$0.00	\$260,666
BRA (In-Kind)		\$14,568	\$0.00
<b>Phase 2 Total</b>	<b>\$550,468</b>	<b>\$289,802</b>	<b>\$260,666</b>
<b>STUDY TOTAL</b>	<b>\$1,613,636</b>	<b>\$1,352,970</b>	<b>\$260,666</b>