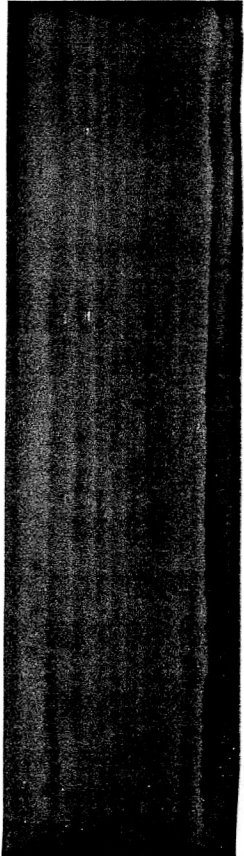
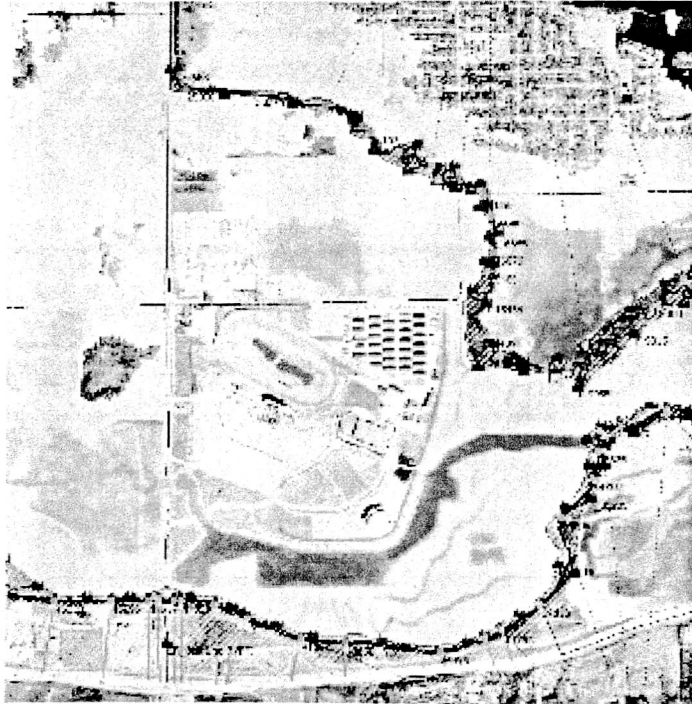
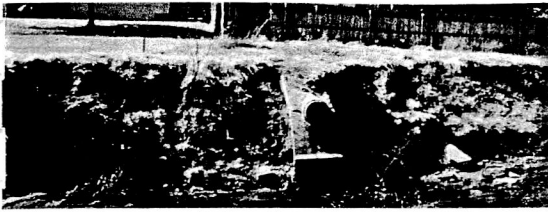


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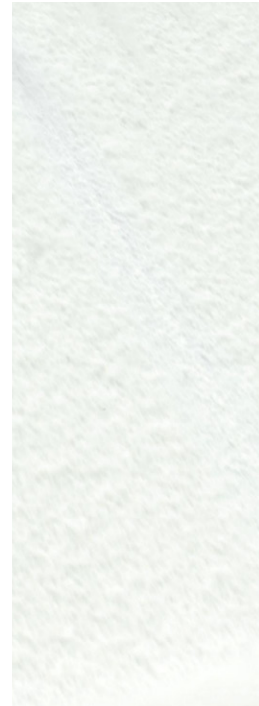
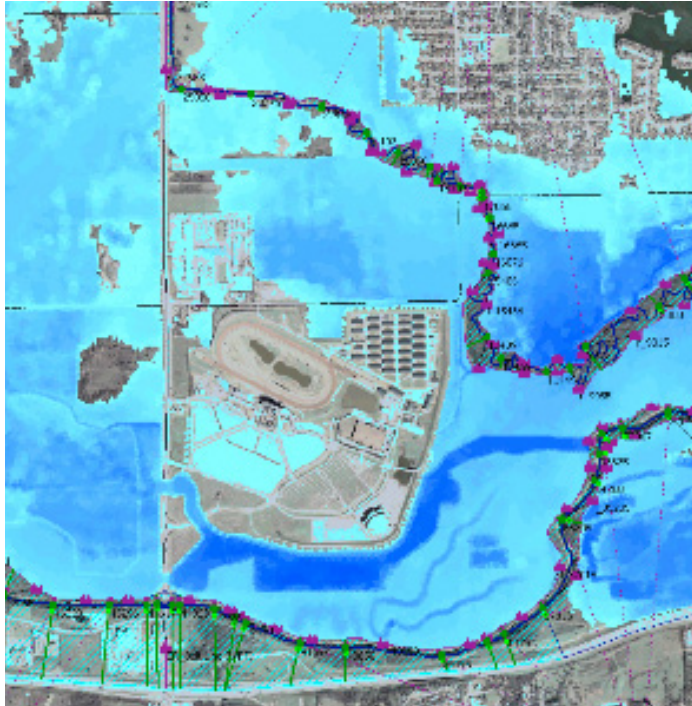
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FloodFUND

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Summary

The fundamental objective of the Flood Funding Needs Database (FloodFUND) Research Project is to gather information on flood mitigation projects throughout the State of Texas. The information obtained through this research project will be used in the development of the 2012 State Water Plan which will in turn be used to develop legislation pertaining to flood mitigation project funding and grants.

FloodFUND received project information through an online questionnaire from 254 stakeholders across Texas. These stakeholders included cities, counties, municipal utility and water districts, educational institutions as well as federal agencies.

This report provides several geospatial and tabular summaries including: by stakeholder and by population. The 790 projects include those submitted by stakeholders and Halff research efforts, and these projects total over \$5.64 Billion in spending for current and planned flood mitigation projects. This includes an estimated \$330 Million in flood mapping studies for streams and rivers throughout Texas with out of date engineering data. When projected over the entire State's population, it is estimated that the State of Texas has over \$7.46 Billion in current and planned flood mitigation projects.

In the 2007 State Water Plan, the U.S. Army Corps of Engineers (USACE) predicted that spending between 2007 and 2020 on USACE projects in Texas would total \$1 Billion. For the FloodFUND Research efforts, the USACE Southern Division provided program budget information for FY11 and FY12 from USACE HQ approved budgets for each state. In FY11 and FY12, \$171.3 Million is approved in the budget for flood control and coastal projects in Texas, including feasibility studies. As expected, due to the current economic climate, the approved budget numbers are lower than the amount of flood control project needs. One USACE District in Texas estimated over \$326 Million in current flood control needs. The FloodFUND 2011 estimate of \$7.46 Billion is in addition to the revised estimates provided by USACE headquarters. With major flooding damages and the highest number of flood related deaths in the country, the State of Texas has an incredible need to identify funding opportunities for flood control solutions throughout the state.

1.0 Introduction and Background

The FloodFUND Research Project is an effort to gather information on flood mitigation projects, under construction or planned, throughout the State of Texas. This information will be used in the development of the 2012 State Water Plan in order to gain a more complete picture of flood mitigation funding needs across the state. Halff Associates, Inc. (Halff) was selected by the Texas Water Development Board (TWDB) to research this information.

Entities involved with flood mitigation projects (project stakeholders), were identified and contacted through the FloodFUND outreach efforts. Several methods of outreach were utilized, including email, phone calls, meetings, an article in the winter edition of the Texas Floodplain Management Association (TFMA) newsletter, an article in the Halff quarterly water resources newsletter, The Current, and a booth at the TFMA Spring 2011 Conference in Sugar Land, Texas.

Types of flood mitigation projects, for the purpose of this project, included the following: stream bank stabilization, construction/repair efforts involving dams and levees, retention and detention basins, stream channelization, acquisition/relocation/elevation of structures, efforts to remediate localized drainage. Project information gathered includes: type of project, if the project is a need or want, project funding sources and project status (planned or under construction).

Project information was collected through an online questionnaire at www.TexasFloodFUND.org. Stakeholders were prompted to answer a series of questions as well as enter specific project information. The questionnaire is discussed in detail later in this report.

2.0 Stakeholder Identification

Local, regional, state and federal entities were identified as FloodFUND Project stakeholders. All Texas counties and incorporated cities were considered stakeholders, regardless of their participation in the National Flood Insurance Program.

Stakeholder contact information was initially obtained from the Texas State Directory Online website. Information obtained from this site includes city official's names, phone numbers, city office address and email addresses. This information was compiled into a Microsoft Excel spreadsheet, and efforts were made to confirm that appropriate contacts were included for all organizations.

Identified stakeholders were divided into sub-categories: city, county, state, federal, river authority and "other". The "other" category encompasses stakeholders such as municipal utility districts, academic agencies and drainage districts. Stakeholders not identified during the initial effort were added to the database at a later date. These stakeholders were identified with the assistance of other Halff staff who felt the stakeholder would be a beneficial addition to the effort.

Special effort was made to contact the "Top 25", the twenty-five largest stakeholders (by population). A list of these stakeholders is shown in Table 1. This group was seen as potentially having more funds to conduct flood mitigation projects due to their large population. This list grew to 34 stakeholders to include those who influence a large region of Texas.

Table 1: "Top 25" Stakeholders

Bastrop County*	City of Corpus Christi	City of Houston	Hays County	Tarrant County
Bell County	City of Dallas	City of San Antonio	Hidalgo County	Tarrant Regional Water District
Bexar County	City of Denton	Collin County	Hidalgo County Drainage District #1	Travis County
Brazoria County	City of El Paso	Denton County	International Boundary and Water Commission	U.S. Army Corps of Engineers
Cameron County	City of Fort Worth	El Paso County	Jefferson County Drainage District 6	Willacy County
City of Arlington	City of Galveston	Fort Bend County	Montgomery County*	Williamson County*
City of Austin	City of Grand Prairie	Harris County Flood Control District	Nueces County*	

**Contact efforts did not yield any data*

Halff staff contacted the "Top 25" stakeholders personally by phone and in-person meetings to communicate the importance of their participation in FloodFUND. Some stakeholders completed a Microsoft Word copy of the questionnaire (see Appendix D) or sent a Microsoft Excel spreadsheet containing project information for Halff staff to enter into the database on their behalf.

3.0 Questionnaire

A stakeholder questionnaire was developed to obtain the most complete project information possible. It is divided into sections: contact information, project information and other information. This questionnaire was available online (<http://www.TexasFloodFUND.org>) as well as a Microsoft Word document version (see Appendix D) for email transmittal.

In the first section of the questionnaire, project stakeholders identified themselves, their organization and preferred contact method. They also noted whether they had completed or participated in any flood control projects within the last 10 years. This information was necessary if the stakeholder's organization did not have any current or planned flood mitigation projects. Stakeholders were also asked to note if their organization was experiencing any known flooding issues but did not have any current action plan or funding to implement a solution.

Stakeholders entered their total project cost and funding source(s). The sources were subdivided into federal, state and local sources. Federal sources include FEMA Hazard Mitigation Grant Program (FEMA HMGP), FEMA Severe Repetitive Loss Grant (FEMA SRL Grant), FEMA Flood Mitigation Assistance Grant (FEMA FMA Grant), FEMA Repetitive Flood Claims Grant (FEMA RFC Grant), FEMA Public Assistance Grant, United States Army Corps of Engineers Project (USACE Project), Natural Resource Conservation Service (NRCS) and other federal sources. State sources include Texas Water Development Board loan (TWDB loan), Texas Department of Transportation (TxDOT), and other sources. Local sources include bond initiatives, the organization's

annual operating budget, the organization's stormwater utility fund and other sources. The stakeholder entered funding amounts for each subcategory.

Each project was classified as either planned or under construction. A planned project is a project that has been identified as a flood control project with cost estimates but had not yet begun at the time the stakeholder completed the questionnaire. Often, funding for the recommended solutions considered "Planned" projects had not yet been secured. An under construction project is a project that is currently underway. The stakeholder entered an estimated start date for planned projects, an estimated completion date for projects under construction or noted that the project was planned but lacked funding needed to proceed. The stakeholder was able to enter as many projects as they desired, or they were given the option to submit project information via email.

If the stakeholder was unwilling or unable to provide specific project cost, they instead provided an overall cost for current and planned projects. This was accounted for when analyzing stakeholder data.

The third section of the questionnaire asked general flooding-related questions not related to a specific project. This information was necessary to determine the scope of an organization's flood mitigation efforts. Stakeholders noted whether or not their organization had a mitigation plan, the type of said plan as well as whether or not they had performed a Hazards United States Multi-Hazard (HAZUS-MH) run and level of run for this mitigation plan.

Stakeholders were asked if their organization had experienced any flooding events in the past 30 years. If so, they entered the event date, number of deaths due to the event and estimated damage (in dollars) from the event. The stakeholder could enter multiple flood events as needed. Stakeholders then noted if their organization had a Capital Improvement Program (CIP) for flood control or drainage projects and an estimated annual program budget.

Stakeholders noted if their organization funded flood control projects with a Stormwater Utility Fund, an estimated annual amount of the fund and the total cost of flood control or drainage projects funded by the fee system within the past 10 years.

4.0 Outreach

Outreach was a vital component of the FloodFUND Research Project and was an ongoing effort throughout the duration of the project. Initial stakeholder contact occurred in January 2011 and consisted of a teaser flyer informing stakeholders of the FloodFUND Project (Appendix D1). Stakeholders received a subsequent email notifying them that the online questionnaire was active and open to stakeholder data input (Appendix D2). An informational article was published in the Halff quarterly water resources newsletter, the Current (Appendix D3), and the same article was also published in the Texas Floodplain Management Association (TFMA) winter newsletter (Appendix D4). Additional outreach occurred when stakeholders experienced difficulties with the questionnaire website, needed clarification on questionnaire items or had additional project information to submit that was not included in their initial questionnaire submittal. Reminder emails

were sent throughout the project to remind stakeholders to submit project information either through the online questionnaire or via email to a Halff representative.

Halff utilized a booth at the Spring TFMA Conference in Sugar Land, Texas from April 11-14, 2011 to gather project data from stakeholders that had yet to complete a questionnaire. Stakeholders attending the conference plenary session presentations were notified of the booth and encouraged to provide project data. Copies of the questionnaire were made available for those who wished to submit their project data at a later time. A flyer with project overview information and contact information for Halff representatives across Texas was also made available to conference attendees (Appendix D5). The Halff representative spoke with project stakeholders during the conference. Persons not identified as project stakeholders also expressed interest in the FloodFUND Project effort.

The approved Scope of Work (SOW) for this project included Webinar Sessions as a proposed tool for stakeholder communication and outreach. However, personal contact was found to be more successful than the use of Webinar Sessions. Mass email efforts received a large amount of response and allowed for customized outreach to each stakeholder. Personal phone calls and in-person meetings were found to be more valuable for obtaining data. This customization was more effective than a generalized approach.

5.0 Project Data

Stakeholder-entered project information from the website questionnaire first fed into a Microsoft Structured Query Language (SQL) database. This database was accessible through an online portal in order to check the status of questionnaires as well as troubleshoot problems the stakeholders encountered when using the website. Data saved in this database was then exported into a Microsoft Access 2007 database for further processing. Erroneous entries were removed, and the data was formatted to comply with Environmental Systems Research Institute (ESRI) ArcMap geodatabase standards.

Stakeholder questionnaire data was saved in the SQL database in several sections using unique identification numbers to maintain relationships between sections. This method was necessary because stakeholders were able to enter information for multiple projects. These relationships would not be preserved if the data was exported directly from SQL to Microsoft Excel spreadsheet, so the data was exported to a Microsoft Access database as an interim step.

The data, once exported to Microsoft Access, was first processed to remove erroneous and duplicate entries. Typographic errors were then corrected as well as stakeholder organization names edited to match with names previously entered into an ESRI ArcMap shapefile. This editing made it possible to import data into an ESRI ArcMap geodatabase. Census Bureau population estimates (2008) were added to the shapefiles representing county and city stakeholders. This information was used to normalize stakeholder project cost information and to account for stakeholders who were not able to participate.

Geographic Information Systems (GIS) shapefiles representing all counties and cities in Texas were originally created by the Texas Natural Resources Information Systems (TNRIS)'s Strategic Mapping program. Additional shapefiles representing the jurisdiction

of river authorities, the International Boundary Water Commission (IBWC) and university stakeholders were also utilized.

Data processing involved importing stakeholder questionnaire responses into a Geographic Information System. First, the data was exported from Microsoft Access to several .dbf database tables, which were then imported into an ESRI geodatabase. These tables were then joined to the unique identification numbers assigned in the SQL database. The GIS database, and all files within, use the Geographic Coordinate System (GCS) North American 1983 projection.

The user is able to further analyze the flood mitigation project information in GIS by queries, sorting, or report creation. This will allow the user more flexibility to obtain desired results based on their desired criteria. It will also provide ease of use for those who wish to obtain faster results than analyzing hard-copy data.

6.0 Results

Two hundred fifty-four (254) stakeholders participated in the survey, either online or by sending their information to Halff. Responding stakeholders entered 790 current and planned projects totaling over \$5.64 Billion. Table 2 lists those stakeholders with current or planned projects and project cost. Many smaller stakeholders (both in population and jurisdictional area) reported they experienced flooding problems but either had no current plans or no money to proceed with flood control projects. Larger stakeholders such as the City of McAllen, Harris County Flood Control District, the International Boundary Water Commission, the City of El Paso and El Paso County reported multiple projects.

Stakeholder responses covered a variety of geographic areas across Texas and provided an adequate cross-section of the population. Limiting factors to stakeholder response appeared to be limited internet access and limited personnel available to respond to the questionnaire. Responses covered 75% of the Texas population (from 2008 Census population estimates).

6.1 Flood Events

Many stakeholders reported experiencing flood events in their jurisdiction within the past 30 years. Several of these events were due to Hurricanes Ike, Dolly, Hugo, Ivan and Tropical Storm Allison. Damage estimates for several of the individual events exceeded \$100 Million. Responding stakeholders indicated 83 deaths occurred in their jurisdiction within the past 30 years. The City of Galveston reported the largest loss of life during Hurricane Ike, with 32 deaths. The National Weather Service estimated over 200 deaths related to flooding since 1996 in the State of Texas.

6.2 Dams in Texas

2010 Texas Commission on Environmental Quality (TCEQ) indicates there are 7,139 dams in Texas. TCEQ data shows 963 dams are considered "high-hazard", 766 are "significant-hazard" and 5410 are considered "low-hazard". The TCEQ Dam Safety Program has budgeted \$2.5 Million for 2010-2011 inspection and regulation efforts.

Stakeholders reported fifteen (15) current or planned projects relating to dams within their jurisdiction. USACE reported \$3.5 Million in spending for planned dam-related projects.

- The City of McKinney reported two dam-related projects, East Fork Above Lavon Watershed Dams 2B and 17. These are both low-hazard dams according to 2001 NRCS dam data.
- The City of Burnet responded with “Water Conservation Service Dam Maintenance Program” in their questionnaire. Further research discovered two dams, Hamilton Creek WS SCS Site 3 and Site 1 dams. 2001 NRCS data indicates these are both high-hazard dams.
- The City of Brownsboro indicated one project involving dams at the city’s wastewater plant. No NRCS information was found for these dams.
- El Paso County indicated they were making improvements to one high-hazard dam, Fabens Dam. The City of El Paso indicated they were upgrading nine dams within their jurisdiction, and these dams were rated high-hazard dams in the 2001 NRCS data.

6.3 Local Funding

Forty (40) responding stakeholders indicated their organization had a Capital Improvement Program for flood control or drainage projects, and the average reported budget was \$2.34 Million. Nineteen (19) responding stakeholders indicated their organization funded flood control projects with a Stormwater Utility Fund, and the average reported annual funding amount was \$1.95 Million. These stakeholders also reported spending an average \$13.22 Million on projects funded by their Stormwater Utility Fund within the past 10 years.

6.4 Flood Mapping Needs

The identification of flood risks throughout our state is the first step to implementing flood control solutions. Watersheds throughout the state must be accurately modeled to analyze the hydrologic and hydraulic characteristics of the basins and streams. Throughout Texas, the majority of our streams have not been studied in over 30 years. The out-of-date flood hazard data makes it very difficult for our local, regional, and federal partners to successfully manage flooding concerns and implement flood control solutions. The first step to accurately identifying flood hazards is a detailed engineering analysis of the stream and watershed which leads to the identification of flood control alternatives and eventual flood mitigation projects.

Two regional studies were conducted as Pilot Projects in 2009 and 2010 by the North Central Texas Council of Governments (NCTCOG) and the Texas Colorado River Floodplain Coalition (TCRFC). Both organizations completed a "Flood Map Needs Assessment" to determine the quantity of streams that were in need of updated floodplain analysis and estimates were made to summarize the cost to complete these studies. These two studies resulted in almost 4,000 miles of stream identified for floodplain study updates at an estimated cost of \$55 Million. The 4,000 miles of stream only represents approximately 2.5% of the state's total stream mileage. A conservative projection would suggest that, at least 15% of the stream miles in Texas are in need of Floodplain Study Updates, which projects to an estimated cost of \$330 Million. That estimate only includes

the study necessary to begin to plan, design, and construct flood mitigation projects. FEMA recently completed their Coordinated Needs Management Strategy for Texas (CNMS), and preliminary results are in line with the projection of 15% of the state's streams are in need of updates. The \$330 Million estimate for flood mapping needs was included in the statewide flood mitigation project cost of \$7.46 Billion.

Table 2: Stakeholders with Current/Planned Projects and Cost

Stakeholder	Located in County(ies)	Projects	Total Cost Rounded to nearest \$1K
Abilene [§]	Jones, Taylor	1	\$300,000
Alice	Jim Wells	1	\$650,000
Alvin [§]	Brazoria	1	\$37,284,000
Amarillo [§]	Potter, Randall	45	\$36,719,000
Andrews	Andrews	4	\$68,000
Arlington	Tarrant	11	\$69,581,000
Austin	Travis, Williamson	39	\$241,902,000
Balch Springs [§]	Dallas	1	\$1,084,000
Bedford	Tarrant	10	\$6,895,000
Bell County [§]	-	10	\$336,000
Bexar County [§]	-	1	\$162,776,000
Brownsboro	Henderson	1	\$15,000
Brownsville	Cameron	3	\$3,675,000
Bruceville-Eddy	McLennan, Falls	1	\$1,000
Bryan	Brazos	28	\$18,568,000
Buda	Hays	1	\$50,000
Burnet	Burnet	3	\$1,935,000
Cameron County	-	6	\$70,558,000
Carrollton	Collin, Denton, Dallas	4	\$9,500,000
Clyde	Callahan	1	\$5,000
Corpus Christi	Kleberg, Nueces, San Patricio	38	\$20,924,000
Corral City	Denton	2	\$1,257,000
Dallas	Collin, Dallas, Denton, Kaufman, Rockwall	All [†]	\$606,600,000
Denton County	-	5	\$1,825,000
Donna	Hidalgo	14	\$875,000
Duncanville	Dallas	4	\$140,000
Edinburg	Hidalgo	12	\$16,586,000
El Paso	El Paso	97	\$543,791,000
El Paso Water Authority/ El Paso County	El Paso	54	\$153,480,000
Enchanted Oaks	Henderson	1	\$20,000
Fort Bend County Drainage District	Fort Bend	1	\$25,000,000
Fort Worth	Denton, Tarrant, Wise	71	\$494,690,000
Frisco [§]	Collin, Denton	1	\$132,000
Gainesville	Cooke	1	\$13,000,000

Stakeholder	Located in County(ies)	Projects	Total Cost Rounded to nearest \$1K
Galveston County	-	7	\$171,200,000
Garland	Collin, Dallas, Rockwall	7	\$5,210,000
Grand Prairie [§]	Dallas, Ellis, Tarrant	2	\$48,702,000
Grapeland	Houston	1	\$200,000
Grapevine	Dallas, Denton, Tarrant	1	\$600,000
Guadalupe-Blanco River Authority [§]	-	1	\$1,410,000
Harlingen	Cameron	3	\$4,500,000
Harris County Flood Control District	Harris	15	\$140,600,000
Hays County	-	1	\$175,000
Hays, City of	Hays	1	\$42,000
Hidalgo County	-	All [†]	\$83,125,000
Hidalgo County Drainage District No. 1	Hidalgo	7	\$197,328,000
Houston [§]	Fort Bend, Harris, Montgomery	15	\$77,536,000
International Boundary and Water Commission	-	12	\$154,083,000
Irving Flood Control District – Section 1	Dallas	3	\$18,590,000
Jefferson County Drainage District 6 [§]	Jefferson	3	\$39,555,000
Kerrville	Kerr	3	\$980,000
Los Fresnos	Cameron	3	\$1,004,000
Lower Rio Grande Valley Development Council	Cameron, Hidalgo, Starr, Willacy	All [†]	\$718,373,000
Lubbock	Lubbock	2	\$73,000,000
Mansfield	Ellis, Johnson, Tarrant	9	\$3,300,000
Marble Falls [§]	Burnet	1	\$200,000
Maverick County [§]	-	1	\$8,709,000
McAllen	Hidalgo	68	\$76,127,000
McKinney	Collin	7	\$18,760,000
Medina County [§]	-	1	\$32,000
Mercedes	Hidalgo	1	\$50,000
Merkel	Taylor	1	\$2,225,000
Mesquite	Dallas, Kaufman	1	N/A [‡]
Nacogdoches, City of [§]	Nacogdoches	1	\$85,350,000
Newton County	-	7	\$14,216,000
Olmos Park	Bexar	1	\$400,000
Orange County	-	1	\$500,000
Orange County Drainage District	Orange	3	N/A [‡]
Plano [§]	Collin, Denton	3	\$6,000,000
Pleasanton	Atascosa	2	\$450,000
Richland Hills	Tarrant	1	\$10,500,000
Rio Grande City	Starr	10	\$19,470,000
San Antonio [§]	Bexar	11	\$20,605,000
San Antonio River Authority [§]	Bexar	16	\$69,218,000

Stakeholder	Located in County(ies)	Projects	Total Cost Rounded to nearest \$1K
Sealy	Austin	6	\$33,104,000
Sherman	Grayson	1	\$333,000
Southlake	Denton, Tarrant	3	\$665,000
Tarrant Regional Water District	-	1	\$287,200,000
Texarkana [§]	Bowie	1	\$416,000
Travis County	-	5	\$77,121,000
Upper Brushy Creek Water Control and Improvement District [§]	Williamson	1	\$1,200,000
U.S. Army Corps of Engineers	-	All [†]	\$171,309,000
Waco	McLennan	17	\$69,000,000
Waller County [§]	-	1	\$99,000
Wharton County [§]	-	1	\$30,000,000
Wichita Falls	Wichita	32	\$30,373,000
Willacy County	-	13	N/A [‡]
Yoakum	DeWitt, Lavaca	1	\$700,000
Zapata County	-	1	\$391,000
Total Stakeholder Projects		790	\$5,314,458,000
Texas Flood Mapping Needs Estimate			\$330,000,000
Grand Total			\$5,644,458,000

[†]Indicates no specific number of projects received

[‡]Indicates no dollar amount received

[§]Indicates project cost from research effort only, not stakeholder response

Tables 3 and 4 (below) show the distribution of responding stakeholders by population, total current and planned project cost and the average total current and planned project cost sorted by population group. The average project cost per stakeholder is found by dividing the total project cost by number of responding stakeholders. “Number of Stakeholders” indicates the number of stakeholders that responded out of the total number of stakeholders in that population group.

**Table 3: Cities - Responding Stakeholders with Current or Planned Projects
Population vs. Project Cost**

Population Groups	Number of Stakeholders	Total Project Cost Rounded to nearest \$1K	Average Total Project Cost per stakeholder Rounded to nearest \$1K
Under 25,000	135 of 1104	\$87,866,000	\$651,000
25,000 - 50,000	18 of 49	\$110,320,000	\$6,129,000
50,000 - 200,000	23 of 43	\$274,292,000	\$11,926,000
200,000 - 500,000	6 of 7*	\$192,234,000	\$32,038,000
500,000 - 1,000,000	3 of 3	\$1,433,863,000	\$477,955,000
Greater than 1,000,000	3 of 3	\$366,141,000	\$122,047,000
Total	184	\$2,464,716,000	\$650,746,000

*Includes Irving Flood Control District – Section 1

**Table 4: Counties - Responding Stakeholders with Current or Planned Projects
Population vs. Project Cost**

Population Groups	Number of Stakeholders	Total Project Cost Rounded to nearest \$1K	Average Total Project Cost per stakeholder Rounded to nearest \$1K
Under 25,000	11 of 155	\$14,607,000	\$1,328,000
25,000 - 50,000	5 of 39	\$30,130,000	\$6,026,000
50,000 - 200,000	10 of 38	\$13,884,000	\$1,389,000
200,000 - 500,000	10 of 12*	\$263,650,000	\$26,365,000
500,000 - 1,000,000	6 of 6**	\$340,551,000	\$56,759,000
Greater than 1,000,000	3 of 3***	\$303,376,000	\$151,688,000
Total	38	\$966,198,000	\$243,555,000

*Includes Brazoria County Drainage District No. 5 and Jefferson County Drainage District No. 6

**Includes El Paso Water Authority and Fort Bend County Drainage District

***Includes Harris County Flood Control District; Dallas County not included because of limited population in unincorporated areas

The U.S. Army Corps of Engineers data is not included in Tables 3 or 4. The USACE reported current and planned project costs of \$171.3 Million.

Table 5 (below) shows the number of projects stakeholders indicated they had completed within the past 10 years and the cost of those projects.

Table 5: Stakeholder Projects within Past 10 Years

Stakeholders	Number of Projects	Estimated Total Cost Rounded to nearest \$1K
98 of 254	927	\$1,416,341,000

Table 6 (below) shows the responding stakeholder organization types and the number of each category.

Table 6: Responding Stakeholder Types

Stakeholder Type	Number
City	190
County	40
Federal	3
River Authority	3
State Agency	1
Academic	1
Other	16
Total	254

Table 7 lists the number of stakeholder projects by type.

Table 7: Stakeholder Project Types

Project Type	City	County	Federal	River Authority	Other	Total	Total Cost Rounded to nearest \$1K
Acquisition/Relocation/Elevation	25	11	-	-	4	40	\$222,979,000
Channelization	54	10	-	-	6	70	\$252,222,000
Dam	13	1	-	-	1	15	\$11,064,000
Detention/Retention Basin	24	4	-	-	30	58	\$319,788,000
Levee System	1	-	-	-	15	16	\$173,323,000
Localized Drainage	339	27	-	-	17	383	\$846,783,000
Stream restoration/Erosion control/Bank stabilization	31	1	-	-	6	38	\$56,699,000
Other	105	30	1	18	16	99	\$3,431,600,000
Total	592	84	1	18	95	790	\$5,314,458,000

7.0 Conclusions and Recommendations

The FloodFUND Research Project proved to be a valuable channel with which to gather flood mitigation project data from a wide array of entities across Texas. The website was an efficient tool for gathering this data and allowing stakeholders the freedom to enter their data. Stakeholders were also willing to contribute to the project in order to have their information included in the 2012 State Water Plan. The stakeholders understood the significance of this plan and were very appreciative to have their "voice" heard. Larger stakeholders reported a greater number of projects as well as project spending/cost. This was expected since areas of higher population are often considered higher risk and have access to a larger tax base.

The FloodFUND Research Project resulted in \$5.64 Billion in current and planned flood control projects. The stakeholders who responded represent approximately 19.01 million citizens in Texas (2008 Census estimate). This information was used to project an estimated \$7.46 Billion in current and planned projects to cover the current Texas population of over 25 million people. This number was derived by analyzing the 2008 population data covered by responding stakeholder projects, costs from the stakeholder projects and calculating a linear projection to estimate the total cost of flood mitigation projects in Texas. Population estimates used in this calculation are from 2008 US Census data. Equation 1 (below) shows the projection.

Table 8: Derivation of Statewide Project Dollars

$$\frac{\text{Reported Stakeholder Project dollars}}{\text{2008 Population Covered by Stakeholder Projects}} = \frac{\text{Total Estimated Flood Mitigation Project Costs in Texas}}{\text{Total Texas Population (2010)}}$$

$$\frac{\$5.64 \text{ Billion}}{19.01 \text{ million people}} = \frac{\$X}{25.145 \text{ million people}}$$

$$X = \frac{\text{Total Estimated Flood Mitigation Project Costs in Texas}}{\text{Total Texas Population (2010)}} = \$7.46 \text{ Billion}$$

There is a clear need for continued funding for flood mitigation projects. Many smaller communities are unable to proceed with much-needed flood mitigation projects due to lack of funding. It is recommended that additional funding be made more readily available to these stakeholders with smaller populations. This could be achieved through several methods, including creating additional grants and funding opportunities geared toward underprivileged or smaller stakeholders. Entities that supply funding could also increase awareness of current flood mitigation project funding to the smaller stakeholders since many are not aware of current opportunities. These stakeholders may also benefit from increased contact with agencies that may advocate for funding on their behalf.

8.0 Acknowledgements

Halff would like to acknowledge the numerous people that provided assistance throughout the duration of the FloodFUND Research Project. The participation of the many stakeholders in much appreciated, and their input was very valuable. Gilbert Ward at TWDB provided guidance throughout the research project. Halff Associates employees who provided assistance with stakeholder contact efforts include: John Espinoza, John Ivey, Lynn Lovell, Joey Trevino, Bill Lewis, Dwayne Hamilton, Wes Birdwell, Tony Sartori, Raul Garcia, Robert Saenz, Stephen Crawford, Jessica Baker and Catherine Rowley.

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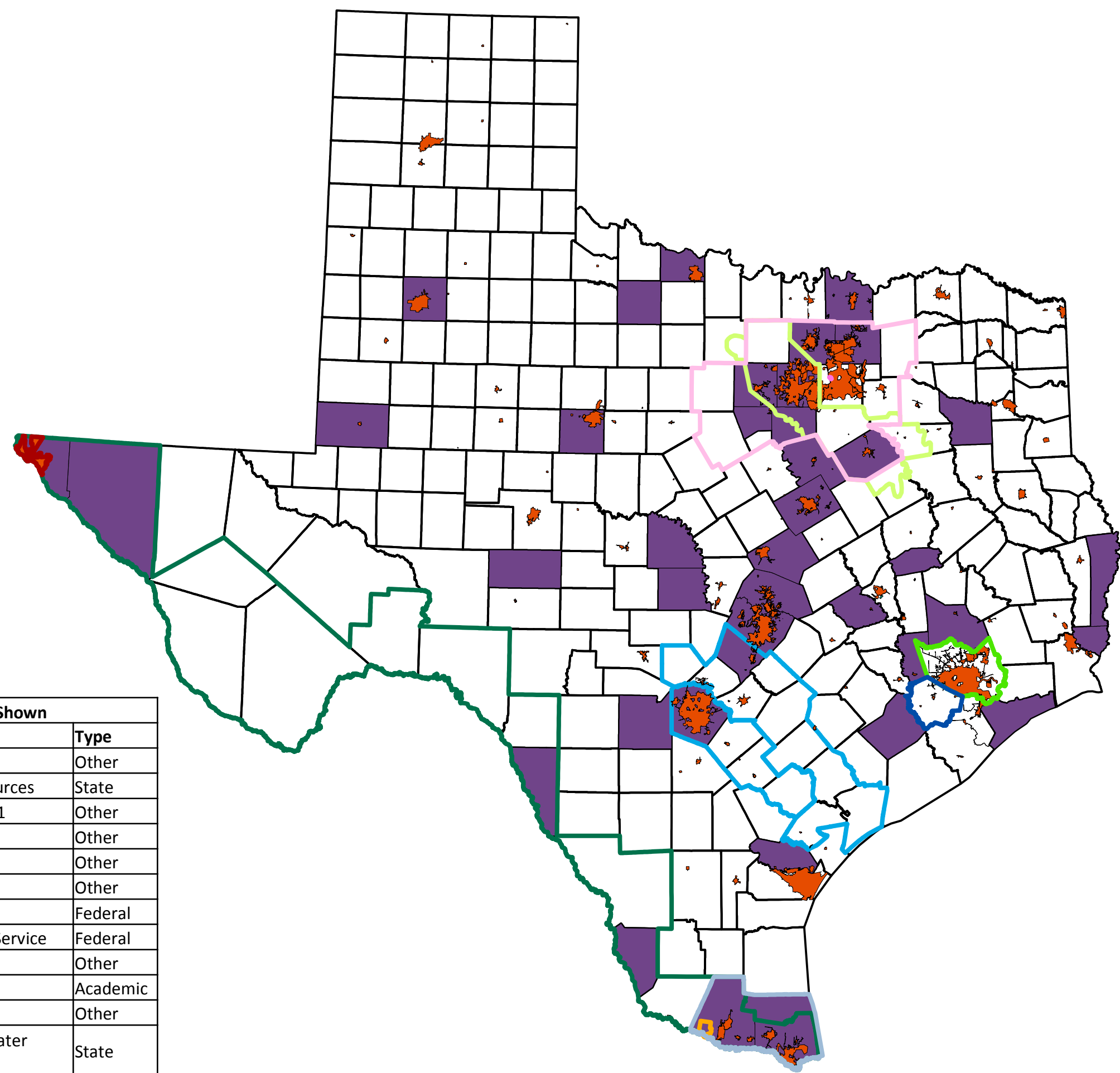
Appendix A
Map of Participating Stakeholders



FloodFUND

**FloodFUND
Research Project**

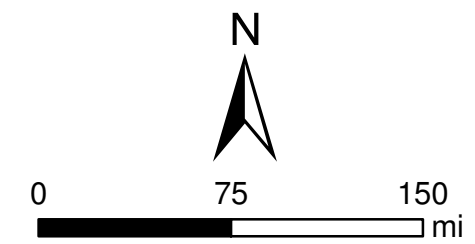
Appendix A: Map of Participating Stakeholders



Legend

- City Stakeholder
- County Stakeholder
- River Authority Stakeholder
- County Boundary
- Agua Special Utility District
- El Paso Water Utility
- Fort Bend County Drainage District
- Harris County Flood Control District
- International Boundary and Water Commission
- Irving Flood Control District 1
- Lower Rio Grande Development Council
- North Central Texas Council of Governments
- Tarrant Regional Water District

Stakeholders Not Shown	
Name	Type
Brazoria County DD No. 5	Other
Department of Information Resources	State
Hidalgo County Drainage District 1	Other
Irving Flood Control District 1	Other
Irving Flood Control District 3	Other
Jefferson County DD No. 6	Other
National Weathe Service	Federal
Natural Resources Conservation Service	Federal
Orange County Drainage District	Other
Texas Tech University	Academic
Upper Brushy Creek WCID	Other
Upper Neches River Municipal Water Authority	State
U.S. Army Corps of Engineers	Federal



Appendix B
FloodFUND Database Attribute Fields

Appendix B: FloodFUND Database Attribute Fields

This appendix provides a description of the various attribute fields found in the project GIS database. Some fields may only appear in the tables within the database.

Attribute Field	Description
Add_fund	Additional funding anticipated?
Add_fund_amt	Additional funding amount
Add_fund_date	Additional funding date
CIP	If the stakeholder has a Capital Improvement Program that funds flood mitigation projects
CIP_Budget	Annual CIP operating budget
Commission_funded	Whether or not projects within the past 10 years were commission-funded
Cost	Cost of Project
Current_Plan_Projects	Whether or not the stakeholder had any current or planned flood mitigation projects
Damage	Estimated maximum damage incurred during flood event
Department	Department in which stakeholder works
Email	Stakeholder email
Est_complete_date	Estimated project completion date (if currently under construction)
Est_cost	Estimated cost of projects completed within past 10 years
Extension	Stakeholder phone number extension
Federal_funded	Whether or not projects within the past 10 years were federally-funded
Flood_Date	Approximate flood event date
Flood_Event	If the stakeholder had experienced a flood event within their jurisdiction
Flood_Proj_10_Years	Whether or not the stakeholder had completed any flood mitigation projects within the past 10 years
Fund_type	Project funding type
Funding_Source	Source of project funding
Funding_Source_Other	Stakeholder-entered project funding source if option not listed
FundingNotSecure	Project funding not currently secured
Hazus_Info	If the flood hazard mitigation plan has HAZUS-MH run information
Hazus_Level	Level of HAZUS-MH run
Issue_desc	Description of known issues with no plan
Known_issues_no_plan	Whether or not the stakeholder had any identified flooding issues but did not have any plans to deal with them
Mail_Address	Stakeholder mailing address
Mail_City	Mailing Address city
Mail_Zip	Mailing Address zip code
Mitigation_Plan	If the stakeholder has a flood hazard mitigation plan
Name	Stakeholder Name

Attribute Field	Description
Num_Deaths	Estimated deaths due to flood event
Num_Projects	Number of flood mitigation projects completed within the past 10 years
Org_type	Type of organization (City, County, etc.)
Organization	Name of stakeholder/organization
Phone	Stakeholder contact phone number
Plan_Type	Flood hazard mitigation plan type
Plan_Type_Other	Type of flood hazard mitigation plan if not listed
Planned_date	Planned project start date
Pop_2008	2008 Census update population
Preferred_Contact	Stakeholder preferred method of contact
Project_Name	Name of project
Project_type	Type of project
Project_type_other	Stakeholder-entered project type when the particular project did not fall into a given category
Reason	Reason for project
Self_funded	Whether or not projects within the past 10 years were self-funded
State_funded	Whether or not projects within the past 10 years were state-funded
Status	Project status
Stormwater_ProjectFunded_Cost	Total cost of projects funded by stormwater utility fund within past 10 years
Stormwater_Revenue	Stormwater fund annual amount to flood mitigation projects
Stormwater_Utility	If the stakeholder has a stormwater utility fund that funds flood mitigation projects
Surv_Date	Date on which survey started
Survey_ID	Foreign key to join to "Survey_section2", "Organization", "Project_Funding", and "Flood_Event" tables. ID for Stakeholder survey.
Survey_Section_2_ID	Foreign key used to join "Project_Funding" table to "Survey_Section_2" table.
Title	Title of stakeholder completing questionnaire
TWDB_project_study	Selected if the project was a TWDB project
Type	Stakeholder type

Appendix C1
FloodFUND Responding Stakeholder Points
of Contact

Appendix C1: FloodFUND Responding Stakeholder Points of Contact

This table lists responding stakeholders and their associated organization.

First Name	Last Name	Organization
Francisco	Flores	Agua Special Utility District
Richard	Dolgener	Andrews County
Kelley	Holcomb	Angelina & Neches River Authority
Billy	Henderson	Baylor County/City of Seymour
Melinda	Bahr	Brazoria County Drainage District #5
David	Bagley	Burleson County
Ernesto	Hinojosa, P.E.	Cameron County
Monty	Winter	City of Alice
Chris	Flanigan	City of Allen
David	Kocurek	City of Alvin
Scott	Wallace	City of Andrews
Maurice	Schwanke	City of Anna
Audra	Valamides	City of Arlington
Mapi	Vigil	City of Austin
Mustafa	Curtess	City of Austwell
J.B.	Lowery, Jr.	City of Bardwell
Charlene	Orman	City of Bayside
Tom	Rodino	City of Bayview
Kenneth	Reid	City of Beasley
Craig	Koch	City of Beaumont
John	Kubala	City of Bedford
Mackie	Bobo-White	City of Bedias
Tommy	Carter	City of Bells
Sharyn	Harrison	City of Berryville
Rose	Wigham	City of Blanket
Joe	Mosier	City of Brady
Pat	Martindale	City of Bronte
Mitch	McElroy	City of Brownfield
J.D.	Jones	City of Brownsboro
Joe	Hinojosa	City of Brownsville
Koni	Billings	City of Bruceville-Eddy
Brett	McCully	City of Bryan
Stanley	Fees	City of Buda
John	Hobson	City of Bulverde
Ruthie	Sager	City of Bunker Hill Village
Roy	Fyffe	City of Burnet
David	Smith	City of Canton
Danny	Cornelius	City of Canyon

First Name	Last Name	Organization
Mike	McKay	City of Carrollton
David	Thompson	City of Carthage
Garret	Bonn	City of Cedar Park
N.R.	Goolsby	City of Centerville
Norma	Zuniga	City of Charlotte
Michael	Ulbig	City of Cleveland
Richard	Sheffield	City of Clyde
Donna	Madrid	City of Colorado City
Mai-Theresa	Bernal	City of Corpus Christi
Bob	Blizzard	City of Corral City
Diana	Robinson	City of Corsicana
Richard	Frazier	City of Cottonwood Shores
W.R.	Cornett	City of Cresson
Susan	Borchardt	City of Crowell
Steve	Parker	City of Dallas
Kathy	Noland	City of Deer Park
Noreen	Housewright	City of Denton
Frank	De Los Rios	City of Donna
Gina	Garcia	City of Duncanville
Cecil	Funderburgh	City of Eastland
Ponciano	Longoria	City of Edinburg
Alan	Shubert	City of El Paso
Donald	Warner	City of Enchanted Oaks
Lauren	Sturm	City of Falls City
Amy	Crane	City of Florence
Cyndi	Nichols	City of Floresville
Gary	Brown	City of Floydada
Wynona	Lusk	City of Follett
Roger	Hudgins	City of Forsan
Steve	Eubanks	City of Fort Worth
Cynthia	Lackey	City of Freer
Frank	Manigold	City of Friendswood
Bob	Loflin	City of Fulton
Roy	Lewis	City of Gainesville
Mike	Fitzgerald	City of Galveston
Robert	Jenkins	City of Garland
Tom	Benz	City of Georgetown
Spencer	Schneider	City of Giddings
Violet	Melton	City of Gladewater
Gabriel	Johnson	City of Grand Prairie
William	Job	City of Grapeland
John	Robertson	City of Grapevine

First Name	Last Name	Organization
Steve	Sanborn	City of Groves
Mike	Glockzin	City of Hallsburg
Daniel	Serna	City of Harlingen
Kathy	Davidson	City of Hays
Peter	Freehill	City of Highland Haven
Jerry	Barker	City of Hillsboro
Lisa	Runnels	City of Hooks
Rick	Martinez	City of Humble
Matthew	Bushak	City of Hutto
Robert	Stoddard	City of Ingleside
Laquetta	Harris	City of Iraan
Michael	Collier	City of Jasper
Danny	Segundo	City of Jersey Village
Linda	Shepard	City of Jones Creek
James	Whitt	City of Keller
Duane	DuBose	City of Kenedy
Robert	Gore	City of Kerrville
John	Nett	City of Killeen
Elroy	Roelke	City of Knollwood
Jeffery	LaComb	City of Kountze
Mario	Perez	City of Kyle
Linda	Alger	City of Lago Vista
Bonnie	Taylor	City of Lakeside City
Paul	Duncan	City of Lakeway
Larry	Lawson	City of Leroy
Jason	Laumer	City of Little Elm
Pat	Hayes	City of Log Cabin
C.E.	Nichols	City of Lone Star
Mark	Adas	City of Longview
James	Lively	City of Lorenzo
Mark	Milum	City of Los Fresnos
Beatrice	Weaver	City of Los Indios
Annita	Tindle	City of Lott
Janis	Cable	City of Lowry Crossing
Michael	Keenum	City of Lubbock
Freddie	Cahanin	City of Lumberton
Mada	Barron	City of Malone
Howard	Redfearn	City of Mansfield
Randolph	Schwenn	City of Marion
Ramon	Navarro, IV	City of McAllen
Lissa	Shepard	City of McKinney
Michelle	Leftwich	City of Mercedes

First Name	Last Name	Organization
Marie	Garland	City of Meridian
Steve	Campbell	City of Merkel
Matthew	Holzapfel	City of Mesquite
Shirley	Scruggs	City of Moran
Eddie	Perritt	City of Mount Pleasant
Stan	Endres	City of Muenster
David	Brunson	City of Muleshoe
Mike	Hill	City of Murchison
Gary	Johnson	City of Navasota
Caroline	Waggoner	City of North Richland Hills
Ronda	Quintana	City of Oak Leaf
John	Blain	City of Oak Ridge
Scott	Martinez	City of O'Donnell
Brenda	Williamson	City of Oglesby
L. David	Givler	City of Olmos Park
Karen	Sedlak	City of Paint Rock
Shawn	Napier	City of Paris
Lynda	Fairchild	City of Pattison
Blake	Overmeyer	City of Pflugerville
Kathy	Coronado	City of Pleasanton
Stephen	Bursey	City of Point
Taylor	Shelton	City of Port Neches
Judy	Ritter	City of Reklaw
Cara	Hubbard	City of Reno
Tonya	Roberts	City of Rice
Michael	Barnes	City of Richland Hills
Ruth	Elster	City of Richmond
Elisa	Beas	City of Rio Grande City
Joan	Harvey	City of Riverside
Danny	Halden	City of Round Rock
David	Collins	City of Rusk
Linda	Gann	City of Sadler
Clinton	Bailey	City of San Angelo
Sean	Landis	City of Seabrook
Ronald	Harness	City of Seagoville
Larry	Mayberry, CFM	City of Sealy
Gerald	Bodin	City of Seguin
Don	Keene	City of Sherman
Amber	Malone	City of Snook
Vic	Chambers	City of Snyder
Leonard	Leinfelder	City of Sonora
Larry	Saurage	City of Sour Lake

First Name	Last Name	Organization
Scott	Fry	City of South Padre Island
Steve	Anderson	City of Southlake
Edward	Hansen	City of Spearman
Melvin	Webb	City of Springtown
Greg	Smith	City of Sunray
Steve	Rogers	City of Terrell
Robert	Kotasek	City of The Colony
Donna	Carney	City of Tioga
Belinda	Hohhertz	City of Tye
Bill	Lancaster	City of Valley Mills
Mary	Hakze	City of Valley View
Mark	Hines	City of Waco
Johnnie	Reagan	City of Watauga
James	Hotopp	City of Weatherford
Dolores	Stoever	City of Weimar
Julie	Bennett	City of White Deer
Bill	Goodson	City of Whitewright
Glenn	Soerens	City of Wichita Falls
Arthur	Faiello	City of Willis
George	Hernandez, Sr.	City of Woodsboro
Adam	Findeisen	City of Yoakum
Tracy	Homfeld	Collin County
Bennett	Howell	Denton County
Mel	McKey	Department of Information Resources
Carlos	Rubio	El Paso Water Utility
Mark	Vogler	Fort Bend County Drainage District
Jerry	White	Grayson County
Tom	Pope	Hays County
Tony	Pena, Jr.	Hidalgo County
Godfrey	Garza, Jr.	Hidalgo County Drainage District No. 1
Mike	Watson	Hill County
James	McAusland	Hood County
Guadalupe	Kelly	Hudspeth County
Rodolfo	Montero	International Boundary and Water Commission
Jackey	Knox	Irving Flood Control District – Section 1
Dallas	Burke	Irving Flood Control District – Section 3
Mike	Walker	Johnson County
Ronald	Moore	Llano County
Manuel	Cruz	Lower Rio Grande Valley Development Council
Nicholas	Olenik	Lubbock County
Shelly	Butts	Madison County
Hendrick	Stephen	McLennan County

First Name	Last Name	Organization
Mark	Mooney	Montgomery County
Thomas	Donaldson	National Weather Service – West Gulf River Forecast Center
H.M.	Davenport	Navarro County
Greg	Wobbe	Newton County
John	Tidwell	North Central Texas Council of Governments
Lisa	Roberts	Orange County
Mark	Stephenson	Orange County Drainage District
Kirk	Fuqua	Parker County
Stephen	Graham	San Antonio River Authority
William	Zagorski	San Patricio County
Marsha	Hardy	San Saba County
Charlie	Bradley	Schleicher County
James	Nicholson	Smith County
Joe	Trammel	Tarrant County
David	Marshall	Tarrant Regional Water District
Mike	Peel	Taylor County
Ken	Rainwater	Texas Tech University
Ed	Helton	Town of Trophy Club
Stacey	Scheffel	Travis County
-	-	U.S. Army Corps of Engineers
Monty	Shank	Upper Neches River Municipal Water Authority
Lisa	DeWeese	USDA- NRCS
Dan	Roark	Village of The Hills
Lee	Bourgoin	Wichita County
Frank	Torres	Willacy County
Joe M.	England, P.E.	Williamson County
Mario	Gonzalez-Davis	Zapata County

Appendix C2
Non-responding Stakeholders and Project
Information Source(s)

Appendix C2: Non-responding Stakeholders and Project Information Source(s)

This table lists non-responding stakeholders and source(s) of project information. Project information was obtained through research efforts.






Stakeholder	Project Information Source
Bell County	Annual Work Plan: 2011
Bexar County	City of San Antonio: Regional Flood Mitigation Plan
City of Abilene	2009 Capital Budget & 2009-2013 Capital Improvements Program
City of Amarillo	Storm Water Management Master Plan
City of Frisco	Engineering Services Monthly Report
City of Houston	SWMP Maps
City of Nacogdoches	Flood Control Study, March 2010
City of Plano	Community Investment Program Status Report and Other Activities
City of San Antonio	Near Northwest Community Plan Public Improvement Projects; City of San Antonio: Regional Flood Mitigation Plan
City of Texarkana	FY 2010 Solicited Flood Protection Planning Grant Applications
Guadalupe-Blanco River Authority	FY 2011 Solicited Flood Protection Planning Grant Applications
Jefferson County Drainage District No. 6	Flood Protection Planning Study: City of Beaumont
Maverick County	Flood Protection Planning Study
Medina County	FY 2010 Solicited Flood Protection Planning Grant Applications
San Antonio River Authority	City of San Antonio: Regional Flood Mitigation Plan
Upper Brushy Creek Water Control and Improvement District	FY 2011 Solicited Flood Protection Planning Grant Applications
Waller County	FY 2010 Solicited Flood Protection Planning Grant Applications
Wharton County	Half Associates, Fort Worth Office

Appendix D
Stakeholder Outreach Material

Appendix D: Stakeholder Outreach Material

- D1. Teaser Notification Flyer
- D2. Website Activation Notification
- D3. Half "The Current" Article
- D4. Texas Floodplain Management Association Winter Newsletter Article
- D5. Texas Floodplain Management Association Spring 2011 Conference Flyer
- D6. FloodFUND Questionnaire – Microsoft Word Version
- D7. Reminder email
- D8. FloodFUND Research Project Website

D1. Teaser Notification Flyer: Sent December 20, 2010

	 <p>FloodFUND NEED FLOOD FUNDS?</p>  <p>Texas Water Development Board Needs Your Help to Plan for the 2012 State Water Plan</p>	 <p>DON'T BE LEFT OUT! The Texas Water Development Board is researching flood projects in your community for inclusion in the 2012 State Water Plan.</p> 		
<p>In the next couple of weeks, you will receive a link to an easy online survey to help identify your current and future flood mitigation projects. Your participation is important to ensure that the State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. This data could influence future legislation for flood mitigation project funding in Texas. All participants will receive a digital copy of the Flood FUNDing research report.</p>		<p>For more information, please contact:</p> <table><tr><td>Jessica Baker, PE, CFM, PMP Half Associates 214-217-6692 jbaker@half.com</td><td>Gilbert Ward Texas Water Development Board 512-463-6418 gilbert.ward@twdb.state.tx.us</td></tr></table>	Jessica Baker, PE, CFM, PMP Half Associates 214-217-6692 jbaker@half.com	Gilbert Ward Texas Water Development Board 512-463-6418 gilbert.ward@twdb.state.tx.us
Jessica Baker, PE, CFM, PMP Half Associates 214-217-6692 jbaker@half.com	Gilbert Ward Texas Water Development Board 512-463-6418 gilbert.ward@twdb.state.tx.us			

D2. Website activation notification: Sent January 12, 2011

TWDB FloodFUND Research Survey



Your help is needed! The TWDB FloodFUND online questionnaire is ready. In order to successfully complete the questions, you will need basic information on your current and/or planned flood mitigation projects as well as past flooding events (date, estimated damage in dollars, etc.) You will be able to return to a saved, incomplete questionnaire by entering your phone number on the main page, so there's no need to rush through if you run out of time.

To start a questionnaire, please click [here](#) or visit www.TexasFloodFUND.org. Please complete this online questionnaire by February 28, 2011.

The questionnaire is best viewed on Internet Explorer 7 (or later), Mozilla Firefox or Google Chrome.

Thank you for your participation in the FloodFUND Research Project. Your input is important to ensure the 2012 State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. All participants will receive a digital copy of the final FloodFUND report.

If you have questions, please contact:

Jessica Baker, PE, CFM, PMP
Halff Associates
214-217-6692
jbaker@halff.com

Gilbert Ward
Texas Water Development Board
512-463-6418
gilbert.ward@twdb.state.tx.us

Catherine Rowley, CFM
Halff Associates
214-217-6484
crowley@halff.com

Halff Associates was selected by the Texas Water Development Board to research Flood Mitigation Funding in the State of Texas. The Flood Funding Needs Database (FloodFUND) is being utilized to collect responses from Texas stakeholders including communities, counties, and local, state, and federal agencies involved in flood control projects.

D3. Halff "The Current" article: Released April 2011



- 03** WEST FORK TRINITY RIVER:
1D & 2D DIMENSIONAL ANALYSES
- 04** SPRING INTO DRAINAGE
INFRASTRUCTURE INSPECTION
- 06** TFMA INITIATES THE 2011
"FREEBOARD" SURVEY
- 07** LARGEST TFMA EVENT
IN NORTH TEXAS

the Current

A NEWSLETTER FROM THE WATER RESOURCES ENGINEERING GROUP OF HALFF ASSOCIATES, INC.

USACE 408 Permit Guidelines Change

Walter Skipwith, P.E., D.WRE

This is the third article in a continuing series on levee safety.

Since the Katrina catastrophe, levees throughout the US have received heightened scrutiny. As a result, the US Army Corps of Engineers (USACE) has significantly ramped up their Levee Safety Program.

USACE Levee Safety policies and guidelines continue to evolve. As a result, projects like proposed replacements for bridges spanning the Trinity River now require complex bridge hydraulic analyses due to the potential impact on the

Dallas Floodway levees, which are owned, operated and maintained by the City of Dallas with Federal (USACE) oversight. In addition, changes to the existing level of risk to life and property (residual risk) as a result of the project must be discussed and a risk analysis may be required. The level of complex hydrology and hydraulics needed is determined by the USACE Fort Worth District based on an evaluation of project impacts for "Hydraulic Neutrality". In past projects involving the Trinity River and its tributaries, the definition of "Hydraulic Neutrality" has been derived from Upper Trinity River Regional Environmental Impact Statement Record of Decision (ROD). The ROD states that the maximum allowable hydraulic impacts must meet the following criteria; no rise in

100-year or Standard Project Flood levels; maximum allowable loss of valley storage for the 100-year or Standard Project Flood shall be 0% and 5%, respectively; alterations of the floodplain may not create erosive velocities and the floodplain may



FloodFUND

**TEXAS WATER
DEVELOPMENT
BOARD FLOODFUND
RESEARCH PROJECT**

Your help is needed! The Texas Water Development Board (TWDB) is gathering information, via the FloodFUND Research Project, on the cost of flood mitigation projects currently under construction or planned throughout Texas. This funding information will be critical in developing the 2012 State Water Plan. The State Water Plan is a compilation of approved water management strategies that have been developed by 16 regional water planning groups. These plans will help determine funding needs across the state.

USACE 408 Permit Guidelines Change

be altered to the extent permitted by equal flood conveyance reduction on both sides of the channel.

In addition, any modification to a federal levee system above and beyond ordinary O&M requires USACE approval under 33 USC 408 (408 Permit). There are two levels of 408 Permits, minor and major. Minor 408 Permits are reviewed and approved by the USACE at the District level. Many projects will require a Major 408 permit, which is also submitted to the appropriate USACE district for initial review and approval, then requires quality assurance review by the Major Subordinate Command (Southwestern Division) prior to being forwarded to Head Quarters - USACE (HQUSACE) for final approval by the Chief of Engineers. The major components of a 408 Permit submittal include evaluations of project impacts from hydrologic, hydraulic, environmental, structural and geotechnical standpoint. Typically, the USACE requires complex hydrologic and hydraulic analyses such as Unsteady Flow, 2D flow and/or Sediment Transport to determine the impacts of the project as part of the 408 Permit submittal. In addition, changes to the existing level of risk to life and property (residual risk) as a result of the project are discussed and a risk analysis may be required.

The best approach to successfully navigate the 408 Permit process and accomplish the complex hydrology & hydraulics (H&H) required is to 1) formulate the project to achieve "Hydraulic Neutrality" to avoid the additional effort involved in Risk Analysis, 2) utilize

and build upon previous complex hydraulics analyses performed within the Dallas Floodway, 3) benefit from existing knowledge and experience with local USACE staff and criteria and 4) draw from the firm's large pool of extremely well qualified and highly trained hydrologists and hydraulic engineers to staff this part of the project.

Half Associates has previously developed complex hydraulics analyses for the Dallas Floodway such as the Unsteady Flow, 2D Flow and Sediment Transport analyses performed for the Trinity Parkway Initial 408 Submittal. In that project, the Unsteady Flow analysis was used to successfully validate the conventional Steady Flow results, the 2D Flow analysis was used to analyze the complex scour situation along a proposed flood wall and the Sediment Transport modeling demonstrated insignificant sediment impacts. A Corridor Development Certificate (CDC) application and a Conditional Letter of Map Revision submittal to FEMA were also prepared for the Trinity Parkway Initial 408 Submittal. In another Dallas Floodway project, our team's expert hydraulic modeling skills and thorough understanding of the USACE "Hydraulic Neutrality" criteria for the Santa Fe Trestle Trail Bridge (208 Permit approved Feb. 2010) enabled the project to avoid a major 408 Permit. This allowed timely approval needed to preserve the project funding. The successful accomplishments of these projects demonstrate that Half's H&H staff possesses detailed knowledge of the river and the evaluation criteria applied by local USACE district staff. ♦



TEXAS WATER DEVELOPMENT BOARD FLOODFUND RESEARCH PROJECT

The FloodFUND Research Project is aimed at collecting data on funding received for flood control projects via an online questionnaire at www.TexasFloodFUND.org. The goal of the questionnaire is to gather as much data as possible in order to paint a complete picture of current and planned funding for flood mitigation projects across the state. FloodFUND project stakeholders include communities, counties, river authorities, state and federal agencies and any other organizations involved with the funding of flood mitigation projects. Over 2,500 stakeholders have been identified in Texas. Your participation is vital to ensure the State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. This data could influence future legislation for flood mitigation project funding in Texas.

To start a questionnaire, please visit www.TexasFloodFUND.org. Please complete this online questionnaire by the end of April 2011. All participants will receive a digital copy of the FloodFUND Research Report.

Half Associates was selected by the TWDB to research flood mitigation project funding throughout Texas. Please contact Jessica Baker, P.E., CFM, PMP at jbaker@half.com or 214-217-6692, or Gilbert Ward at gilbert.ward@twdb.state.tx.us if you have questions. ♦

D4. Texas Floodplain Management Association Winter Newsletter Article: Released
December 29, 2010



Texas Water Development Board FloodFUND Research Project

From Jessica Baker

Your help is needed! The Texas Water Development Board (TWDB) is gathering information, via the FloodFUND Research Project, on the cost of flood mitigation projects currently under construction or planned throughout Texas. This funding information will be critical in developing the 2012 State Water Plan. The State Water Plan is a compilation of approved water management strategies that have been developed by 16 regional water planning groups. These plans will help determine funding needs across the state.

The FloodFUND Research Project is aimed at collecting data on funding received for flood control projects via an online questionnaire. The questionnaire is meant to gather as much data as possible in order to paint a complete picture of current and planned funding for flood mitigation projects across the state. FloodFUND project stakeholders include communities, counties, river authorities, state and federal agencies and any other organizations involved with the funding of flood mitigation projects.

Over 2,500 stakeholders have been identified in Texas. Your participation is vital to ensure the State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. This data could influence future legislation for flood mitigation project funding in Texas.

Stakeholders will be contacted via email with additional information on how to submit their mitigation project information. Please keep an eye out for this email! All participants will receive a digital copy of the FloodFUND Research Report.

Halff Associates was selected by the TWDB to research flood mitigation project funding throughout Texas. Please contact Jessica Baker, P.E., CFM, PMP at jbaker@halff.com or 214-217-6692, or Gilbert Ward at gilbert.ward@twdb.state.tx.us if you have questions or concerns.

D5. Texas Floodplain Management Association Spring 2011 Conference flyer: April 11 – 14, 2011



Texas Water Development Board FloodFUND Research Project

www.TexasFloodFUND.org

The Texas Water Development Board (TWDB) is gathering information, via the FloodFUND Research Project, on the cost of flood mitigation projects currently under construction or planned throughout Texas. This funding information will be critical in developing the 2012 State Water Plan. The State Water Plan is a compilation of approved water management strategies that have been developed by 16 regional water planning groups. These plans will help determine funding needs across the state.

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Halff Associates was selected by the TWDB to research flood mitigation project funding throughout Texas. Please contact Jessica Baker, P.E., CFM, PMP at jbaker@halff.com or 214-217-6692, or Gilbert Ward at gilbert.ward@twdb.state.tx.us if you have questions.

FloodFUND Questions - Halff Regional Staff

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956-664-0286



D6. FloodFUND questionnaire – Microsoft Word version



Texas Water Development Board

FloodFUND - Stakeholder Questionnaire

YOUR HELP IS NEEDED! *The Texas Water Development Board is collecting information about the cost of flood mitigation projects currently under construction and planned throughout Texas. This funding information will be critical in the development of the 2012 State Water Plan.*

MAKE SURE YOUR COMMUNITY IS INCLUDED... *Your participation is important to ensure that the State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. This data could influence future legislation for flood mitigation project funding in Texas.*

THANK YOU FOR RECOGNIZING THE IMPORTANCE OF FLOOD CONTROL IN TEXAS. *As a thank you for your participation, you will receive a digital copy of the Flood FUND research report.*

Definitions

Capital Improvement Program (CIP) – a short-range plan that identifies projects, provides a planning schedule and funding options for identified projects.

Federal Emergency Management Agency (FEMA)

Flood FUND – Flood Funding Needs Database

Flood Mitigation Assistance (FMA) – FEMA-run program that provides funds to help states and communities implement measures that reduce or eliminate long-term risk of flood damage to structures.

Hazard Mitigation Grant Program (HMGP) – FEMA-run program that provides grants to states and local governments to implement long-term hazard mitigation measure after a major disaster declaration.

HAZUS-MH (Hazards United States Multi-hazard) – Risk-assessment tool used to estimate potential losses due to floods, hurricane winds and earthquakes.

HAZMAP (Hazard Mitigation Action Plan) – any cost-effective action taken to eliminate or reduce the long-term risk to life and property from natural and technological hazards.

Mitigation Plan – plan of action to reduce or eliminate long-term risk to life and property from a hazard event.

Natural Resources Conservation Service (NRCS) – Federal program committed to conserving natural resources on private lands.

Public Assistance Grant – FEMA grant that provides assistance to state, tribal and local governments, and certain non-profit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

Repetitive Flood Claims (RFC) – FEMA grant program that assists states and communities in reducing flood damages to insured properties that have had one or more National Flood Insurance Program claims.

Severe Repetitive Loss Grant (SRL Grant) - FEMA grant program that provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the National Flood Insurance Program.

United States Army Corps of Engineers (USACE) – provides public engineering services in peace and war to strengthen the Nation's security, energize the economy and reduce risks from disasters.



Texas Water Development Board

FloodFUND - Stakeholder Questionnaire

Section 2 - Project Information

Please be as specific as possible when answering the following questions about your flood control/mitigation projects

Project 1: Name _____

- Reason: Need (Flood Issues)
 Want (Enhancements)

- Type of Project: Channelization
 Stream restoration/ Erosion control/ Bank stabilization
 Acquisition/ Relocation/ Elevation
 Dam
 Detention/Retention Basin
 Levee system
 Localized drainage
 Other _____

Total Project Cost (\$) _____

Funding source (check all that apply)

- Federal: FEMA HMGP Grant FEMA SRL Grant FEMA FMA Grant FEMA RFC Grant
 FEMA Public Assistance Grant USACE Project
 Other _____
 Funding Amount \$ _____

- State: TWDB – Loan TxDOT NRCS
 Other _____
 Funding Amount \$ _____

- Local: Bond Annual Operating Budget Stormwater Utility Fund
 Other _____
 Funding Amount \$ _____

Planned but funding not secured

- Status (select only one) Planned – Future need; Estimated construction start date _____
 Under Construction - Funded; Estimated construction completion date _____

Was this project part of a Texas Water Development Board Flood Protection Plan study? Yes No

Please attach additional pages if necessary.



Texas Water Development Board

FloodFUND - Stakeholder Questionnaire

Section 3 - Other Information

Flooding-related Questions

Does your jurisdiction have a Mitigation Plan? Yes No

What type of plan? Flood Hazard Mitigation Hazard Mitigation Action Plan (HAZMAP)

Do you have any HAZUS-level run information for this plan? Yes No

What level? 1 2 3 Unknown

Have there been any flooding events in your jurisdiction in the past 30 years? Yes No Unsure

Date _____ Estimated Damage (\$) _____

Deaths _____

Date _____ Estimated Damage (\$) _____

Deaths _____

Please attach additional pages if necessary.

Does your jurisdiction have a Capital Improvement Program (CIP) for flood control and/or drainage? Yes No

What is the typical annual budget? _____

Does your jurisdiction fund flood control projects with your Stormwater Utility Fund? Yes No

What is the estimated annual amount? (\$) _____

What is the total cost of flood control/drainage projects funded by the Stormwater Utility or similar fee system in the past 10 years? (\$) _____

Thank you very much for your responses.

Contact Information

For questionnaire assistance, please contact:

Jessica Baker, P.E., CFM
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214-217-6692
jbaker@halff.com

Gilbert Ward
Texas Water Development Board 512-463-6418
gilbert.ward@twdb.state.tx.us

Catherine Rowley, CFM
Halff Associates
214-217-6484
crowley@halff.com

D7. Reminder email: sent February 10, 2011



Reminder - please start and/or complete your FloodFUND survey. You only have until February 28, 2011 to submit a survey. Please see below for instructions on how to get started.

In order to successfully complete the questions, you will need basic information on your current and/or planned flood mitigation projects as well as past flooding events (date, estimated damage in dollars, etc.) You will be able to return to a saved, incomplete questionnaire by entering your phone number on the main page, so there's no need to rush through if you run out of time.

To start a questionnaire, please click [here](#) or visit www.TexasFloodFUND.org. Please complete this online questionnaire by February 28, 2011.

The questionnaire is best viewed on Internet Explorer 7 (or later), Mozilla Firefox or Google Chrome.

Thank you for your participation in the FloodFUND Research Project. Your input is important to ensure the 2012 State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. All participants will receive a digital copy of the final FloodFUND report.

If you have questions, please contact:




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jbaker@halff.com

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Catherine Rowley, CFM
Halff Associates
214-217-6484
crowley@halff.com

Halff Associates was selected by the Texas Water Development Board to research Flood Mitigation Funding in the State of Texas. The Flood Funding Needs Database (FloodFUND) is being utilized to collect responses from Texas stakeholders including communities, counties, and local, state, and federal agencies involved in flood control projects.

[Frequently Asked Questions](#)



FloodFUND
Texas Water Development Board
FloodFUND Grant - *Stakeholder Questionnaire*

[Show Definitions](#)

YOUR HELP IS NEEDED! The Texas Water Development Board is collecting information about the cost of flood mitigation projects currently under construction and planned throughout Texas. This funding information will be critical in the development of the **2012 State Water Plan**.

MAKE SURE YOUR COMMUNITY IS INCLUDED... Your participation is important to ensure that the State Water Plan reflects your jurisdiction's flood mitigation projects and their cost. This data could influence future legislation for flood mitigation project funding in Texas.

THANK YOU FOR RECOGNIZING THE IMPORTANCE OF FLOOD CONTROL IN TEXAS. As a thank you for your participation, you will receive a digital copy of the FloodFUND research report.

This Questionnaire includes approximately 15 questions and should require no more than 30 minutes to complete.

[Click here to begin a new questionnaire.](#)

If you are returning to complete a questionnaire, please enter your phone number and click the Continue Questionnaire button.

Phone Number

Extension

Jessica Baker, P.E., CFM, PMP Half Associates 214-217-6692 jbaker@half.com	Gilbert Ward Texas Water Development Board 512-463-6418 gilbert.ward@twdb.state.tx.us
--	---

Half Associates was selected by the Texas Water Development Board to research Flood Mitigation Funding in the State of Texas. The Flood Funding Needs Database (FloodFUND) is being utilized to collect responses from Texas stakeholders including communities, counties, and local, state, and federal agencies involved in flood control projects.



Texas Water Development Board
FloodFUND Grant - Stakeholder Questionnaire

[Show Definitions](#)

Date: 5/18/2011

Section 1

Contact Information

Name (Last,First)

Title

Organization



Other

Department

Mailing Address

Street

City ZIP

Phone

Numbers only, please.

Extension

Email

Preferred Contact

Phone Email Mailing Address

Have you completed any flood control or drainage projects in the past 10 years?

Do you have any current or planned flood control or drainage projects within your jurisdiction?



FloodFUND

Texas Water Development Board
FloodFUND Grant - *Stakeholder Questionnaire*

[Show Definitions](#)

This page will list all of the projects you have entered.

- 1) Please input all of your current/planned flood mitigation projects on this page.
- 2) Click on 'New Project' to begin a new project.
- 3) Once you enter your project information, click 'Save and return to project list' to return to this screen.
- 4) If you wish to edit a previously entered project, click the project's name below.
- 5) When you have entered all of your project information, click 'Continue to Section 3'.

If you would like to submit additional information, please [click here](#) or send your documents to [email@texasfloodfund.org](mailto:texasfloodfund.org). Please use 'FloodFUND questionnaire' as the subject line.

[Return to Section 1](#)

[New Project](#)

[Continue to Section 3](#)

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Half Associates was selected by the Texas Water Development Board to research Flood Mitigation Funding in the State of Texas. The Flood Funding Needs Database (FloodFUND) is being utilized to collect responses from Texas stakeholders including communities, counties, and local, state, and federal agencies involved in flood control projects.



Texas Water Development Board
FloodFUND Grant - Stakeholder Questionnaire

[Show Definitions](#)

Please enter a project name.
Please choose a reason for your project.
Please choose a type for your project.
Please choose a status for your project.

Section 2

Project Information

Please be as specific as possible when answering the following questions about your flood control/mitigation projects.

Project Name

Was this project part of a Texas Water Development Board Flood Protection Planning Study? No

Reason

Type of Project

Total Project Cost

Funding Source

(Select all that apply)

Federal:	<input type="text" value="--Select One--"/>	<input type="text" value="Describe Other Source"/>	Cost: <input type="text" value="\$0.00"/>
State:	<input type="text" value="--Select One--"/>	<input type="text" value="Describe Other Source"/>	Cost: <input type="text" value="\$0.00"/>
Local	<input type="text" value="--Select One--"/>	<input type="text" value="Describe Other Source"/>	Cost: <input type="text" value="\$0.00"/>
Other	<input type="text" value="--Select One--"/>	<input type="text" value="Describe Other Source"/>	Cost: <input type="text" value="\$0.00"/>

Funding Not Secured

Status

If you would like to submit additional information, please [click here](#) or send your documents to email@texasfloodfund.org. Please use 'FloodFUND questionnaire' as the subject line.

<input type="button" value="Delete Project"/>	<input type="button" value="Save"/>	<input type="button" value="Save and Return to Project List"/>	<input type="button" value="Cancel"/>
---	-------------------------------------	--	---------------------------------------

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FloodFUND

Texas Water Development Board
FloodFUND Grant - Stakeholder Questionnaire

[Show Definitions](#)

Section 3

Flooding Related Questions

Does your jurisdiction have a Mitigation Plan?

What type of plan?

Other Plan Type

Do you have any HAZUS-level run information for this plan?

What Level?

Have there been any flooding events in your jurisdiction in the past 30 years?

Please provide information concerning these flood events.

	Flood Date	Estimated Max. Damage Amount (\$)	Number of Deaths
<input type="button" value="Insert"/> <input type="button" value="Clear"/>	<input type="text" value="MM/DD/YYYY"/>	<input type="text" value="\$500,000"/>	<input type="text"/>

Does your jurisdiction have a Capital Improvement Program (CIP) for flood control and/or drainage?

What is the annual operating budget?

Do you fund flood control projects with your storm water utility fund?

What are the annual revenues?

What is the total cost of flood control/drainage projects funded by the Stormwater Utility or similar fee system in the past 10 years?

If you would like to submit additional information, please [click here](#) or send your documents to email@texasfloodfund.org. Please use 'FloodFUND questionnaire' as the subject line.

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Appendix E
Official TWDB Comments and Half
Responses

Appendix E: Official TWDB Comments and Halff Responses

Official TWDB comments and Halff response (shown in italics) are listed below.

1. The approved Scope of Work (SOW) proposed that Webinar Sessions would be included as part of the stakeholder communication and information acquisition efforts. The SOW stated that a summary of the Webinar Sessions would be provided in the draft report including dates and times the Webinars were held, number of participants, and questions addressed, however this discussion was not included in the draft report. Please provide in the final report or state why utilization of Webinars was not conducted.

A paragraph was added in section "4.0 Outreach" explaining why Webinar Sessions were not conducted. It was found that personal phone calls and meetings with project stakeholders was more effective and provided an opportunity to customize the outreach efforts for each stakeholder.

2. Section 2.0; please include a description of how the stakeholders were identified, particularly City and County. Were all communities who participate in the National Flood Insurance Program (over 1,100) identified as stakeholders? Or was geographic location and population used to screen potential stakeholders down to the list who were actually notified to participate in the questionnaire? Please elaborate.

Additional information added to Section 2.0 to explain how stakeholders were identified. Local, regional, state and federal entities were identified as FloodFUND Project stakeholders. All Texas counties and incorporated cities were considered stakeholders, regardless of their participation in the National Flood Insurance Program.

3. The report states that the stakeholder responses resulted in \$2.64 Billion in current and planned flood control projects and extrapolated out statewide to \$4.16 Billion need. Please provide a more detailed discussion of the methodology utilized to reach the \$4.16 Billion estimate.

Table 8 added to illustrate how statewide cost was projected.

4. Please expand section 6.0 Results to include a discussion of "Dams", providing estimates from the Natural Resource Conservation Service (NRCS) concerning the number and condition of old Soil Conservation Service (SCS) structures, and elaborate on the stakeholder information (Table 2) which contains 15 dam projects relative to the SCS dams. Perhaps consider creating a subsection of 6.0 specific to a discussion related to "dams".

Subsection added to Section 6.0 to discuss dams and stakeholder response containing dam-related projects.

5. Table 2 shows 530 projects, however Table 6 shows 543 projects. Please correct or describe why they do not equal.

All data was updated after final outreach push to gather stakeholder data.

6. Please consider expanding Table 3 and Table 5 to illustrate the number of stakeholders contacted compared to the number who responded. Also consider separating Table 3 between Cities and Counties.

Table 3 was divided into Table 3 and Table 4 to show response between cities and counties out of total number of contacted stakeholders per type (city or county). Table 5 was edited to show stakeholder response compared to number of stakeholders contacted.

7. Table 3 only shows 37 stakeholders, but does not describe how these 37 were derived. Please consider expanding Table 3 to represent all 175 cities responding to the survey, and all 25 counties who responded.

Additional discussion for Table 3 included. Table 3 split into Table 3 and Table 4 to show city and county response separately. Columns added to Table 7 to show distribution between cities, counties and other stakeholders.

8. Please consider including within Section 6.0 Results and Section 7.0 Conclusions and Recommendations, a discussion of the degree of stakeholder response; particularly whether it represented an adequate statistically diverse cross-section of the state, geographically or by population.

Discussion on degree of stakeholder response added to Section 6.0.

Appendix F

Digital Data

Appendix F: Digital Data

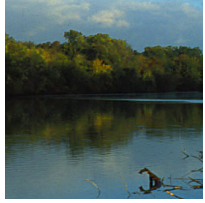
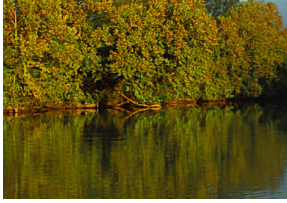
DVD Containing:

FloodFUND Research Project Report (PDF)

FloodFUND Research Project Geodatabase (ESRI Personal Geodatabase)

FloodFUND Questionnaire Word document (Microsoft Word)

FloodFUND Contact database (Microsoft Excel)



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