

Appendix A – Estimating financial need for mitigation

Data sources

Financial information used to estimate mitigation needs comes from two sources: (1) reported estimates of mitigation costs and available funding based on survey responses, which represent 60 percent of the state's population, and (2) a statistical analysis to develop estimates for the remaining 40 percent of the population not represented by survey responses.

Reported financial costs and funding levels for much of the state came from the information obtained and analyzed from two stakeholder surveys (representing 299 Texas communities). Respondents to the surveys represent communities that collectively encompass 60 percent of the state's population, or 15 million people (based on the 2010 census). Funding estimates for this portion of the state are based on responses from 268 cities and counties and 31 other entities such as river authorities, special drainage districts, and councils of government.

In general, communities reported their known mitigation needs based on a combination of existing local inventories of reported flood problems, master planning efforts, and capital improvement program plans. We also followed up with nine communities to validate their survey responses with respect to the mitigation projects and financial information.

To ensure this report considers statewide anticipated flood mitigation costs and funding needs, we used a statistical analysis to account for the 10 million people (or 40 percent of the state's population) that are not represented directly by survey responses. Specifically, we used a linear regression analysis to create three predictive models. The first model correlated the population of surveyed communities with their anticipated cost for mitigation. The second correlated the same population to their available funding, and the third model correlated that population, again, with the amount of non-local (state, federal, *etc.*) funding required.

We used these models to extrapolate funding estimates on a per capita basis for each aforementioned funding category to represent the population that did not respond to the survey (*i.e.*, the non-responding population). This information was later combined with the financial estimates of the surveyed population to provide an overall picture of financial needs for flood mitigation projects for the state as a whole.

For this analysis, we had to match population size with each associated financial variable (anticipated cost, available local funding, available non-local funding). Therefore, we used only city and county data and so performed no extrapolation of costs for non-responding river

authorities or special districts, etc. We eliminated three outliers and data representing the seven largest communities in the state, all with populations exceeding 500,000, because this information was not representative of the smaller-sized communities we were trying to estimate. Ultimately, the analysis is based on information derived from survey responses for 258 communities.

Following the survey-based approach for estimating anticipated mitigation costs, the TWDB did not factor in cost estimates for very large federal projects, such as a third flood control reservoir in the Houston area or the Coastal Spine/Ike Dike—a coastal barrier system under consideration to protect the Houston-Galveston region from hurricane storm surge. We also did not include cost estimates identified by the state for the rehabilitation of high hazard dams.

Estimating the funding shortfall

A principle objective of this report is to estimate the shortfall between funding available from local, state, and federal sources and the total cost to mitigate flooding. The following equation serves as the basis for estimating this potential statewide funding shortfall:

Flood Funding Shortfall

$$= \textit{Anticipated Costs} - \textit{Available Local Funds} - \textit{Available NonLocal Funds}$$

Anticipated costs are estimated based on reported and extrapolated costs to implement mitigation activities for communities across the state. Reported estimates are derived from Survey 1, which allowed communities to select a range of anticipated costs (e.g., less than \$1 million; \$1 million to \$25 million; \$25 million to \$50 million, etc., up to greater than \$1 billion), and Survey 2, which allowed communities to report a specific anticipated cost for implementation of all identified activities over the next 10 years. We used specific costs for a community when possible. When not available, we used the midpoint of the range chosen by a community, as reported in Survey 1. These data were combined with extrapolated estimates derived from the statistical analysis based on reported anticipated costs to provide an overall anticipated cost of mitigation for the state.

Available local funds represent all locally available financial resources that communities expect to be able to contribute, at their discretion, to fund mitigation activities. The TWDB assumed that a portion of local funds will include bonds issued in the capital markets. The estimate of available local funds comes from a combined dataset comprised of: (1) the information provided by respondents related to their overall anticipated mitigation costs that cannot be covered by non-local sources; (2) an estimate of available local funds in the future, based on their community's spending patterns over the past 10 years; and (3) an extrapolated estimate representing available funds for the non-responding population.

The difference between anticipated costs and the amount of locally available funds paints a broad picture of the non-local funding needs—whether state, federal, or other—needed by communities to aid their mitigation activities.

$$\text{NonLocal Funding Needs} = \text{Anticipated Costs} - \text{Available Local Funds}$$

Available non-local funds represent the total amount of funding from federal and state financial assistance programs that each community will have access to for its flood mitigation activities. The TWDB assumed that a portion of the non-local funds will take the form of loans with some measure of subsidy provided by the state as non-local financial assistance, which ultimately reduces the required financing cost at the local level. Our estimate of available non-local funds for this analysis is based on programs that currently finance flood mitigation in Texas. Federal funding through programs of the USACE is based on average annual funding in recent years. Estimated funding from the Community Development Block Grant Program for Disaster Recovery is based on 10 percent of the historical disaster funding for Texas from 2008 through 2018. Estimates for other federal and state grant programs were generally based on an analysis of funding available for Texas over the previous 5- to 10-year period, depending on the availability of funding data for the program.

The TWDB has two financial assistance programs with significant capacity to offer primarily loans for stormwater and flood control projects. The estimate of available funding from the Clean Water State Revolving Fund over the next 10 years is based on two aspects, a percentage of the total non-local funding needs for respondents indicating a willingness to receive subsidized loans but capped at the capacity of the program net of expected demand for non-flood related projects. The Texas Water Development Fund (DFund) has the constitutional authority to issue bonds with up to \$6 billion outstanding at any time. The estimate of available DFund funding was similarly based on a percentage of total non-local funding needs for respondents willing to receive market rate loans, which is well within the capacity of the DFund. Despite DFund offering a credit subsidy, the market rate loan survey response was used, because the magnitude of the subsidy can be small depending on the credit rating of the borrower.

Once these funding sources (Table A.1) were accounted for, the TWDB determined the total statewide financial shortfall in funding that is needed to support flood mitigation activities in Texas. This *flood funding shortfall* is based on the difference between the anticipated statewide mitigation cost and the combination of all available local and non-local funding sources that are not post-disaster funds and are present within existing programs.

2018 State Flood Assessment – Texas Water Development Board – January 2019

Table A.1. Types of funding, cost share, and estimated amounts over the next 10 years

| Funding source | Funding Type and Potential Cost Share | | | | | Potential Funding (2018–2028) | |
|--|---------------------------------------|-------------------------|----------------------|----------------------|---------------------------|----------------------------------|---------------------------------------|
| | Funding type | | Matching funds | | In-kind services accepted | Estimated funding | |
| | Loan / Grant | Disaster/ Non-Disaster | Standard | Special conditions | | Low | High |
| Clean Water State Revolving Fund (CWSRF) [TWDB] | Loan and Grant-like | Disaster & Non-Disaster | 100 / 0 | | - | \$1,755,000,000 | \$2,665,000,000 |
| Cooperating Technical Partners Program (CTP) [FEMA, TWDB] | Grant | Non-Disaster | 50 / 50 | | Yes | \$2,400,000 | \$10,000,000 |
| Technical Partners Program (CTP) [FEMA directly] | Grant | Non-Disaster | 50 / 50 | | Yes | \$12,000,000 | \$17,000,000 |
| Flood Protection Planning Grant [TWDB] | Grant | Non-Disaster | 50 / 50 | 75 / 25 | Yes | \$11,000,000 | \$16,000,000 |
| Pre-Disaster Mitigation (PDM) [FEMA, TDEM] | Grant | Non-Disaster | 75 / 25 | 90 / 10 | No | \$17,000,000 | \$40,000,000 |
| Texas Commission on Environmental Quality [TCEQ] | Grant | Non-Disaster | - | - | - | \$0 | \$1,000,000 |
| Texas Department of Transportation [TXDOT] | Grant | Non-Disaster | - | - | - | \$0 | \$8,500,000 |
| Texas State Soil and Water Conservation Board [TSSWCB] | Grant | Non-Disaster | 95 / 5 | - | No | \$45,000,000 | \$50,000,000 |
| Texas Water Development Fund (DFund) [TWDB] | Loan | Non-Disaster | 100 / 0 | - | - | \$170,000,000 | \$335,000,000 |
| U.S. Army Corps of Engineers Small Continuing Authorities Program (USACE CAP) | Grant-like | Non-Disaster | 65 / 35 ¹ | 75 / 25 ¹ | Yes ¹ | \$0 | Included with line below ¹ |
| U.S. Army Corps of Engineers Specific Authorized Programs & Continuing Authorities Program (CAP) | Grant | Non-Disaster | - | - | Yes | \$0 | \$450,000,000 |

2018 State Flood Assessment – Texas Water Development Board – January 2019

| Funding source | Funding Type and Potential Cost Share | | | | | Potential Funding (2018–2028) | |
|--|---------------------------------------|------------------------|----------------|---------------------------|---------------------------|----------------------------------|------------------------|
| | Funding type | | Matching funds | | In-kind services accepted | Estimated funding | |
| | Loan / Grant | Disaster/ Non-Disaster | Standard | Special conditions | | Low | High |
| U.S. Department of Agriculture - Natural Resources Conservation Service (NRCS) | Grant | Non-Disaster | 50 / 50 | - | Yes | \$30,000,000 | \$60,000,000 |
| Flood Mitigation Assistance [FEMA, TWDB] | Grant | Non-Disaster | 75 / 25 | 90 / 10 RL 100 / 0 SRL | Yes (no more than 50%) | \$250,000,000 | \$300,000,000 |
| Community Development Block Grant-Disaster Recovery (CDBG-DR) [HUD, GLO] | Grant | Disaster | 100 / 0 | - | - | \$0 | \$1,300,000,000 |
| Hazard Mitigation Grant Program (HMGP) [FEMA, TDEM] | Grant | Disaster | 75 / 25 | - | - | \$0 | \$17,000,000 |
| TOTALS | | | | | | \$2,292,400,000 | \$5,269,500,000 |

¹ USACE CAP funding is included in the total USACE Specific Authorized Programs Budget. Matching fund requirements only apply to the CAP funds, which are not defined but would likely be a small percentage of the total.