



SECTION 6. MITIGATION STRATEGY

6.1 Introduction

This section presents mitigation actions for Fort Bend County (the Planning Area) to reduce potential exposure and losses identified as concerns in the Risk Assessment (Section 5). The Planning Partnership reviewed the risk assessment to identify and develop these mitigation actions, which are presented herein.

This section includes:

- Background and Past Mitigation Accomplishments
- General Mitigation Planning Approach
- Strengths, Weaknesses, Obstacles, and Opportunities
- Review and Update of Mitigation Goals and Objectives
- Mitigation Strategy Development and Update

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events. Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment.

Mitigation actions can include activities such as: revisions to land-use planning, training and education, and structural and nonstructural safety measures.

6.2 Background and Past Mitigation Accomplishments

In accordance with DMA 2000 requirements, a discussion regarding past mitigation activities and an overview of past efforts is provided as a foundation for understanding the mitigation goals, objectives, and activities outlined in this Hazard Mitigation Plan (HMP). The Planning Area, through previous and ongoing hazard mitigation activities, has demonstrated that it is proactive in protecting its physical assets and citizens against losses from natural and human-caused hazards. Examples of previous and ongoing actions, projects, and capabilities include the following:

- Fort Bend County participated in the development of a 2018 Hazard Mitigation Plan (HMP) and facilitated the 2023 HMP update, which included the participation of all municipal governments in the Planning Area. The current planning process represents the regulatory five-year local plan update process.
- All municipalities in Fort Bend County participate in the National Flood Insurance Program (NFIP), which requires the adoption of Federal Emergency Management Agency (FEMA) floodplain mapping and certain minimum construction standards for building within the floodplain.
- Currently, three Fort Bend municipalities are participating in the NFIP Community Rating System (CRS) program.
- Municipalities have participated on a limited basis in available mitigation grant funding opportunities to implement mitigation projects, including the following:
 - Safe rooms for tornadoes and severe wind events
 - Generators
 - Infrastructure protection measures for roadways and bridges
 - Property acquisitions
 - Retrofitting public structures



- Warning systems
- Shoreline stabilization
- Mitigation planning
- The County and its municipalities have implemented mitigation actions to protect critical facilities and infrastructure throughout the Planning Area. These actions and others were identified in the County's Participation in their 2018 HMP.
- TDEM supports Fort Bend County communities reducing their risk and increasing their resilience. TDEM provides a comprehensive program to support local jurisdictions as they assess the risks they face, plan to mitigate them, and fund those plans to implement mitigation projects that reduce risk across the Planning Area.
- In 2020, the County and local municipalities responded to and worked to mitigate the impacts of the coronavirus pandemic through education of the public, enforcement of local and state social distancing and masking measures, and establishment of best practices to slow the spread of COVID-19.

These past and ongoing activities have contributed to the Planning Area's understanding of its hazard preparedness and future mitigation activity needs, costs, and benefits. These efforts provide an ongoing foundation for the Planning Partnership to use in developing this HMP update.

6.3 General Mitigation Planning Approach

The overall approach used to update the County and local hazard mitigation strategies are based on FEMA and State of Texas regulations and guidance regarding local mitigation plan development, including:

- DMA 2000 regulations, specifically 44 CFR 201.6 (local mitigation planning)
- FEMA Local Mitigation Planning Policy Guide, April 19, 2023
- FEMA Local Mitigation Planning Handbook, March 2013
- FEMA Local Mitigation Plan Review Guide, October 1, 2011
- FEMA Integrating Hazard Mitigation into Local Planning, March 1, 2013
- FEMA Plan Integration: Linking Local Planning Efforts, July 2015
- FEMA Mitigation Planning How-To Guide #3, Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3), February 2013
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013

The mitigation strategy update approach includes the following steps that are further detailed in later subsections of this section:

- Section 6.4 – Problem and solutions exercise
- Section 6.5 – Review and update mitigation goals and objectives
- Section 6.6 - Develop and prepare a mitigation strategy, including:
 - Review of the 2018 HMP mitigation actions
 - Identification of progress on the previous Fort Bend County and local mitigation strategies
 - 2023 HMP Mitigation Action Plan
 - Mitigation best practices
 - Mitigation strategy evaluation and prioritization
 - Benefit/cost review



6.4 Problem and Solutions Identification

A problem and solutions identification exercise was completed via online survey by the participating jurisdictions. Participants were asked to fill out at least one problem and solution for each of the hazards of concern for the 2023 HMP update. The Planning Partnership was asked to begin the exercise by identifying a problem caused by one of the hazards. Next, potential solutions to that problem were identified. To conclude the discussion of each ranked hazard, participants were asked about anticipated costs, benefits, funding sources, and project feasibility. The results were compiled and presented to the Planning Partnership. The results were also used by the participants to help identify capabilities and potential mitigation actions.

6.5 Review and Update of Mitigation Goals and Objectives

FEMA defines **Goals** as general guidelines that explain what should be achieved. Goals are usually broad, long-term, policy statements, and represent a global vision.

FEMA defines **Objectives** as strategies or implementation steps to attain mitigation goals. Unlike goals, objectives are specific and measurable, where feasible.

FEMA defines **Mitigation Actions** as specific actions that help to achieve the mitigation goals and objectives.

This section documents the efforts to update the guiding principles and hazard mitigation goals and objectives established to reduce or avoid long-term vulnerabilities to the identified hazards.

6.5.1 Goals and Objectives

According to CFR 201.6(c)(3)(i): “The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.” Further, FEMA mitigation planning guidance recommends establishing objectives to better tie mitigation

goals to specific mitigation strategies (e.g., projects, activities, and initiatives).

The goals established in the 2018 Fort Bend County Hazard Mitigation Plan were presented to the Steering Committee and Planning Partnership for review and amendment throughout the planning process. This review was made with consideration of the hazard events and losses since the 2018 plan, the updated hazard profiles and vulnerability assessment, and the goals and objectives established in the updated 2018 State HMP.

The Steering Committee met on February 9, 2023, to review the 2018 goals and objectives and provided input on updated goals and objectives. These updates were presented to the Planning Partnership during the March 2023 Mitigation Strategy Workshop. As a result of these efforts, Table 6-1 presents the Planning Area’s updated goals and objectives for the 2023 HMP update.

Table 6-1. Fort Bend County 2023 Hazard Mitigation Plan Goals and Objectives

2023 HMP Update Goals	
1	Educate and inform citizens regarding potential emergency situations related to hazards.
2	Decrease the risk to life and property from hazards through planning, preparing, and mitigating.
3	Performing projects that reduce the impact of natural hazards in order to increase resiliency and enhance the ability to recover.
4	Enhance coordination between local, county, state, and federal agencies by understanding the impact of hazards in Fort Bend County and developing policies and strategies to effectively manage and reduce risk.
5	Support continuity of operations pre-, during, and post-hazard events, including the support of community lifelines and critical facilities.



2023 HMP Update Objectives	
1	Evaluate and improve safety & loss reduction codes/standards for hazards that affect Fort Bend County and its municipalities.
2	Develop and strengthen public/private partnerships between the County, non-profits, and the business community.
3	Identify funding sources and increase awareness of funding sources to obtain funding for mitigation projects from a variety of federal, state, regional, and local entities.
4	Promote sustainable communities and hazard-resilient development.
5	Promote the use of emergency notification systems and weather alert systems for all hazards.
6	Develop publications and information on all hazards that could potentially impact Fort Bend County.
7	Incorporate hazard mitigation into community planning mechanisms, codes/ordinances, day-to-day operations, and projects.
8	Identify, protect, and assist socially vulnerable populations recover from hazard impacts.
9	Ensure continuity of operations of government, non-government, commerce, private sector, non-profit, and infrastructure.
10	Implement mitigation measures that promote the reliability of community lifeline systems.

6.6 Mitigation Strategy Development and Update

As required by FEMA, the County and participating municipalities completed a comprehensive evaluation of the mitigation strategies and actions from the 2018 HMP and reported on the status of each. Their update may be found in each jurisdictional annex (Section 9). In addition, the County and participating municipalities were provided the opportunity to include new strategies or actions to include in the 2023 HMP Update. New actions were prioritized to ensure they are cost-effective, environmentally sound, and technically feasible using the methodology outlined below.

6.6.1 Review of the 2018 HMP Mitigation Action Plans

To evaluate progress on local mitigation actions, the planning consultant met with each participant to discuss the status of the mitigation actions identified in the 2018 plan. For each action, jurisdictions were asked to provide the status of each action (*No Progress, In Progress, Ongoing Capability, Discontinue, or Completed*) and provide review comments on each. Jurisdictions were requested to quantify the extent of progress and provide reasons for the level of progress or why actions were being discontinued. Each jurisdictional annex in Section 9 (Jurisdictional Annexes) provides a table identifying the jurisdiction’s prior mitigation strategy, the status of those actions and initiatives, and their disposition within their updated strategy.

Local mitigation actions identified as *Complete*, and those actions identified as *Discontinued*, were removed from the updated strategies. Local mitigation actions identified as an *Ongoing Capability* were incorporated into the capability assessment of each jurisdictional annex. Those actions identified as *No Progress* or *In Progress* that remain a priority for the jurisdiction have been carried forward into the updated mitigation strategy. Actions identified as *Ongoing Capabilities*, which are fully integrated into the normal operational and administrative framework of the community have been identified within the capabilities section of each annex and removed from the updated mitigation strategy.

Throughout the planning process, the planning consultant worked directly with each community (phone, email) to assist with the development and update of their annex and include mitigation strategies, focusing on identifying well-defined, implementable projects with a careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

At the November 2022 kick-off meeting and during subsequent local-level planning meetings (phone, email), all participating jurisdictions were requested to identify mitigation activities completed, ongoing, and potential/proposed. As new potential



mitigation actions, projects, or initiatives became evident during the plan update process, including as part of the risk assessment update and as identified through the public and stakeholder outreach process detailed in Section 2 (Planning Process), jurisdictions were made aware of these either through direct communication (local meetings, email, phone), at Steering and Planning Committee meetings, or via their draft jurisdictional annexes.

6.6.2 Identification and Analysis of Mitigation Techniques

Concerted efforts were made to ensure that municipalities develop updated mitigation strategies that included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance (FEMA “Local Mitigation Planning Handbook” March 2013), specifically:

- **Local Plans and Regulations** - These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- **Structure and Infrastructure Projects** - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- **Natural Systems Protection** - These are actions that minimize damage and losses and preserve or restore the functions of natural systems.
- **Education and Awareness Programs** - These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as the NFIP and CRS, StormReady (NOAA), and Firewise (NFPA) Communities.

6.6.3 2023 HMP Mitigation Action Plan

To help support the selection of an appropriate, risk-based mitigation strategy, each annex provides a summary of hazard vulnerabilities identified during the plan update process, either directly by municipal representatives, through a review of the available Fort Bend County and local plans and reports, and through the hazard profiling and vulnerability assessment process.

In March 2023, the Planning Partnership participated in a mitigation strategy development workshop, supplemented by emails and phone calls between jurisdictions and the contract consultant, for all participating jurisdictions to support the development of focused problem statements based on the impacts of natural hazards in the County and their communities. These problem statements were intended to provide a detailed description of the problem area, including its impacts to the municipality/jurisdiction, past damages, loss of service; etc. An effort was made to include the street address of the property/project location, adjacent streets, water bodies, and well-known structures as well as a brief description of existing conditions (topography, terrain, hydrology) of the site. These problem statements formed a bridge between the hazard risk assessment, which quantifies impacts to each community with the development of actionable mitigation strategies.

As discussed within the hazard profiles in Section 4.3 (Risk Assessment), the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards, including flood, hurricanes and tropical storm, severe weather, severe winter weather, and wildfire. By way of addressing these climate change-sensitive hazards within their local mitigation strategies and integration actions, communities are working to evaluate and recognize these long-term implications and potential impacts and to incorporate them in planning and capital improvement updates.



A strong effort has been made to better focus local mitigation strategies to clearly defined, readily implementable projects and initiatives that meet the definition or characteristics of mitigation. Broadly defined mitigation actions were eliminated from the updated strategy unless accompanied by discrete actions, projects, or initiatives. Certain continuous or ongoing strategies that represent programs that are fully integrated into the normal operational and administrative framework of the community have been identified within the capabilities section of each annex and removed from the updated mitigation strategy.

To assist with the development of mitigation actions, municipalities were provided with the following:

- 2023 HMP goals and objectives
- 2018 HMP mitigation strategies
- Risk assessment results
- Outcome of the problem and solutions exercise
- Mitigation catalog
- Stakeholder and public input (e.g. resident and stakeholder survey results)
- FEMA resources

Overall, a comprehensive range of specific mitigation initiatives were considered by each plan participant to pursue in the future to reduce the effects of hazards. Some of these initiatives may be previous actions carried forward for this plan update. These initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Throughout the course of the plan update process, additional regional and county-level mitigation actions were identified by the following processes:

- Review of the results and findings of the updated risk assessment
- Review of available regional and County plans reports and studies
- Direct input from County departments and other County and regional agencies
- Input received through the public and stakeholder outreach process

6.6.4 Mitigation Best Practices

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in the Planning Area, in compliance with 44 CFR Section 201.6(c)(3)(ii). One catalog was developed for each natural hazard of concern evaluated in this plan, referred to as Appendix F (Mitigation Strategy Supplementary Data). The catalogs present alternatives that are categorized in two ways:

- By whom would have responsibility for implementation:
 - Individuals – personal scale
 - Businesses – corporate scale
 - Government – government scale
- By what each of the alternatives would do:
 - Manipulate the hazard
 - Reduce exposure to the hazard
 - Reduce vulnerability to the hazard
 - Build local capacity to respond to or be prepared for the hazard

The alternatives presented include actions that will mitigate current risk from hazards and actions that will help reduce risk from changes in the impacts of these hazards resulting from climate change. Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the catalog as well as other resources made available to all jurisdictions (i.e., FEMA’s Mitigation Ideas). The catalog provides a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the planning partners to implement. Some of these



actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalog was to provide a list of what could be considered to reduce risk from natural hazards within the Planning Area. Actions in the catalog that are not included for the partnership's action plan were not selected for one or more of the following reasons:

- The action is not feasible;
- The action is already being implemented;
- There is an apparently more cost-effective alternative; and/or
- The action does not have public or political support.

6.6.5 Mitigation Strategy Evaluation and Prioritization

Section 201.c.3.iii of 44 CFR requires an action plan describing how the actions identified will be prioritized. Recent FEMA planning guidance (March 2013) identifies a modified STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) mitigation action evaluation methodology that uses a set of 10 evaluation criteria suited to the purposes of hazard mitigation strategy evaluation. This method provides a systematic approach that considers the opportunities and constraints of implementing a particular mitigation action.

Based on this guidance, the Steering Committee has adopted and applied an action evaluation and prioritization methodology, which includes an expanded set of 14 criteria to include the consideration of cost-effectiveness, availability of funding, anticipated timeline, and if the action addresses multiple hazards.

The 14 evaluation/prioritization criteria used in the 2023 update process are:

- 1) **Life Safety** – How effective will the action be at protecting lives and preventing injuries?
- 2) **Property Protection** – How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- 3) **Cost-Effectiveness** – Are the costs to implement the project or initiative commensurate with the benefits achieved?
- 4) **Technical** – Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
- 5) **Political** – Is there overall public support for the mitigation action? Is there the political will to support it?
- 6) **Legal** – Does the municipality have the authority to implement the action?
- 7) **Fiscal** – Can the project be funded under existing program budgets (i.e., is this initiative currently budgeted for)? Or would it require a new budget authorization or funding from another source such as grants?
- 8) **Environmental** – What are the potential environmental impacts of the action? Will it comply with environmental regulations?
- 9) **Social** – Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower-income people?
- 10) **Administrative** – Does the jurisdiction have the personnel and administrative capabilities to implement the action and maintain it, or will outside help be necessary?
- 11) **Multi-hazard** – Does the action reduce the risk to multiple hazards?
- 12) **Timeline** – Can the action be completed in less than 5 years (within our planning horizon)?



- 13) Local Champion** – Is there a strong advocate for the action or project among the jurisdiction’s staff, governing body, or committees that will support the action’s implementation?
- 14) Other Local Objectives** – Does the action advance other local objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of other plans and programs?

Specifically, for each mitigation action, the jurisdictions were asked to assign a numeric rank (-1, 0, or 1) for each of the 14 evaluation criteria, defined as follows:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

Further, jurisdictions were asked to provide a summary of the rationale behind the numeric rankings assigned, as applicable. The numerical results were totaled to assist each jurisdiction in selecting mitigation actions for the updated plan.

As step 1 in the prioritization process, actions that had a numerical value between 0 and 4 were initially prioritized as low; actions with numerical values between 5 and 9 were initially categorized as medium; and actions with numerical values between 10 and 14 were initially categorized as high.

As step 2, jurisdictions were asked to consider the benefits and costs as well as the desired timeline for implementation and project completion timeline when finalizing each action’s priority as high/medium/low. These attributes are included in the mitigation strategy table and for FEMA-eligible projects in the mitigation worksheets (Section 9 – Annexes).

For the plan update, there has been an effort to develop more clearly defined and action-oriented mitigation strategies. These local strategies include projects and initiatives that are seen by the community as the most effective approaches to advance their local mitigation goals and objectives within their capabilities. In addition, each jurisdiction was asked to develop problem statements. With this process, participating jurisdictions were able to develop action-oriented and achievable mitigation strategies.

6.6.6 Benefit/Cost Review

Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. Stated otherwise, cost-effectiveness is one of the criteria that must be applied during the evaluation and prioritization of all actions comprising the overall mitigation strategy.

The benefit/cost review applied in the evaluation and prioritization of projects and initiatives in this HMP update process was qualitative; that is, it does not include the level of detail required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM) grant programs. For all actions identified in the local strategies, jurisdictions have identified both the costs and benefits associated with project, action, or initiative.

Costs are the total cost for the action or project and may include administrative costs, construction costs (including engineering, design, and permitting), and maintenance costs.



Benefits are the savings from losses avoided attributed to the implementation of the project and may include life safety, structure and infrastructure damages, loss of service or function, and economic and environmental damage and losses.

When possible, jurisdictions were asked to identify the actual or estimated dollar value for project costs and associated benefits. Having defined costs and benefits allows a direct comparison of benefits versus costs and a quantitative evaluation of project cost-effectiveness. Often, however, numerical costs and/or benefits have not been identified or may be impossible to quantitatively assess.

For the purposes of this planning process, jurisdictions were tasked with evaluating project cost-effectiveness with both costs and benefits assigned to “High”, “Medium”, and “Low” ratings. Where quantitative estimates of costs and benefits were available, ratings/ranges were defined as:

- Low = < \$10,000
- Medium = \$10,000 to \$100,000
- High = > \$100,000

Where quantitative estimates of costs and/or benefits were not available, qualitative ratings using the following definitions were used:

Table 6-2. Qualitative Cost and Benefit Ratings

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases).
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.
Benefits	
High	Project will have an immediate impact on the reduction of risk exposure to life and property.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
Low	Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly. For some of the Fort Bend County initiatives identified, the Planning Partnership may seek financial assistance under FEMA’s HMGP or Hazard Mitigation Assistance (HMA) programs. These programs require detailed benefit/cost analysis as part of the application process. These analyses will be performed when funding applications are prepared, using the FEMA BCA model process. The Planning Partnership is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Partnership reserves the right to define “benefits” according to parameters that meet its needs and the goals and objectives of this HMP.