2022 Prioritization Framework for the Allocation of Funds from the Harris County Flood Resilience Trust

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Purpose

This document outlines the 2022 Prioritization Framework for the Harris County Flood Control District's (District) approach to allocating funds from the Flood Resilience Trust. The District strives to complete projects that prevent the worst impacts on people first ("worst first" approach). This document evaluates a combination of several factors to develop a prioritization framework.

The 2018 Bond Program identified over 200 flood mitigation projects throughout Harris County. All projects have been initiated and are at various stages of the project lifecycle, but some projects may have a gap in funding due to a lack of anticipated partnership funding such as Federal or State grants or may need contingency funding. The 2022 Prioritization Framework summarized in this document includes evaluation criteria and a weighting process that will provide input to the allocation of funds from the Harris County Flood Resilience Trust towards 2018 Bond Projects with funding gaps or contingency funding needs throughout the remaining lifetime of the Bond, as well as input to the allocation of any surplus or unused Flood Resilience Trust funds towards additional projects not currently included in the 2018 Bond Project list.

Types of Projects

The following are the major types of projects that may be scored with the Prioritization Framework to determine prioritization for funding:

- Right-of-Way, Planning, Design and/or Construction Projects – Traditional infrastructure projects to reduce flooding potential.
- Floodplain Preservation and Right-of-Way Acquisition – Acquisition of property deep in the floodplain for preservation as well as acquisition of property for future projects.
- Wetland Mitigation Banks – Creation of wetlands for permanent protection and wetland mitigation credits to offset the loss of wetlands due to development.
- Storm Repairs and Restore Channel Capacity - Projects that include fixing side slope failures and desilting channels to restore the channel capacity to the original design.
- Subdivision Drainage Improvements – Projects typically in partnership with another agency that has primary jurisdiction to improve the internal subdivision drainage in conjunction with District channels.

The 2022 Prioritization Framework presented here is intended for use in evaluating both projects that are ongoing and newly identified projects that may be funded using any remaining Flood Resilience Trust funding once all existing 2018 Flood Bond projects are fully funded.

However, this framework is not suited for evaluation of buyout projects or countywide projects:

- Buyout projects are necessarily long-term projects that require close collaboration with local communities.
- Countywide projects do not fit easily within the framework developed here due to the challenges in estimating the flood risk reduction benefits from these projects. These projects in the 2018 Flood Bond include the following:

- Flood Warning System – Improvements and advancements to the existing District's Flood Warning System and
- Floodplain Mapping Updates – Updates to the Federal Emergency Management Agency (FEMA) 1% floodplain maps and other mapping products.

As such, these projects are separately funded and are not anticipated to draw from the Flood Resilience Trust.

Project Prioritization

Evaluation criteria were developed to determine the prioritization score for flood mitigation projects. These criteria allow for an opportunity to create objectivity in the prioritization process. The Weighted Factors Analysis used to evaluate the remaining projects is described below in detail with the following criteria:

- Project Efficiency
  - Project Efficiency using People Benefitted
  - Project Efficiency using Structures Benefitted
- Existing Conditions
- Social Vulnerability Index
- Long Term Maintenance Costs
- Environmental Impacts
- Potential for Multiple Benefits

Each project is assigned a score for each criterion below ranging from 0 to 10. A score of "10" represents that a project for which the criterion was fully met and a score of "0" indicates that the project met did not meet the criterion.

2022 Prioritization Framework Criteria

Metric	Description	Weight
Project Efficiency	*People Benefitted* Total Cost of Project/Number of people benefitted by the project (Table 1).	15%
	Structures Benefitted Total Cost of Project/Structural benefits in 100-year rainfall (Table 2).	30%
Existing Conditions	*For channel and detention projects:* Capacity of the existing Flood Control District channel to manage a flooding event. Lower system capacity means a higher score (Table 3). *For subdivision drainage projects:* Estimated existing drainage conditions, using a combination of the maximum excess rainfall in a 100-yr event and the existing quality of drainage infrastructure in the project area (Table 4).	20%
Social Vulnerability Index (SVI)	CDC measure of communities' ability to survive and recover from a disaster (Table 5).	20%
Long-Term Maintenance Costs	Long-term operating costs of projects (Table 6).	5%
Environmental Impacts	*For channel and detention projects*: Anticipated environmental impact of the project, including whether it requires a permit from the US Army Corps of Engineers or requires the purchase of mitigation credits (Table 7). *For subdivision drainage projects:* Anticipated right-of-way impacts of the project (Table 8).	5%
Potential for Multiple Benefits	*For channel and detention projects:* Anticipated recreational or environmental benefits of the project (Table 9). *For subdivision drainage projects:* Ability of the project to work in conjunction with a nearby detention basin or channel improvement project (Table 10).	5%
	Total	100%

Project Efficiency

Project efficiency is the measure of the amount of funding that is required to reduce the risk of flooding for people or structures from a 100-year rain or flood event. Project efficiency is divided between two measures of efficiency: Project Efficiency using People Benefitted, and Project Efficiency using Structures Benefitted.

Project Efficiency using People Benefitted

Tables 1 provides scoring for ranges of project efficiency using people benefitted. This measure is defined as the total cost of the project divided by the number of people that receive a flood damage reduction benefit from a 100-year flood or rainfall event, based on the estimated population within the project benefit area.

$$Project\ Efficiency\ using\ People\ Benefitted = \frac{Total\ Cost\ of\ Project\ (\$)}{\#\ of\ People\ Benefitted}$$

Table 1: Project Efficiency using People Benefitted Scoring Criteria

Criteria	Score
Greater than $77,000/person	1
$28,001 to $77,000/person	4
$15,001 to $28,000/person	6
$6,000 to $15,000/person	8
Less than $6,000/person	10

Project Efficiency using Structures Benefitted

Table 2 provides scoring for ranges of project efficiency using structures benefitted. This measure is defined as the total cost of the project divided by the number of structures that receive a flood damage reduction benefit from a 100-year flood or rainfall event.

$$Project\ Efficiency\ using\ Structures\ Benefitted = \frac{Total\ Cost\ of\ Project\ (\$)}{\#\ of\ Structures\ Benefitted}$$

Table 2: Project Efficiency using Structures Benefitted Scoring Criteria

Criteria	Score
Greater than $261,000/structure	1
$106,001 to $261,000/structure	4
$60,001 to $106,000/structure	6
$23,000 to $60,000/structure	8
Less than $23,000/structure	10

Existing Conditions

The existing conditions metric for District channels utilizes a data set that was developed to determine the system capacity of the channel. The capacity ranges from 1% Annual Exceedance Probability (AEP), or 100-year storm, to the 50% AEP storm, or 2-year storm. A channel with system capacity greater than the 1% AEP is expected have less than 1% probability of flooding in a given year, while a channel with system capacity less than 50% AEP is expected to have greater than 50% probability of flooding in a given year. Table 3 defines the scoring associated with the system capacity for the District channel in question.

Table 3: Existing Conditions Scoring Criteria (Channel and Detention Projects)

Criteria	Score
System capacity is > 1% AEP storm (100-year storm)	0
System capacity is < 1% AEP storm (100-year storm)	1
System capacity is < 2% AEP storm (50-year storm)	2
System capacity is < 4% AEP storm (25-year storm)	4
System capacity is < 10% AEP storm (10-year storm)	6
System capacity is < 20% AEP storm (5-year storm)	8
System capacity is < 50% AEP storm (2-year storm)	10

A major source of flooding in Harris County occurs outside of the 100-year floodplain, in large part due to inadequate stormwater infrastructure. For projects that provide flood reduction benefits outside the 100-year floodplain, such as subdivision drainage improvement projects, the Existing Conditions metric is based on the estimated excess rainfall accumulation in a 100-year flood event using MAAPNext rain-on-grid data *and* existing quality of drainage infrastructure in the project area. The existing quality of drainage infrastructure is classified using the following criteria:

- *High-Quality Infrastructure* = Streets and roads within the subdivision of proposed improvement are constructed with curb-and-gutter streets post-1984.
- *Medium-Quality Infrastructure* = Streets and roads within the subdivision of proposed improvement are constructed with curb-and-gutter streets pre-1984.
- *Low-Quality Infrastructure* = Streets and roads within the subdivision of proposed improvement are open ditch.

Table 4 defines the scoring associated with the Existing Conditions metric for subdivision drainage improvement projects.

Table 4: Existing Conditions Scoring Criteria (Subdivision Drainage Improvement Projects)

Criteria	Points
Low estimated excess rainfall AND high-quality drainage infrastructure	0
Intermediate estimated excess rainfall OR medium-quality drainage infrastructure (but not both)	3
Intermediate estimated excess rainfall AND medium-quality drainage infrastructure	6
High estimated excess rainfall OR low-quality drainage infrastructure (but not both)	9
High estimated excess rainfall AND low-quality drainage infrastructure	10

Social Vulnerability Index

Social vulnerability refers to the resilience of communities when confronted with disasters such as flooding. Communities that are more socially vulnerable are at greater risk for loss of life during a disaster and are slower to recover after a disaster. The Centers for Disease Control has created its Social Vulnerability Index (SVI) using 15 U.S. Census variables that influence a community's ability to prepare for, respond to, and recover from a disaster. These factors include the percentage of elderly residents, limited English proficiency, households without a vehicle, and other factors. The SVI score of the community served by a given project determines the scoring of this criterion. Table 5 provides the scoring ranges to account for social vulnerability.

Table 5: Social Vulnerability Scoring Criteria

Criteria	Score
SVI indicates low level of vulnerability	1
SVI indicates low to moderate level of vulnerability	4
SVI indicates moderate to high level of vulnerability	7
SVI indicates high level of vulnerability	10

Long Term Maintenance Costs

Maintenance costs for each type of project varies. For channel and detention projects, considerations include the ability to access the channel, channel geometry and material, and maintenance berm width. For example, concrete-lined channels have different maintenance costs than grass-lined channels. Additionally, the size of the channel and/or stormwater detention basin will affect the maintenance costs. Table 6 defines the scoring associated with long term maintenance costs.

Table 6: Long Term Maintenance Costs Scoring Criteria

Criteria	Score
Project will require extensive or specialized maintenance	2
Project will require maintenance outside of District's or jurisdiction's regular maintenance practices	6
Project only requires regular, on-going maintenance	10

Minimize Environmental Impacts

Tables 7 and 8 define the scoring associated with project specific environmental mitigation. For channel and detention projects, environmental mitigation could include purchasing credits at a wetlands or streambank mitigation bank, completing environmental permits, and creating self-mitigating projects. Each of these items has an impact on project cost and schedule.

Table 7: Minimize Environmental Impacts Scoring Criteria (Channel and Detention Projects)

Criteria	Score
Project will have significant environmental impacts requiring a Corps of Engineers Individual Permit and mitigation bank credits	0
Project will have significant environmental impacts requiring mitigation bank credits	2
Project is able to significantly avoid environmental impacts	6
Project has minimal or no environmental impacts	10

For subdivision drainage improvement projects, impact on the environment is minimized when a project can be completed within the road's existing right-of-way.

Table 8: Minimize Environmental Impacts Scoring Criteria (Subdivision Drainage Improvement Projects)

Criteria	Score
Project will require acquiring additional right-of-way	6
Project can be completed within the road's existing right-of-way	10

Potential for Multiple Benefits

Tables 9 and 10 define the scoring associated with the project's potential for multiple benefits including recreational and environmental enhancements. For subdivision drainage improvement projects, multiple benefits are achieved when the drainage improvement project's benefit area also benefits from a nearby detention basin or channel improvement project.

Table 9: Potential for Multiple Benefits Scoring Criteria (Channel and Detention Projects)

Criteria	Score
Project does not have multiple benefits	0
Project has recreational benefits	4
Project has environmental enhancement benefits	6
Project has recreational and environmental enhancement benefits	10

Table 10: Potential for Multiple Benefits Scoring Criteria (Subdivision Drainage Improvement Projects)

Criteria	Score
Project area does not benefit from a District improvement such as a nearby channel improvement or detention basin project	6
Project area also benefits from a District improvement such as a nearby channel improvement or detention basin project	10

Weighted Factors Analysis

The Weighted Factors analysis allows criteria to be weighted based on percentages that sum to 100 percent. Each of the criteria was given a percentage weighting based on a holistic view of flood risk reduction priorities. The District's mission is to provide flood damage reduction projects that work, with appropriate regard for community and nature-driven values; therefore, flood risk reduction for people and structures is the most heavily weighted factor, with the remaining factors weighted in decreasing order of priority: infrastructure and community equity, maintenance, and other factors that influence the long-term value of the project.

• Project Efficiency Weighting Factor	
o Resident Benefits Efficiency	15%
o Structure Benefits Efficiency	30%
• Existing Conditions Weighting Factor	20%
• Social Vulnerability Index Weighting Factor	20%
• Long Term Maintenance Costs Weighting Factor	5%
• Minimizes Environmental Impacts Weighting Factor	5%
• Potential for Multiple Benefits Weighting Factor	5%
	100%