

2028 REGIONAL FLOOD PLAN DRAFT CHAPTER 3 REGION 6 SAN JACINTO

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PREPARED FOR THE SAN JACINTO
REGIONAL FLOOD PLANNING GROUP

2028 REGIONAL FLOOD PLAN

DRAFT CHAPTER 3

PREPARED FOR:

TWDB on behalf of Region 6 San Jacinto Regional Flood Planning Group

PREPARED BY:

Freese and Nichols, Inc.

Halff Associates, Inc.

Hollaway Environmental + Communications Services, Inc.

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CHAPTER 3. FLOODPLAIN MANAGEMENT PRACTICES AND FLOOD PROTECTION GOALS

The overarching goal of all RFPs must be “to protect against the loss of life and property” as set forth in the Guidance Principles, 31 TAC §362.3. This includes the need to:

1. Identify and reduce the risk and impact to life and property that already exists, and
2. Avoid increasing or creating new flood risk by addressing future development within the areas known to have existing or future flood risk.

The San Jacinto Regional Flood Planning Group (RFPG) was tasked with evaluating and recommending floodplain management practices (Task 3A), flood mitigation needs (Task 3B), and flood protection goals (Task 3C) within the region. This chapter describes the processes undertaken by the RFPG to achieve these tasks and summarizes the outcomes of this effort.

Chapter 3.A. Evaluation and Recommendations on Floodplain Management Practices

Floodplain management practices are crucial to accomplishing these objectives at regional and local levels. Institutional support for floodplain management comes in multiple forms from the state and local levels. Local institutional support includes adequate budgeting for the floodplain administration office, general support from governing boards, and departmental support from local public works and finance departments. Regional and state institutional support comes in the form of agency cooperation, guidance and information sharing, technical guidance on complex matters, and general political support. External professional support for floodplain management practices typically comes in the form of professional engineers, surveyors, insurance professionals, environmental planners, and technicians. These subject matter experts are often relied on to provide the technical materials and understanding needed to properly complete floodplain development permit applications and execute their requirements. The relative number and availability of qualified professionals play an important role in the efficiency of regulatory compliance.

Floodplain management is defined in Title 31 Texas Administrative Code §361.10 as “the operation of an overall program of corrective and preventative measures for reducing flood damage.” The nature and implementation of floodplain management practices vary across the region. The following sections provide a qualitative assessment of regional trends in existing floodplain management practices within the San Jacinto region.

3.A.1. Existing Floodplain Management Practices

Existing floodplain management practices for regulatory entities within the region, specifically municipalities and counties, were collected and assessed. For the purpose of this chapter, floodplain management practices refer to the ordinances and regulations enacted by regulatory entities to manage flooding in their respective communities. Floodplain management documents available via open-source searches were first collected. Parallel to this effort, a web-based survey, detailed in Chapter 1, was sent to the region to gather additional information. A high-level summary of existing floodplain management

practices is included in **Table 6** in **Appendix 3A-1**. Values for entities were classified as “Unknown” if data were not provided through the survey or could not be found online. **Figure 3-1** summarizes the classification distribution of floodplain management practices for regulatory entities in the region.

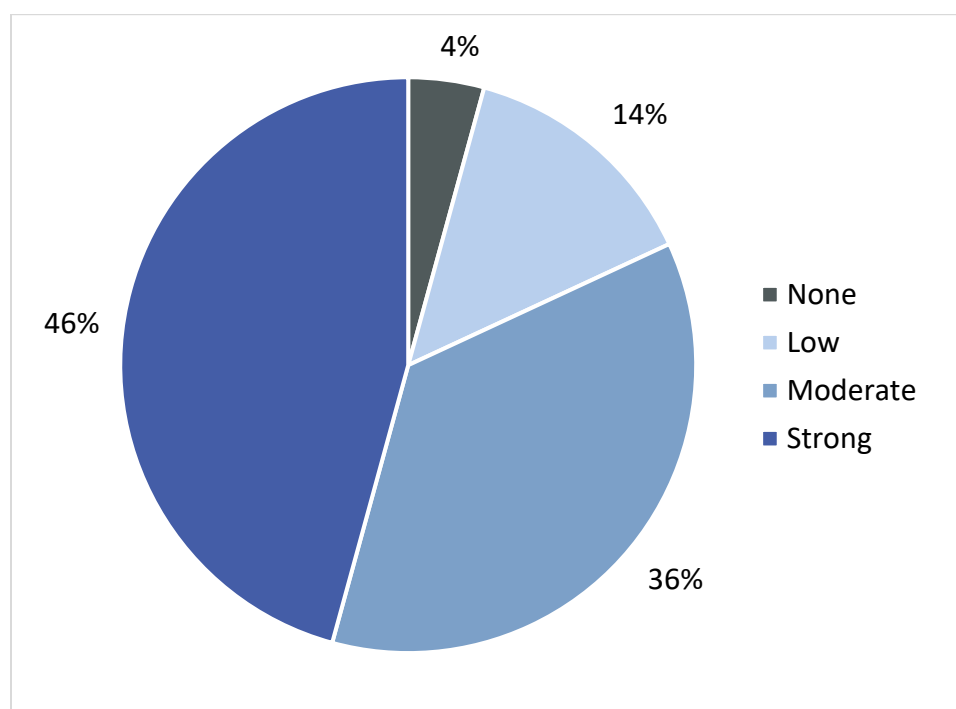


FIGURE 3-1: LEVEL OF FLOODPLAIN MANAGEMENT PRACTICES

The Federal Emergency Management Agency (FEMA) establishes Base Flood Elevations (BFEs) and Special Flood Hazard Areas (SFHAs) along rivers, creeks, and large tributaries that are shown on Flood Insurance Rate Maps (FIRMs) and adopted by municipalities and counties. FIRMs define the geographic area for which local floodplain regulations are applicable. They are developed by FEMA through a discovery process that includes input from hydrologic and hydraulic analyses as well as local stakeholders. The most important geographic zones defined on FIRMs are Special Flood Hazard Areas (SFHAs), floodways, and, to a lesser extent, 0.2% ACE areas designated as shaded Zone X. Other designations and zones are also defined on FIRMs, such as coastal zones and jurisdictional boundaries. The geographic accuracy of zones defined on FIRMs, or the degree to which FIRMs accurately reflect flood risk, is dependent on changes in land use or rainfall patterns after the published date. Communities use the FIRM, BFE, and SFHA data in their floodplain permitting processes as a requirement for participating in the NFIP. Insurance agents use FIRMs to determine if flood insurance is required for a property. Flood insurance rates are determined for individual properties based on their location in the SFHA.

To participate in the NFIP, a community must adopt minimum standards that are outlined in Title 44 of the Code of Federal Regulations, 44 CFR § 60.3. **Map 13** in **Appendix 3A-2** demonstrates the widespread coverage of floodplain management practices throughout the region that meet or exceed NFIP minimum standards. NFIP participation allows residents of a community to purchase flood insurance and makes the community eligible for disaster assistance following a flood event. FEMA maintains records of community eligibility in a publicly available report, the Community Status Book, and suspends

communities that fail to meet the minimum requirements. The Community Status Book, consulted on July 27, 2026, indicated that all counties and the majority of municipalities within the San Jacinto region actively participate in the NFIP. The one municipality listed as a non-participant in the Community Status Book is the City of North Cleveland. It is also noted that the City of Plantersville, the City of Spring, and The Woodlands Township are not listed in the Community Status Book.

Municipalities and counties have the authority to establish their own policies, standards, and practices to manage land use and permitting within associated legal jurisdictions and when developed properties utilize infrastructure that is owned and operated by these regulatory entities. Regulatory entities have the responsibility and authority to permit development that is reasonably safe from flooding. They can adopt and enforce standards higher than FEMA NFIP minimum standards to better protect people and property from flooding. FEMA supports entities that choose to establish higher standards to better protect life and property, which many entities throughout the San Jacinto region have implemented.

The ability and terms by which regulatory entities enforce floodplain ordinances or regulations are typically codified in sections documenting specific penalties for noncompliance. Specific penalties codified in adopted regulations imply an understanding of, preparation for, and support from local officials, administrative boards, and code enforcement. A designation of “None” was assigned to entities for which no data were obtained through the methods discussed below or that lacked a flood damage prevention ordinance (FDPO).

3.A.1.a. Low Floodplain Management Practices

Entities were considered to have “low” floodplain management practices if current ordinances or regulations met the minimum requirements per the NFIP. Approximately 14% of regulatory entities within the Region have “low” floodplain management practices.

Floodplain management criteria for flood-prone areas and minimum requirements per Title 44 of the Code of Federal Regulations, 44 CFR § 60.3, are listed at the end of this section and summarized below.

- Require permits for all proposed construction in the community to determine whether construction is proposed within flood prone areas
- Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding:
 - If a proposed building site is in a flood prone area, all new construction and substantial improvements shall be designed to adequately prevent flotation or collapse and be constructed with materials resistant to flood damage
- Review subdivision proposals to determine whether such a proposal will be reasonably safe from flooding:
 - If a subdivision proposal is in a flood prone area, any such proposal shall be reviewed to ensure that all such proposals are consistent with the need to minimize flood damage within the flood prone area and
 - All public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage;

- Adequate drainage is provided to reduce exposure to flood hazards
- Adopt and enforce a FDPO
- Require new or substantially improved homes and manufactured homes to be elevated above the BFE
- Require elevation certificates to ensure compliance
- Conduct field inspections, cite violations, resolve noncompliance issues, and consider and manage variances
- Require within flood prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the system
- Require within flood prone areas new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flood events

3.A.1.b. Moderate Floodplain Management Practices

Entities were designated as having a “moderate” level of floodplain management practices if current regulations exceeded the minimum requirements of the NFIP. Some of these higher standards include detention requirements, compensatory fill requirements in the 1.0% ACE regulatory floodplain, and requirements that minimum finished floor elevations of new habitable structures exceed the BFE.

3.A.1.c. Strong Floodplain Management Practices

Entities were designated as having a “strong” level of floodplain management practices if the entity currently regulated to the effective 0.2% ACE regulatory floodplain or had adopted NOAA Atlas 14 rainfall data. Most entities within the San Jacinto region fall within this category of floodplain management practice.

Within the San Jacinto region, the effective 0.2% ACE rainfall is widely considered to be a proxy for the Atlas 14 1.0% ACE rainfall. Approximately 46% of regulatory entities within the region have “strong” floodplain management practices. Regulations implemented by these entities include requiring compensatory floodplain fill mitigation for fill placed within the effective 0.2% ACE floodplain as well as requiring that finished floor elevations of new habitable structures be built above the 0.2% ACE floodplain elevation.

Regulatory entities with “strong” floodplain management practices have chosen to implement regulations that go well beyond NFIP minimum requirements and demonstrate some of the strongest floodplain management practices in the state.

3.A.1.d. Enforcement of Floodplain Management Practices

After the level of floodplain management practices was determined, the level of enforcement of those floodplain management practices was analyzed. Entities with no designated floodplain management practices or regulations were categorized as having a level of “None.” Entities were categorized as

having “Low,” “Moderate,” and “High” levels of enforcement if they issue fines less than \$500, equal to \$500, and greater than \$500, respectively. Additionally, if entities utilize Section 1316 of the National Flood Insurance Act of 1968, the level of enforcement was classified as “High.” Section 1316 of the National Flood Insurance Act of 1968 denies new flood insurance coverage for properties in violation of floodplain regulations to limit use and development in flood-prone areas.

3.A.2. Impacts of Floodplain Management Practices on Population and Property

Since the 1980s, communities in the San Jacinto region have incrementally improved floodplain and development regulations. These regulations are targeted at new development; there is typically a delay between when floodplain management practices are implemented and when the benefits of those practices may be realized and quantified. An analysis of flooded structures within Harris County occurred after Hurricane Harvey in August 2017. What was notable regarding the analysis was that, although 75,000 homes were built in unincorporated Harris County since 2009, only 467, or 0.6% of those 75,000 homes, flooded during Hurricane Harvey. The year 2009 was when HCFCFCD implemented significant updates to its hydrologic and hydraulic analysis criteria, which improved the safety of structures. None of the 467 flooded homes were substantially damaged. For context, it is estimated that roughly 154,000 homes flooded within Harris County as a result of Hurricane Harvey, amounting to between 9% and 12% of the total number of buildings in the county. Improved floodplain management and development regulations have directly benefited communities within Harris County and the San Jacinto region.

The implementation of floodplain management practices is the first line of defense to avoid increasing flood risk or creating new flood risk and can yield significant returns on investment. A study by the National Institute of Building Sciences published in 2019 concluded that investment in updating building codes and improving development regulations can result in major savings, as much as \$7 for every \$1 invested, in avoided fatalities, damages, and other indirect costs associated with riverine flooding, such as diverted resources required to facilitate the recovery process and interruption to business. Improving floodplain management practices and elevating minimum standards within a region present some of the lowest-cost, proactive solutions to protecting both existing and future populations from worsening flood risk.

3.A.3. Recommendation of Minimum Floodplain Management Standards

Task 3A requires the RFPG to “make recommendations regarding forward-looking floodplain management and land use recommendations, and economic development practices and strategies, that should be implemented by entities within the FPR.” The San Jacinto RFPG is required to consider the possibility of recommending and/or adopting region-wide minimum standards, land use practices, or economic development practices and strategies that should be implemented by flood-related authorities to manage flood risk in the region. Recommending minimum standards encourages entities with flood-related authority to implement standards that meet or exceed those minimum standards. Adopting minimum standards requires entities to meet or exceed the minimum standards adopted by the RFPG as a pre-requisite for Flood Management Strategies (FMSs), Flood Management Evaluations

(FMEs), and Flood Mitigation Projects (FMPs) sponsored by that entity to be included in the RFP. Funding programs administered by the TWDB will require that activities be recommended in the RFP to be eligible for future financial assistance.

Due to already widespread active participation in the NFIP by communities within the San Jacinto region, discussion on minimum standards was focused on higher standards. During the July 2025 Technical Committee meeting, the committee agreed to propose five new recommended floodplain management practices for discussion at the August 2025 San Jacinto RFPG meeting. During the August and September 2025 San Jacinto RFPG meetings, feedback was solicited on the existing and proposed recommended floodplain management practices. Input from the RFPG at the April 2025 meeting centered on ensuring that adequate flexibility was incorporated into the identified standards to allow entities to adopt regulations that best suited both the needs of their community and their current staffing capabilities. During the November 13, 2025, San Jacinto RFPG meeting, the San Jacinto RFPG voted to continue to recommend three minimum standards, update five minimum standards from the first cycle, and recommend five new minimum standards, for a total of 13 recommended minimum standards, all listed in **Table 3-1**. If the San Jacinto RFPG had chosen to adopt standards, only entities that already have regulations in place that meet or exceed those standards would be eligible for future funding through programs administered by the TWDB. Therefore, the San Jacinto RFPG chose to recommend standards as opposed to adopting them so as not to limit the funding eligibility of entities within the region.

TABLE 3-1: RECOMMENDED MINIMUM FLOODPLAIN MANAGEMENT STANDARDS

Recommended Minimum Standard	Definition
Participation in the National Flood Insurance Program (NFIP)	- All regulatory entities to implement ordinances that meet minimum requirements per the NFIP - All regulatory entities to remain active NFIP participants in good standing - All regulatory entities to participate in the Community Rating System (CRS) Program to reduce flood insurance rate premiums across the region.
Development of No Adverse Impact Policies	- All regulatory entities to define a no adverse impact policy. - The no adverse impact policy should be focused on preventing negative impacts. Evaluation of impacts should be completed using best available hydrologic and hydraulic modeling, where appropriate.

Recommended Minimum Standard	Definition
Establish Minimum Finished Floor Elevations	• All new habitable structures shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 0.2% ACE flood elevation as shown on effective FIRMS except in areas designated as coastal flood zones. • Where regulatory mapping has been updated using Atlas 14 or newer rainfall data, all new habitable structures shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 1.0% ACE flood elevation as shown on effective FIRMS except in areas designated as coastal flood zones. • In areas designated as coastal flood zones, all new habitable structures shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 1.0% ACE flood elevation as shown on effective FIRMS plus 1 foot of freeboard. • All new critical facilities shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 0.2% ACE flood elevation as shown on effective FIRMS plus 2 feet of freeboard except in areas designated as coastal flood zones. • Where regulatory mapping has been updated using Atlas 14 or newer rainfall data, all new critical facilities shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 1.0% ACE flood elevation as shown on effective FIRMS plus 2 feet of freeboard except in areas designated as coastal flood zones. • In areas designated as coastal flood zones, all new critical facilities shall have a finished floor elevation established at or above or waterproofed to the FEMA effective 1.0% ACE flood elevation as shown on effective FIRMS plus 2 feet of freeboard.
Encourage Use of Best Available Data	• Utilize the latest rainfall data, NOAA Atlas 14 or newer rainfall data, when conducting new analyses, designing drainage infrastructure, or developing regulations and criteria.
Compensatory Storage Requirements in the 1.0% ACE Floodplain	• Any reduction in floodplain storage or conveyance capacity within the 1.0% ACE regulatory floodplain must be offset with a hydraulically equivalent (one-to-one) volume of mitigation sufficient to offset the reduction, except in areas identified as coastal flood zones. • A full hydrologic and hydraulic analysis should be performed to demonstrate that floodplain fill mitigation provided is sufficient.
Compensatory Storage Requirements in the 0.2% ACE Floodplain	• Any reduction in floodplain storage or conveyance capacity within the 0.2% ACE regulatory floodplain must be offset with a hydraulically equivalent (one-to-one) volume of mitigation sufficient to offset the reduction, except in areas identified as coastal flood zones. • A full hydrologic and hydraulic analysis should be performed to demonstrate that floodplain fill mitigation provided is sufficient.
Development of Detailed Hydrologic and Hydraulic Analysis Criteria/Requirements	• All regulatory entities to develop hydrologic and hydraulic modeling criteria or requirements. • All regulatory entities to identify features of a proposed development that would warrant a full hydrologic and hydraulic analysis.
Incentivizing the Preservation of the Floodplain	• All regulatory entities to explore and develop systems for incentivizing the preservation of the floodplain directly within the regulatory floodplain or within 100 feet of the banks of unstudied streams.
Nature-Based Solutions	• All regulatory entities should adopt criteria for the design of nature-based solutions for drainage infrastructure and stormwater quality management. TWDB's nature-based solutions guidance manual should be referenced when adopting criteria. • All regulatory entities should establish criteria that would require new construction to incorporate, or at minimum consider, nature-based solutions in the design of drainage infrastructure and mitigation.

Recommended Minimum Standard	Definition
Operations & Maintenance	- All flood-related authorities who own and operate drainage infrastructure to create a maintenance plan for those assets to manage and reduce future replacement costs. - All flood-related authorities who own and operate drainage infrastructure to develop and maintain an asset management plan, including GIS dataset of assets, to support maintenance of infrastructure. Datasets to leverage infrastructure toolkit that has been prepared by the TWDB to improve the assessment of drainage infrastructure condition and functionality.
Property Acquisition Program	All regulatory entities should develop property acquisition programs for repetitive loss structures.
Flood Warning System	All regulatory entities should develop flood warning systems for public awareness.
Hazard Mitigation Plan	All regulatory entities should develop and maintain Hazard Mitigation Plans to help prepare for, respond to, and recover from flood events and maximize funding eligibility for disaster recovery funding.

Chapter 3.B. Flood Mitigation Needs Analysis

The Texas Water Development Board utilized Task 3B to conduct a high-level assessment of the San Jacinto region with the goal of identifying areas with the greatest flood risk knowledge gaps and greatest known flood risk and mitigation needs. Guidance from the TWDB Technical Guidelines for Regional Flood Planning (Exhibit C) indicates that the gaps in flood risk information should be of “flood prone areas with poorly defined or inadequate flood risk information to the extent that it would prevent the RFPG from identifying potentially feasible FMSs and/or FMPs to mitigate flood risks.” The guidance for areas of greatest flood risk indicates that ongoing and planned flood risk reduction projects with funding should be considered when determining areas of greatest need. The results of Task 3B help guide the subsequent Task 4A effort of identifying FMEs, FMPs, and FMSs. **Table 3-2** provides a summary of the Technical Guidelines factors that were identified in Exhibit C, as well as factors that were considered by the Regional Flood Planning Group.

TABLE 3-2: TWDB GUIDANCE AND FACTORS CONSIDERED FOR THE NEEDS ANALYSIS

Guidance from TWDB	Factors Considered by the RFPG
1. Areas most prone to flooding that threatens life and property	- Existing Conditions and Future Conditions - Area in the existing 0.2% ACE floodplain - Structures within 0.2% ACE floodplain - Agricultural area within 0.2% ACE floodplain - Quantity of roadway miles in the 0.2% ACE floodplain - Number of roadway stream crossings - Number of critical facilities in 0.2% ACE floodplain

Guidance from TWDB	Factors Considered by the RFPG
2. The relative locations, extent and performance of current floodplain management and land use policies and infrastructure located within the Flood Planning Region	• Community participation in National Flood Insurance Program • Presence of a city and/or county Drainage Criteria Manual • Presence of higher floodplain standards • Rating of higher floodplain standards • Level of enforcement • A community's Community Rating System score
3. Areas with an emergency need	• FEMA-designated Repetitive Loss/Severe Repetitive Loss structures • Critical facilities within the existing 0.2% ACE floodplain • Hurricane evacuation routes • Early warning flood monitoring gauges • Historical fatalities associated with floods
4. Existing modeling analyses and flood risk mitigation plans	• Presence of Master Drainage Plans, including watershed-wide Master Drainage Plans and watershed planning studies • Presence of Hazard Mitigation Plans and year in which they were adopted
5. Previously identified and evaluated flood mitigation projects	• Previously evaluated flood mitigation efforts by watershed
6. Documentation of historic flooding events	• Number of FEMA claims • Claim property damage • FEMA disaster declarations
7. Previously implemented flood mitigation projects	• Number of active construction projects
8. Additional other factors deemed relevant by RFPG	• Social Vulnerability Index • Nighttime population density
9. Areas identified that do not have adequate inundation mapping 10. Areas identified that lack hydrologic and hydraulic (H&H) models	• Age and level of detail of best available floodplain analysis

3.B.1. Process and Scoring Criteria

Task 3B utilized compiled data from Tasks 1 through 3A to conduct a geospatial assessment of the region by assigning scoring based on calculated metrics associated with the factors listed in **Table 3-2**. The geospatial assessment was performed at a HUC-12 watershed level of detail, which is consistent with the minimum watershed size as specified in the Technical Guidelines. As watersheds are subdivided into smaller watersheds, the number of digits used to identify them gets longer. The smallest unit of division used to identify a watershed is 12 digits, also referred to as a HUC-12. The San Jacinto region has a total of 109 HUC-12 watersheds, with an average size of 47 square miles. Due to the topography of the region, the HUC-12 boundaries in the southern (coastal) zone of the region are much larger than those in the northern part of the region. Four of the 109 HUC-12 boundaries have an average area of 220

square miles, while the remaining 105 HUCs have an average area of 40 square miles. As a result, the average HUC area is skewed, which will lead to uneven results in the distribution of flood risk and knowledge gaps. To address this concern, the four large HUC-12 boundaries were divided further using local watershed boundaries. The result was a total of 118 watersheds, with an average area of 68 square miles.

Based on guidance from the RFPG, a total of ten data categories with 29 subcategories were used in the geospatial assessment. A scoring system was determined for each data category based on the statistical distribution of the data, with an effort made to evenly distribute the number of HUCs with each score within a certain category to differentiate HUCs in the identification of higher need areas. The process for the analysis was:

1. Selected datasets were intersected with HUC-12 watershed boundaries to quantify relevant features within each HUC. For data evaluated at the entity level, values were aggregated to the HUC-12 scale using an area-weighted method.
2. The resulting values were grouped into scoring ranges corresponding to scores from one to five. Scoring ranges were defined such that a similar number of HUC-12 watersheds fell within each score where feasible. In some cases, this resulted in broader scoring ranges to maintain a relatively even distribution of HUCs across score values.
3. Each HUC-12 was assigned a score for each category or subcategory, where higher scores indicate greater flood risk or larger knowledge gaps.
4. For categories with multiple subcategories, scores were averaged to obtain a category score for each HUC-12.
5. Relevant categories were summed to create an overall score for each HUC in both the flood risk and flood risk knowledge gap calculations based on the breakdown in **Table 3-3**.

TABLE 3-3: CATEGORY FACTORS FOR FLOOD RISK KNOWLEDGE GAPS AND KNOWN FLOOD RISK

Category	Knowledge Gap	Flood Risk Need
1		X
2		X
3		X
4	X	
5		X
6		X
7		X
8		X
9 & 10	X	

Further documentation of the scoring methodology is provided in the sections below. The following sections describe all factors used in the Task 3B assessment and explain how each category and subcategory was scored. The objective of Task 3B is to evaluate the overall magnitude of need within each HUC-12 watershed based on the collective presence of relevant factors, rather than to isolate the relative contribution of individual categories. Therefore, no weighting factors were applied at the category level, although weighting was applied within certain subcategories, as described below.

3.B.1.a. Areas Most Prone to Flooding that Threatens Life and Property (Category 1)

Compared to other flood planning regions, the San Jacinto region has more complete mapping coverage based on more detailed and newer flood risk information. A significant remapping effort was undertaken by the HCFCD, whose jurisdiction covers a significant portion of the region. Consideration was given to both existing and future conditions for the determination of areas most prone to flooding that threaten life and property. To calculate total points for this category, the points assigned based on existing floodplain mapping were weighted at 70% while the points assigned based on future floodplain mapping were weighted at 30%. Note that the depth of flooding was not modeled and therefore not utilized for the analysis; instead, only floodplain extents or areas were utilized.

A total of six subcategories contributed to the total points for this category. Calculated metrics and assigned points related to existing conditions were referred to as Category 1A while those related to future conditions were referred to as Category 1B. Scoring criteria for this category is shown in **For this** analysis, if a critical facility was located within the existing 0.2% ACE floodplain, it was counted as flooded without consideration of structure elevation. Furthermore, no critical facility footprints were added under future conditions; the existing critical facility footprints dataset was also used to determine facility counts based on the future floodplain extents. Consideration of structure elevations could be evaluated in future flood planning cycles.

Table 3-4, Existing Conditions, and **Table 3-5**, Future Conditions. The points from the six subcategories were averaged to get the total scores for Categories 1A and 1B.

Areas Within the Floodplain

The total area within the existing and future 0.2% ACE floodplains was determined in Tasks 2A and 2B, respectively. The total area within each 0.2% ACE floodplain was calculated for each HUC-12 and used to assign points for this subcategory.

Number of Structures in the Floodplain

The building footprints dataset was provided by the TWDB on the Data Hub. This dataset was utilized in Task 2A to determine the total number of buildings in the existing 0.2% ACE floodplain. A similar exercise was performed to determine structures within the future 0.2% ACE floodplain by intersecting existing structures with the future conditions floodplains delineated in Task 2B. For Task 3B, points were assigned for this subcategory based on the count of existing buildings within the 0.2% ACE floodplain for each HUC-12 watershed.

For this analysis, if a structure were located within the existing 0.2% ACE floodplain extent, it was counted as flooded without consideration of the structure elevation. Furthermore, no additional

building footprints were added under future conditions due to the challenge and time required to determine the number and location of future buildings; thus, the existing building footprints dataset was also used to determine structure count based on the future floodplain extents. Consideration of structure elevations could be evaluated in future flood planning cycles.

Agricultural Areas

Agricultural areas have been defined for this task as land used for farming. The agricultural areas dataset was provided by the TWDB. This dataset was utilized in Task 2A to determine the total agricultural area, in square miles, within the existing 0.2% ACE floodplain. A similar exercise was performed to determine future impacted agricultural areas within the 0.2% ACE floodplain by intersecting existing agricultural areas with the future conditions 0.2% ACE floodplains delineated in Task 2B. For Task 3B, points were assigned for this subcategory based on the square miles of total impacted agricultural area for each HUC-12 watershed.

For this analysis, no additional agricultural areas were added under future conditions; the existing agricultural areas dataset was used to determine areas based on the future floodplain extent. Consideration of future agricultural areas could be evaluated in future flood planning cycles.

Quantity of Roadway Miles

The roadway segments dataset was provided by the TWDB on the Data Hub website. This dataset was utilized in Task 2A to determine the total number of roadway miles in the existing 0.2% ACE floodplain. A similar exercise was performed to determine roadway miles within the future 0.2% ACE floodplain by intersecting existing roadways within the future conditions floodplain delineated in Task 2B. For Task 3B, points were assigned for this subcategory based on the quantity of roadway miles within the 0.2% ACE floodplain for each HUC-12 watershed.

For this analysis, if a roadway intersected the existing 0.2% ACE floodplain, it was counted as flooded without consideration of roadway elevation due to a lack of consistent topographic data and the time required to extract roadway elevation information. Consideration of roadway elevation could be evaluated in future flood planning cycles. Furthermore, no additional roadways were added under future conditions; the existing roadway dataset was also used to determine roadway miles based on the future floodplain extent.

Number of Stream Crossings

Low water crossings were identified in Task 1 and were downloaded from the TWDB Data Hub website. This dataset was utilized in Task 2A to determine the total number of stream crossings in the existing 0.2% ACE floodplain. A similar exercise was performed to determine low water crossings within the future 0.2% ACE floodplain by intersecting number of existing low water crossings within the future conditions floodplain delineated in Task 2B. For Task 3B, the count of low water crossings within the 0.2% ACE floodplain for each HUC-12 watershed was used to assign points for this subcategory.

For this analysis, no low water crossings were added under future conditions. Consideration of future low water crossings could be evaluated in future flood planning cycles.

Critical Facilities

Critical facilities include but are not limited to fire stations, hospitals, shelters, schools, water and wastewater treatment plants, correctional facilities, aviation facilities, waste disposal facilities, power generation, and chemical manufacturing and processing facilities. The critical facilities footprints dataset was provided by the TWDB on the Data Hub website. This dataset was utilized in Task 2A to determine the total number of critical facilities in the existing 0.2% ACE floodplain. A similar exercise was performed to determine critical facilities within the future 0.2% ACE floodplain by intersecting existing critical facilities with the future conditions floodplains delineated in Task 2B. For Task 3B, points were assigned for this subcategory based on the count of existing critical facilities within the 0.2% ACE floodplain for each HUC-12 watershed.

For this analysis, if a critical facility was located within the existing 0.2% ACE floodplain, it was counted as flooded without consideration of structure elevation. Furthermore, no critical facility footprints were added under future conditions; the existing critical facility footprints dataset was also used to determine facility counts based on the future floodplain extents. Consideration of structure elevations could be evaluated in future flood planning cycles.

TABLE 3-4: TASK 3B SCORING CRITERIA – CATEGORY 1A: EXISTING CONDITIONS

Score (Points)		1	2	3	4	5
Area within the Floodplain (Square Miles)	Range	0-12.0	12.0-16.6	16.6-26.5	26.5-37.0	>37.0
	HUC-12 Count	23	24	24	24	25
Number of Structures in the Floodplain	Range	1-220	221-1,752	1,753-6,000	6,001-16,000	>16,000
	HUC-12 Count	24	23	23	25	23
Number of Critical Facilities in the Floodplain	Range	0	1-7	8-50	51-180	>180
	HUC-12 Count	30	23	22	21	22
Agricultural Areas in the Floodplain (Square Miles)	Range	0-1.54	1.54-2.50	2.50-4.31	4.31-8.80	>8.80
	HUC-12 Count	23	23	24	24	24
Quantity of Roadway Miles in the Floodplain	Range	0-10	10-32	33-102	103-300	>300
	HUC-12 Count	24	23	24	24	23
Number of Stream Crossings	Range	0-24	25-38	39-60	60-113	>113
	HUC-12 Count	25	22	25	23	23

TABLE 3-5: TASK 3B SCORING CRITERIA – CATEGORY 1B: FUTURE CONDITIONS

Score (Points)		1	2	3	4	5
Area within the Floodplain (Square Miles)	Range	0-13.0	13.0-17.8	17.8-28.5	28.5-40.0	>40.0
	HUC-12 Count	24	22	23	25	24
Number of Structures in the Floodplain	Range	0-250	251-1,900	1,901-6,500	6,501-20,000	>20,001
	HUC-12 Count	23	23	24	24	24
Number of Critical Facilities in the Floodplain	Range	0	1-6	7-55	56-230	>230
	HUC-12 Count	27	23	23	23	22
Agricultural Areas in the Floodplain (Square Miles)	Range	0-1.65	1.65-2.89	2.89-4.80	4.80-10.20	>10.20
	HUC-12 Count	24	24	24	23	23
Quantity of Roadway Miles in the Floodplain	Range	0-35.5	35.5-120	120-350	350-1,000	>1,000
	HUC-12 Count	23	23	25	24	23
Number of Stream Crossings	Range	0-27	28-44	45-67	68-117	>118
	HUC-12 Count	25	24	23	22	24

3.B.1.b. Current Floodplain Management and Land Use Policies and Infrastructure (Category 2)

Communities Participating in the NFIP

Communities participating in the Federal Emergency Management Agency’s National Flood Insurance Program were identified during Task 1 effort. Entities that participated in the NFIP were assigned a score of 1, indicating that they have a lower flood risk due to the regulations enforced by entities. Meanwhile, entities that did not participate were assigned a score of 5. HUC-level scores were then calculated using an area-weighted method based on the entities located within each watershed.

Communities with a Drainage Criteria Manual

Communities can regulate development utilizing drainage criteria manuals. These manuals are tools that can regulate detention and local drainage infrastructure. A list of drainage criteria manuals for the counties and communities within the San Jacinto region was compiled in ArcGIS, and then overlaid with

the HUC watershed boundaries. For this exercise, the documentation needed to explicitly be labeled as a Drainage Criteria Manual for the documentation to be considered. Entities with an adopted drainage criteria manual were assigned a score of 1, while entities without a drainage criteria manual were assigned a score of 5. HUC-level scores were calculated using an area-weighted method based on the entities located within each watershed.

Communities with Higher Floodplain Standards

When regulating development in a floodplain, communities can utilize higher floodplain standards than NFIP minimum standards to help reduce the risk of flooding. Higher standards are indicated by additional guidance documents and stricter requirements for new developments or significant redevelopment, such as requiring higher finished floor elevations. Communities with higher floodplain standards were identified utilizing the survey responses compiled in Task 1. Entities that adopted higher floodplain standards were assigned a score of 1, while entities without higher floodplain standards were assigned a score of 5. The score for each HUC was calculated using an area-weighted method based on the entities located within the watershed.

Rating of Practices for Communities

The rating of community practices was developed by reviewing the information compiled in Task 1 and confirming the floodplain management actions each community has in place. This included looking at whether communities maintain up-to-date procedures and follow adopted policies, or rely on informal practices when addressing development within the floodplain. Each community was assigned a score based on the overall strength of its documented practices. Scores reflect whether practices were clearly established or absent. The rating of floodplain management practices for each entity was categorized as strong, moderate, low, or null, and assigned scores of 1, 2, 3.5, and 5, respectively. The final score for each HUC was calculated using an area-weighted method based on the entities present within the watershed.

Level of Enforcement for Communities

The level of enforcement for communities was determined during Task 3A by reviewing how consistently local ordinances and requirements are applied. This assessment used any publicly available documentation that indicated how communities handle compliance and inspections. Communities that demonstrated regular enforcement of floodplain standards received higher scores, while those with minimal enforcement records received lower scores. The level of enforcement of floodplain management regulations for each entity was categorized as strong, moderate, low, or null, and assigned scores of 1, 2, 3.5, and 5, respectively. HUC-level scores were determined using an area-weighted method based on the entities within each watershed.

Communities with CRS Score

Communities with a FEMA Community Rating System score were identified using publicly available data from FEMA. A CRS score indicates that a community has adopted higher standards for floodplain management than the basic requirements for participation in the NFIP and is granted a discount on flood insurance premiums. The scores for this category were based on the CRS score received from

FEMA, ranked such that a lower CRS score (indicating stricter standards) garnered fewer points than a higher CRS score, in line with FEMA scoring requirements. Where HUC boundaries contained multiple CRS-participating communities, the score was calculated utilizing a weighted average of CRS score based upon the communities' area within a HUC watershed. CRS scores were converted to a five-point scale for consistency with other subcategories, where a CRS score of 5 received a score of 1, a CRS score of 6 received a score of 2, a CRS score of 7 received a score of 3, and a CRS score of 8 received a score of 4. Communities without a CRS score were assigned a score of 5.

TABLE 3-6: TASK 3B SCORING CRITERIA – CATEGORY 2

Subcategory						
Communities Participating in NFIP	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	Range of Scores	1	1.1-2.59	2.6-3.39	3.4-4.19	4.2-5
	HUC-12 Count	111	1	1	2	3
Communities with a Drainage Criteria Manual	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	Range of Scores	1-1.64	1.65-2.28	2.29-2.92	2.93-3.56	3.57-5
	HUC-12 Count	80	10	8	17	3
Communities with Higher Floodplain Standards	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	Range of Scores	1-1.8	1.81-2.6	2.61-3.4	3.41-4.2	4.21-5
	HUC-12 Count	108	3	2	0	5
Rating of Practices for Communities	Score Assumption	Strong=1	Mod=3.5	Low=4	N/A	Null=5
	Range of Scores	1-1.6	1.61-2.2	2.21-2.8	2.81-3.4	3.41-5
	HUC-12 Count	43	8	11	9	47
Level of Enforcement for Communities	Score Assumption	Strong=1	Mod=3.5	Low=4	N/A	Null=5
	Range of Scores	1-1.94	1.95-2.88	2.89-3.82	3.83-4.76	4.77-5
	HUC-12 Count	22	12	32	21	31
Communities with CRS Scores	Score Assumption	CRS 5 = 1	CRS 6 = 2	CRS 7 = 3	CRS 8 = 4	Null = 5
	Range of Scores	1-1.88	1.89-2.75	2.76-3.62	3.63-4.49	4.5-5

Subcategory						
	HUC-12 Count	9	18	13	17	61

3.B.1.c. Areas with Emergency Needs (Category 3)

With input from the RFPG, the following subcategories were included in the Task 3B emergency needs assessment:

- FEMA Repetitive Loss (RL)/Severe Repetitive Loss (SRL) data
- Critical facilities within the existing 0.2% ACE floodplain
- Hurricane evacuation routes, calculated in miles
- Early warning flood monitoring gauges
- Historical fatalities associated with floods and heavy rain

The FEMA RL/SRL data was taken from publicly available FEMA data for events from 2009 – 2015, the most recent year available. The data was overlaid with the HUC-12 boundaries to determine the number of structures that suffered damage during historical storm events within each HUC-12 watershed.

Critical facilities include but are not limited to fire stations, hospitals, shelters, schools, water and wastewater treatment plants, correctional facilities, aviation facilities, waste disposal facilities, power generation, and chemical manufacturing and processing facilities.

The critical facilities footprints dataset was provided by the TWDB on the Data Hub website. This dataset was utilized in Task 2A to determine the total number of critical facilities in the existing 0.2% ACE floodplain. Points were assigned for this subcategory based on the count of existing buildings within the 0.2% ACE floodplain for each HUC-12.

For this analysis, if a critical facility was located within the existing 0.2% ACE floodplain extents, it was counted without consideration of the structure elevation. Consideration of structure elevations could be evaluated in future flood planning cycles.

Hurricane evacuation route data was downloaded from the Houston-Galveston Area Council (H-GAC) website. The routes were overlaid with the existing conditions 0.2% ACE floodplain that was created during Task 2A to calculate miles of evacuation routes within each HUC-12 watershed. Watersheds with a greater quantity of evacuation route mileage received higher scores, indicating increased emergency needs.

Flood monitoring gauges were included to represent the availability of real-time hydrologic information for emergency response and decision-making. Gauge locations were overlaid with HUC-12 boundaries, and the total number of gauges within each watershed was calculated. Watersheds with a greater number of gauges received lower scores, while watersheds with fewer gauges received higher scores, reflecting reduced monitoring coverage and increased emergency vulnerability.

Historical fatalities were evaluated using available records associated with coastal flooding, hurricanes, severe storms, flash floods, lakeshore flooding, and heavy rainfall events that occurred within the most recent ten-year period from 2015 through 2025. Fatality data were aggregated at the HUC-12 watershed

level to capture recent patterns in emergency risk. Watersheds with fewer recorded fatalities received lower scores, while watersheds with higher fatality counts received higher scores, indicating increased emergency needs.

Scoring criteria for this category is shown in **Table 3-7**. The points from the five subcategories were averaged to get the total score for Category 3.

TABLE 3-7: TASK 3B SCORING CRITERIA – CATEGORY 3

Score (Points)		1	2	3	4	5
Repetitive Loss	Range	0	1-15	19-54	77-590	≥764
	HUC-12 Count	80	10	9	9	10
Hurricane Evacuation Routes (Miles)	Range	0	0.002-0.4	0.4-1.4	1.4-4.0	≥4.0
	HUC-12 Count	63	14	14	14	13
Critical Facilities	Range	0	1-7	8-44	45-175	≥176
	HUC-12 Count	30	23	21	22	22
Gauges	Range	11-58	7-10	3-6	1-2	0
	HUC-12 Count	20	24	20	21	33
Fatalities	Range	1	N/A	2	N/A	≥3
	HUC-12 Count	56	0	46	0	16

During a RFPG meeting, one suggestion was to track where emergency services personnel or vehicles have trouble reaching people in a time of need. However, this approach was not considered further in this cycle due to a lack of data. Additional research could be performed perhaps in the survey responses, in future flood planning cycles.

3.B.1.d. Existing Modeling Analyses and Flood Risk Mitigation Plans (Category 4)

To score this category, planning-related studies and documents were compiled for the region and associated with their corresponding entities, such as cities or counties. This category includes four subcategories: the presence of a Hazard Mitigation Plan (HMP), the presence of a watershed-wide study, the presence of a Master Drainage Plan (MDP), and the year in which the HMP was adopted.

Communities with Master Drainage Plans, Watershed Studies, and Hazard Mitigation Plans

Master Drainage Plans provide detailed technical information based on hydraulic and hydrologic modeling and floodplain mapping, including infrastructure level of service, local drainage conditions, mitigation alternatives, and implementation and policy recommendations. Watershed-wide planning studies, such as the Watershed Planning Studies completed by the Harris County Flood Control District

(HCFCD), similarly provide regional-scale analysis and identification of mitigation strategies. Hazard Mitigation Plans document identified hazards, vulnerabilities, and mitigation actions at the local or county level.

For the HMP subcategory, all entities within the region were considered to be covered by an HMP. If an entity did not have its own standalone HMP, it was assumed to fall under its respective county’s Hazard Mitigation Plan. As a result, all entities received an HMP score of 1 for this subcategory.

For the watershed study and MDP subcategories, entities were evaluated based on whether a study or plan was present. Entities with an identified watershed study received a score of 1, while those without a watershed study received a score of 5. The same scoring approach was applied to MDPs, where the presence of a Master Drainage Plan resulted in a score of 1 and the absence resulted in a score of 5.

Adopted Year of HMP

The fourth subcategory accounted for the year in which the HMP was adopted to reflect the relative recency of planning efforts. More recent plans were assigned lower scores, indicating more current planning, while older plans were assigned higher scores to reflect a greater potential need for updates. HMPs adopted in 2025 received a score of 1, plans from 2024 received a score of 2, plans from 2023 received a score of 3, plans from 2022 received a score of 4, and plans adopted in 2020 received a score of 5. Since entities are required to update their plans every 5 years, there were no plans found that were older than 2020.

All four subcategory scores were aggregated to the HUC-12 level using an area-weighted method, consistent with the approach used in other scoring categories. This method accounts for multiple entities within a single watershed by weighting each entity’s score based on the portion of its area located within the HUC-12 boundary.

The scoring for this category was structured such that HUC-12 watersheds with fewer planning documents or older hazard mitigation plans received higher scores, indicating a greater need for updated or additional planning efforts. Scoring criteria for this category are presented in **Table 3-8**.

TABLE 3-8: TASK 3B SCORING CRITERIA – CATEGORY 4

Subcategory						
Communities with a Master Drainage Plan	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	Range of Scores	1-1.99	2-2.99	3-3.99	4-4.99	5
	HUC-12 Count	23	19	14	49	13
Communities with a Watershed Study	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	Range of Scores	1-1.8	1.81-2.6	2.61-3.4	3.41-4.2	4.21-5
	HUC-12 Count	45	9	13	10	41

Subcategory						
Communities with a Hazard Mitigation Plan	Score Assumption	Yes=1	N/A	N/A	N/A	No=5
	HUC-12 Count	118	0	0	0	0
Adopted year of Hazard Mitigation Plan	Score Assumption	2025 = 5	2024 = 4	2023 = 3	2022 = 2	2020 = 5
	Range of Scores	1-1.99	2-2.99	3-3.99	4-4.99	5
	HUC-12 Count	20	45	8	34	11

3.B.1.e. Already Identified and Evaluated Flood Mitigation Projects (Category 5)

Flood mitigation projects documented during the previous Regional Flood Plan were compiled to understand how much work had already been initiated or evaluated within each watershed. These include projects listed in local drainage studies, county programs, and regional flood mitigation efforts. Each project was mapped and associated with its HUC watershed to determine the level of existing activity. For scoring, watersheds with fewer identified or active flood mitigation projects received higher scores, reflecting greater unmet need and less prior investment. Watersheds with a larger number of previously identified projects were given lower scores, since those areas have already undergone a greater level of planning or evaluation. The scoring approach for this category is summarized in **Table 3-9**.

TABLE 3-9: TASK 3B SCORING CRITERIA – CATEGORY 5

Score (Points)		1	2	3	4	5
Number of Active projects	Range	≥10	6-9	4-5	2-3	0-1
	HUC-12 Count	11	11	20	37	39

3.B.1.f. Historic Flooding Events (Category 6)

Number of FEMA Claims

To summarize flooding history in the San Jacinto region, redacted FEMA flood claims dating from 1975 through 2022 were obtained in tabular form. The data were redacted to remove street-level identifiers while retaining sufficient spatial information for regional analysis. Flood claims were overlaid with census tract boundaries to determine their general geographic location, and the census tracts were subsequently intersected with HUC-12 watershed boundaries. The number of claims was apportioned to each HUC-12 watershed based on the area of intersected census tracts. Points for this subcategory were assigned based on the total number of FEMA claims within each HUC-12 watershed, with a higher number of claims indicating greater historical flood impacts and corresponding to higher scores. Scoring criteria for this subcategory are shown in **Table 3-10**.

Damage Amount of FEMA Claims

The FEMA redacted flood claim dataset was also used to evaluate the total amount of damages paid within the region. Because the claims span several decades, with events dating back to the 1970s, all claim amounts were converted to 2022 dollars to ensure consistency and comparability across time. The conversion was performed using the Bureau of Labor Statistics Consumer Price Index, adjusting each claim based on the year in which it occurred. The spatial distribution of damage amounts was determined using the same methodology applied to the number of FEMA claims, with census tracts intersected with HUC-12 watershed boundaries and damages apportioned by area. For Task 3B, points were assigned based on the total inflation-adjusted dollar amount of FEMA claim payouts within each HUC-12 watershed, with higher total damages corresponding to higher scores. Scoring criteria for this subcategory are shown in **Table 3-10**.

FEMA Disaster Declarations

Flood related FEMA disaster declarations were included in the assessment to capture the frequency and severity of federally recognized hazard events affecting the region. Disaster declarations reflect large-scale flooding, coastal flooding, hurricanes, severe storms, and heavy rainfall events that exceed local response capabilities and require federal assistance. The number of FEMA disaster declarations associated with each HUC-12 watershed was determined by spatially associating declared events with watershed boundaries. Watersheds with a greater number of FEMA disaster declarations received higher scores to reflect repeated exposure to significant hazard events and elevated emergency response needs, while watersheds with fewer declarations received lower scores. Including FEMA disaster declarations provides important context beyond individual flood claims by highlighting areas that have experienced recurrent, high-impact events requiring federal intervention. Scoring criteria for this subcategory are shown in **Table 3-10**.

TABLE 3-10: TASK 3B SCORING CRITERIA – CATEGORY 6

Score (Points)		1	2	3	4	5
Number of Claims	Range	0	1-47	48-577	596-2411	≥2677
	HUC-12 Count	25	23	23	23	24
Cost of Claims	Range (\$1,000s)	0	0-1,370	1,714 - 25,147	25,833 -140,990	≥150,545
	HUC-12 Count	25	22	24	23	24
FEMA Declarations	Range	0-3	N/A	4	N/A	≥5
	HUC-12 Count	41	0	23	0	54

3.B.1.g. Already Implemented Flood Mitigation Projects (Category 7)

Ongoing construction projects that are being implemented were considered for this subcategory. Based on input from the RFPG or other publicly available information, a list of active construction projects was compiled. Most of these projects were HCFCF 2018 Flood Bond projects. The list of projects was created by cross-referencing bond project status lists with HCFCF's website. An ArcGIS shapefile was created which contained the general locations of these construction projects, associated with approximate boundaries such as for a city or watershed and intersected with the HUC-12 watershed boundaries to determine if construction projects were present within a HUC-12. The magnitude of a project, such as flood reduction amounts, was not included in the category due to variations in project calculations among projects. In future flood planning cycles, the magnitude of the project could also be considered.

The scoring for this category was established so that a HUC-12 watershed with no active construction projects has a higher score, indicating that projects should be recommended for implementation to reduce future flood risk. Scoring criteria for this category is shown in **Table 3-11**.

TABLE 3-11: TASK 3B SCORING CRITERIA – CATEGORY 7

Score (Points)		1	2	3	4	5
Number of Active projects	Range	72-105	61-71	7-60	4-6	2-3
	HUC-12 Count	23	23	24	26	22

3.B.1.h. Social Vulnerability Index and Population Density (Category 8)

Social Vulnerability Index relates to the potential negative effects on communities caused by external stresses on human health, which include natural or human-caused disasters such as floods and disease outbreaks. In the context of Task 3B, SVI is being used as a metric for assessing the vulnerability of communities. The CDC calculates the SVI at the census tract level within a specified county using 15 social factors including poverty, housing, ethnicity, and vehicle access. SVI is ranked on a scale of 0 to 1. Communities on the lower end of the score range have access to more resources and can recover more quickly after a natural disaster.

To support Task 2, the TWDB provided a regionwide building footprints feature class which contained SVI values provided by the CDC appended to each building record within the dataset. For Task 3B, the SVI values within these building records were spatially associated to a specific HUC-12 watershed and then an average SVI per HUC-12 was calculated. Points were assigned for this subcategory to reflect that higher SVI values correlate with a higher flood risk mitigation need, since high SVI areas tend to have greater difficulty recovering from natural disasters.

The RFPG requested that consideration of the impact of flooding on residents be included. Therefore, nighttime population density was added as a subcategory. The population values were obtained from the TWDB during Task 1. They were overlaid with the existing floodplains created in Task 2A. The total impacted population values in the existing 0.2% ACE floodplain using HUC-12 watershed population density were used to assign points. Scoring criteria for this category is shown in **Table 3-12**. The points from the two subcategories were averaged to get the total score for Category 8.

TABLE 3-12: TASK 3B SCORING CRITERIA – CATEGORY 8

Score (Points)		1	2	3	4	5
SVI	Range	0-0.50	0.50-0.595	0.596-0.705	0.705-0.860	>0.860
	HUC-12 Count	24	24	23	24	23
Nighttime Population Density	Range	0-220	221-2,400	2,401-11,200	11,201-60,200	>60,200
	HUC-12 Count	23	24	24	24	23

3.B.1.i. Areas Identified as Flood Map Gaps and Areas Without Hydrologic and Hydraulic Models (Category 9 and 10)

The analyses for mapping and modeling were combined for the purpose of Task 3B. It was assumed that areas with maps would have associated H&H models that would correlate in accuracy and age to the mapping level of detail and effective date. Model coverage within the region is shown in **Appendix 3B-1, Map 14**. For the scores within this category, regulatory FEMA maps were used, rather than watershed study or master drainage plan maps. The analysis was based on the most predominant map type and age within each HUC-12 watershed based on the following scale in order of most detailed to least detailed:

- MAAPnext or NFHL Effective Detailed 2018 and newer
- NFHL Effective Detailed 2014
- Base Level Engineering (BLE) 2018 and newer

The breakdown was created based primarily on the age of terrain data along with the level of mapping study detail. Scoring criteria for this category is shown in **Table 3-13**. Note that no HUC-12 watersheds in the San Jacinto region had only Zone A flood maps or no maps available. Because of the robustness of modeling and mapping within the region, no watersheds were assigned scores of 4 or 5. The MAAPnext models and maps produced for Harris County have greatly reduced the gaps in flood risk information since Cycle 1.

TABLE 3-13: TASK 3B SCORING CRITERIA – CATEGORIES 9 AND 10

Score (Points)		1	2	3	4	5
Map Description	Range	MAAPnext or NFHL Detailed Effective (2018+)	NFHL Detailed Effective (2014)	BLE	N/A	N/A
	HUC-12 Count	55	37	26	0	0

3.B.2. Analysis Results

The HUC scoring methodology described above was implemented across the entire San Jacinto region to address the two goals of Task 3B. The first goal is to identify areas where the greatest flood risk

knowledge gaps exist. The Flood Map Gap/Hydrologic and Hydraulic Modeling (Category 9/10) and Existing Modeling Analysis (Category 4) categories were selected as the basis for identifying these areas.

To create the flood risk knowledge gap maps, the scores from Categories 9/10 and 4 were added for each HUC. The resulting scores are illustrated in **Appendix 3B-2, Map 15**, with areas of the most flood risk knowledge gaps shown in red.

The results of this preliminary assessment show that much fewer portions of the San Jacinto region have both inadequate mapping/hydrologic and hydraulic models compared to Cycle 1. HCFCD is currently in the process of updating all the floodplain maps within Harris County through the Modeling, Assessment, and Awareness (MAAPnext) project. Adoption of these maps is anticipated to occur imminently, and therefore, they were considered adopted for the Cycle 2 effort.

A large portion of the high knowledge gap area is in the northern part of the region, which reflects older mapping, models, and few, if any, Master Drainage Plans. With development spreading from Houston to the west and north, these areas should be reviewed to reduce their knowledge gap score.

The second goal of Task 3B is to determine the areas of greatest known flood risk and flood mitigation needs. For each HUC-12 watershed in the San Jacinto region, the scores across the remaining categories were added to obtain a total score. All categories have equal representation in the total score; however, the composite score for Category 1 was weighted 70% for existing conditions and 30% for future conditions. The resulting scores are illustrated in **Appendix 3B-3, Map 16**, with areas of the greatest known flood risk and flood mitigation needs shown in red. It is important to note the fact that a HUC-12 watershed that resulted in a low score does not necessarily mean that there is no flood risk in this area, only that flood risk is lower when compared to other watersheds in the San Jacinto region.

HUC-12 watersheds determined by this analysis to have high flood risk are distributed throughout the San Jacinto region, but especially in the middle and southern portions of the region. This includes large portions of the City of Houston, as well as the Cities of Pearland, League City, Texas City, and Galveston. Harris, Brazoria, and Galveston Counties are among the areas determined to have the highest flood risk.

Each of these areas tends to score high from a combination of risk factors. For instance, areas in Harris County score high due to the higher population and number of buildings and critical facilities in the floodplain as well as magnitude of flood claims. Watersheds in the southern (coastal) portions of the region also score high due to the vast areas of floodplains present in those areas.

Ultimately, the results of Task 3B assisted the RFPG with subsequent efforts in addressing flood risk knowledge gaps and high flood risk mitigation needs. **Map 15** identifies areas with high flood knowledge gap scores in the San Jacinto region where watershed studies (FMEs) should be prioritized and added to the regional flood plan. **Map 16** in **Appendix 3B-3** identifies areas where the RFPG should strive to identify and implement FMSs and FMPs to reduce the known flood risks within those areas.

Chapter 3.C. Flood Mitigation and Floodplain Management Goals

The objective of Task 3C is to define and select a series of goals that will serve as the drivers of the regional flood planning effort. The RFPG must identify goals that are specific and achievable and, when implemented, will demonstrate progress toward the overarching goal for the statewide planning effort. The overarching goal of all RFPs is to protect against the loss of life and property. Identifying SMART

goals (Specific, Measurable, Attainable, Relevant, and Time-bound) will allow the San Jacinto RFPG to track progress toward reducing flood risk to life and property in the San Jacinto region. To help guide the overall approach and recommendations in the plan, every project, evaluation, and strategy to mitigate flood risk identified will be associated with adopted and defined goals. Per TWDB requirements and guidelines, the goals selected by the RFPG must include the information listed below:

- Description of the goal
- Term of the goal set at 10 years (short-term) or 30 years (long-term)
- Extent or geographic area to which the goal applies
- Residual risk that remains after the goal is met
- Measurement method that will be used to measure goal attainment
- Association with overarching goal categories.

3.C.1. Adoption of Flood Mitigation and Floodplain Management Goals

The RFPG utilized the assessment of current floodplain management and land use practices from Task 3A, as well as the existing and future condition flood risk analyses from Task 2, to guide the development of the goals for the region.

During the August 2025 San Jacinto RFPG meeting, updates to the data requirements of goals were presented. These updates included the addition of defining Goal Themes, Status of Goals, and Percent Complete which help identify progress. During the meeting, progress towards these 1st cycle goals was also presented to the group. The updates and progress for each first cycle goal are detailed in **Table 3-14** below.

TABLE 3-14: FIRST CYCLE GOAL UPDATES

Goal ID	Goal	Percent of Goal Complete	Status Description
06-20-0000000001	There will be 0 flood-related fatalities annually within the San Jacinto region by 2053.	0	No Change to Goal 1 death in Harris County in Houston, TX on July 8, 2024.
06-20-0000000002	Increase the value of state and federal funds awarded within the San Jacinto Region by 10%.	100	Status Complete, Adopt New Goal Clarifying Baseline and Type of Funds (New Goal 06-20-0000000017) 15 FIF Projects; \$64,450,947 committed funds as of August 2025.
06-20-0000000003	Reduce the miles of major roadways subject to inundation during the 100-year event by 10% by 2033.	0	No Change to Goal Estimated Risk Reduction of Roadway Miles if Every FMP is Implemented: 1,949 Total Roadway Miles: 4,350 Theoretical Percent: 45%
06-20-0000000004	Reduce the miles of major roadways subject to inundation during the 100-year event by 25% by 2053.	0	No Change to Goal Estimated Risk Reduction of Roadway Miles if Every FMP is Implemented: 1,949 Total Roadway Miles: 4,350 Theoretical Percent: 45%

Goal ID	Goal	Percent of Goal Complete	Status Description
06-20-0000000005	Increase the number of public entities that invest in stormwater infrastructure and planning by 10% by 2033.	65	No Change to Goal FMEs elevated to FMPs Progress documented based on 93 Flood Regulatory Authorities
06-20-0000000006	Increase the number of entities that invest in stormwater infrastructure and planning by 25% by 2053.	26	No Change to Goal FMEs elevated to FMPs Progress documented based on 93 Flood Regulatory Authorities
06-20-0000000007	All flood regulatory authorities within the region will adopt standards equal to or exceeding minimums as recommended by the San Jacinto RFPG.	82	Update Goal to reflect second cycle minimum standards Flood Regulatory Authorities with Higher Standards: 76 Total Flood Regulatory Authorities: 93
06-20-0000000008	Improve interjurisdictional coordination through participation in the SJRF Planning process. Target to ensure that 50% of identified stakeholders complete the SJRFP stakeholder survey and provide data for inclusion in the RFP by 2033.	23	No Change to Goal Stakeholders Involved: 125 Total number of Entities: 1,101 Goal is based on 50%
06-20-0000000009	Improve interjurisdictional coordination through participation in the SJRF Planning process. Target to ensure that 90% of identified stakeholders complete the SJRFP stakeholder survey and provide data for inclusion in the RFP by 2053.	13	No Change to Goal Stakeholders Involved: 125 Total number of Entities: 1,101 Goal is based on 90%
06-20-0000000010	Expand the understanding of flood risk in the San Jacinto region.	100	Status Complete Region Mapped by Atlas 14
06-20-0000000011	Reduce the number of critical facilities subject to inundation during the 100-year event by 5% by 2033.	0	No Change to Goal Estimated Risk Reduction of Critical Structures if Every FMP is Implemented: 2,425 Total Critical Structures: 3,185 Theoretical Percent: 76%
06-20-0000000012	Reduce the number of critical facilities subject to inundation during the 100-year event by 20% by 2053.	0	No Change to Goal Estimated Risk Reduction of Critical Structures if Every FMP is Implemented: 2,425 Total Critical Structures: 3,185 Theoretical Percent: 76%
06-20-0000000013	At least 35% of all flood mitigation strategies (FMSs) and flood mitigation projects (FMPs) identified within the regional flood plan will incorporate nature-based practices by 2033.	11	No Change to Goal 2 out of 106 Recommended FMPs with NBS Practices 5 out of 76 Recommended FMSs with NBS Practices Goal is based on 35%
06-20-0000000014	At least 90% of flood mitigation strategies (FMSs) and flood mitigation	4	No Change to Goal 2 out of 106 Recommended FMPs with NBS

Goal ID	Goal	Percent of Goal Complete	Status Description
	projects (FMPs) identified within the regional flood plan will incorporate nature-based practices by 2053.		Practices 5 out of 76 Recommended FMSs with NBS Practices Goal is based on 90%
06-20-0000000015	Reduce the number of structures subject to inundation during the 100-year event by 25% by 2053.	0	No Change to Goal Estimated Risk Reduction of Structures if Every FMP is Implemented: 71,812 Total Structures: 240,093 Theoretical Percent: 30%

Additionally, San Jacinto RFPG feedback was solicited at both the July 2025 Technical Committee meeting and the August San Jacinto RFPG meeting, where three new goals were proposed to be adopted. Throughout the goal development process, the Technical Committee, San Jacinto RFPG members, and members of the public were able to provide feedback and comments during multiple public meetings as well as direct comments to the Technical Consultant. After careful consideration, the San Jacinto RFPG adopted the updated first cycle goals as well as the addition of two new goals (06-20-0000000016 and 06-20-0000000017) by a simple majority of voting members present at its planning committee meeting held on September 11, 2025. The final goal (06-20-0000000018) was adopted by the San Jacinto RFPG at the planning committee meeting held on November 13, 2025. These goals are all listed in **Table 11** of **Appendix 3C-1**.

3.C.2. Transformed and Residual Risk

Flood risk will be reduced by the implementation of the actions and construction of the projects necessary to achieve the identified goals. However, the San Jacinto RFPG acknowledges that it is not possible to protect against all potential flood risk. The RFPG has determined the residual and transformed flood risk remaining in the San Jacinto region after each goal is achieved. Residual risk is defined as the risk remaining after the execution of a flood mitigation action, while transformed risk is defined by U.S. Army Corps of Engineers (USACE) as the change in the nature of flood risk for some areas that is associated with the presence of flood hazard reduction infrastructure. For example, a community within the region could choose to construct new flood infrastructure that protects buildings up to the 1% ACE flood elevation. However, the residual risk associated with this action would be that the new infrastructure does not protect buildings for events that exceed the 1% ACE. Using the same scenario, while the new flood infrastructure helps mitigate the flood risk previously posed by the 1% ACE, the risk is now "transformed" into a risk of structural failure of the flood infrastructure, whether it be by a larger storm event or lack of future maintenance. The risk intended to be addressed by the adopted goal combined with the residual and transformed risk represents the totality of flood risk faced in the San Jacinto region. An explanation of residual risk and the measurement method that will be used to determine the progress towards achieving each adopted goal are listed in **Appendix 3C-1**.

3.C.3. Goals as a Guide for the Regional Flood Plan

The selected specific goals will guide the development of the FMSs, FMEs, and FMPs for the San Jacinto region. They build upon TWDB regional flood planning guidance and provide a comprehensive

framework for future strategy development focused on reducing flood risk to people and property, while not negatively affecting neighboring areas.

An abbreviated list of adopted RFP goals is provided in **Table 3-15**. The complete description of adopted goals by the RFPG are included in **Appendix 3C-1**.

TABLE 3-15: ADOPTED FLOOD PROTECTION GOALS

Goal ID	Goal	Term of Goal	Target Year	Metric
06-20-0000000001	There will be 0 flood-related fatalities annually within the San Jacinto region by 2053.	Long Term (30-year)	2053	Number of direct flood-related fatalities
06-20-0000000002	Increase the value of state and federal funds awarded within the San Jacinto Region by 10%.	Short Term (10-year)	2033	State and federal funds awarded to communities within the San Jacinto region
06-20-0000000003	Reduce the miles of major roadways subject to inundation during the 100-year event by 10% by 2033.	Short Term (10-year)	2033	Number of miles of major thoroughfares subject to 100-year flood risk
06-20-0000000004	Reduce the miles of major roadways subject to inundation during the 100-year event by 25% by 2053.	Long Term (30-year)	2053	Number of miles of major thoroughfares subject to 100-year flood risk
06-20-0000000005	Increase the number of public entities that invest in stormwater infrastructure and planning by 10% by 2033.	Short Term (10-year)	2033	Number of public entities that dedicate funding towards stormwater infrastructure and planning
06-20-0000000006	Increase the number of entities that invest in stormwater infrastructure and planning by 25% by 2053.	Long Term (30-year)	2053	Number of public entities that dedicate funding towards stormwater infrastructure and planning
06-20-0000000007	All flood regulatory authorities within the region will adopt standards equal to or exceeding minimums as recommended by the San Jacinto RFPG.	Short Term (10-year)	2033	Number of flood regulatory authorities that adopt standards equal to or exceeding recommended minimums by the RFPG in the second cycle
06-20-0000000008	Improve interjurisdictional coordination through participation in the SJRF Planning process. Target to ensure that 50% of identified stakeholders complete the SJRFP stakeholder survey and provide data for inclusion in the RFP by 2033.	Short Term (10-year)	2033	Number of identified stakeholders who submit survey responses or provide data for inclusion in the San Jacinto Regional Flood Plan
06-20-0000000009	Improve interjurisdictional coordination through participation in the SJRF Planning process. Target to ensure that 90% of identified stakeholders complete the SJRFP stakeholder survey and provide data for inclusion in the RFP by 2053.	Long Term (30-year)	2053	Number of identified stakeholders who submit survey responses or provide data for inclusion in the San Jacinto Regional Flood Plan
06-20-0000000010	Expand the understanding of flood risk in the San Jacinto region.	Short Term (10-year)	2033	Percentage of the floodplain quilt, by studied stream length, that is based on NOAA Atlas 14 rainfall data
06-20-0000000011	Reduce the number of critical facilities subject to inundation during the 100-year event by 5% by 2033.	Short Term (10-year)	2033	Number of critical facilities subject to 100-year flood risk
06-20-0000000012	Reduce the number of critical facilities subject to inundation during the 100-year event by 20% by 2053.	Long Term (30-year)	2053	Number of critical facilities subject to 100-year flood risk

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Goal ID	Goal	Term of Goal	Target Year	Metric
06-20-0000000013	At least 35% of all flood mitigation strategies (FMSs) and flood mitigation projects (FMPs) identified within the regional flood plan will incorporate nature-based practices by 2033.	Short Term (10-year)	2033	Number of FMSs and FMPs that incorporate nature-based practices as defined within the San Jacinto Regional Flood Plan
06-20-0000000014	At least 90% of flood mitigation strategies (FMSs) and flood mitigation projects (FMPs) identified within the regional flood plan will incorporate nature-based practices by 2053.	Long Term (30-year)	2053	Number of FMSs and FMPs that incorporate nature-based practices as defined within the San Jacinto Regional Flood Plan
06-20-0000000015	Reduce the number of structures subject to inundation during the 100-year event by 25% by 2053.	Long Term (30-year)	2053	Number of structures subject to 100-year flood risk
06-20-0000000016	Collect 75% of infrastructure data from flood regulatory authorities by 2038.	Short Term (10-year)	2038	Number of flood regulatory authorities providing infrastructure data through survey and outreach efforts
06-20-0000000017	Increase the FIF funds awarded within the San Jacinto Region by 10% based on \$65 million previously awarded as of August 2025.	Short Term (10-year)	2038	FIF funds awarded to communities within the San Jacinto region
06-20-0000000018	Increase the number of entities regulating floodplains based on Atlas 14 rainfall data to 100%.	Short Term (10-year)	2038	Number of flood regulatory authorities with adopted and regulated floodplains based on NOAA Atlas 14 rainfall data