

**NOTICE OF OPEN MEETING OF THE SAN ANTONIO REGIONAL FLOOD PLANNING
GROUP**

Region 12 San Antonio RFPG

12/16/2021

2:00 PM

TAKE NOTICE that a meeting of the San Antonio Regional Flood Planning Group as established by the Texas Water Development Board, will be held on Thursday, December 16, 2021, at 2:00 PM, in-person at the San Antonio River Authority Board room, located at 201 W. Sheridan St. and virtually on GotoMeeting at <https://global.gotomeeting.com/join/238516701>. You may also dial into the meeting on your phone at +1 (312) 757-3121, access code: 238-516-701

- Agenda:**
1. (2:00 PM) Roll-Call
 2. Public Comments – limit 3 minutes per person
 3. Approval of the Minutes from the Previous San Antonio Regional Flood Planning Group Meeting (Region 12)
 4. Communications from the Texas Water Development Board (TWDB)
 5. Chair Report
 6. Updates from Region 12 Subcommittees
 7. Discussion and Appropriate Action Regarding the Consultant's Work and Schedule
 - a. Task 4B - Identification and Evaluation of Potential FME's, FMS's, and FMP's
 - i. RFPG Action on Proposed Process
 8. Regional Liaison Update
 9. Public Comments - limit 3 minutes per person
 10. Date and Potential Agenda Items for Next Meeting
 11. Adjourn

If you wish to provide written comments prior to or after the meeting, please email your comments to khayes@sariverauthority.org or physically mail them to the attention of Kendall Hayes at San Antonio River Authority, 201 W. Sheridan, San Antonio, TX, 78204 and include "Region 12 San Antonio Flood Planning Group Meeting" in the subject line of the email.

Additional information may be obtained from: Kendall Hayes (210) 302-3641, khayes@sariverauthority.org, San Antonio River Authority, 201 W. Sheridan, San Antonio, TX.

Meeting Minutes
Region 12 San Antonio Regional Flood Planning Group Meeting
Tuesday, November 16, 2021
4:00 PM
San Antonio River Authority

Roll Call:

<u>Voting Member</u>	<u>Interest Category</u>	<u>Present (x) /Absent () / Alternate Present (*)</u>
Brian Yanta	<i>Agricultural interests</i>	X
David Wegmann	<i>Counties</i>	X
Derek Boese	<i>River authorities</i>	X
Doris Cooksey	<i>Electric generating utilities</i>	
Deborah (Debbie) Reid	<i>Environmental interests</i>	X
Nefi M. Garza	<i>Flood districts</i>	X
Cara C. Tackett	<i>Industries</i>	
Jeffrey Carroll	<i>Municipalities</i>	X
John Paul Beasley	<i>Public</i>	X
Suzanne B. Scott	<i>Nonprofit</i>	X
Steve Gonzales	<i>Small business</i>	X
David Mauk	<i>Water districts</i>	X
Steve Clouse	<i>Water utilities</i>	

<u>Non-voting Member</u>	<u>Agency</u>	<u>Present(x)/Absent()/ Alternate Present (*)</u>
Marty Kelly	Texas Parks and Wildlife Department	*Adam Whisenant
James Guin	Texas Division of Emergency Management	
Jami McCool	Texas Department of Agriculture	X
Jarod Bowen	Texas State Soil and Water Conservation Board	
Kris Robles	General Land Office	X
Anita Machiavello	Texas Water Development Board (TWDB)	X
Susan Roberts	Texas Commission on Environmental Quality	

Quorum:

Quorum: **Yes**

Number of voting members or alternates representing voting members present: **10**

Number required for quorum per current voting positions of 12: **7**

All meeting materials are available for the public at: <http://www.region12texas.org>.

AGENDA ITEM NO.1: ROLL CALL

Ms. Kendall Hayes, San Antonio River Authority, called the role and confirmed a quorum.

AGENDA ITEM NO.2: PUBLIC COMMENT – LIMIT 3 MINUTES PER PERSON

Ms. Sadie Smeck, Sunset Commission, introduced herself, explained the role of the Sunset Commission, and invited members to participate in the evaluation.

AGENDA ITEM NO.3: APPROVAL OF THE MINUTES FROM THE SEPTEMBER 21, 2021, SAN ANTONIO REGIONAL FLOOD PLANNING GROUP MEETING (REGION 12)

Mr. Wegmann motioned to approve the minutes. Ms. Scott seconded the motion, motion passed.

AGENDA ITEM NO.4: APPROVAL OF THE MINUTES FROM THE PREVIOUS SAN ANTONIO REGIONAL FLOOD PLANNING GROUP MEETING (REGION 12)

Mr. Boese motioned to approve the minutes. Ms. Reid seconded the motion, motion passed.

AGENDA ITEM NO.5: COMMUNICATIONS FROM THE TEXAS WATER DEVELOPMENT BOARD (TWDB)

Ms. Machiavello provided an update. Tech Memo deliverable due on January 7th.

AGENDA ITEM NO.6: CHAIR REPORT

Chair Garza provided an update on the City of San Antonio's active Bond review process. He encouraged members to participate in the next meeting on December 1st.

AGENDA ITEM NO.7: UPDATES FROM REGION 12 SUBCOMMITTEES

Mr. Boese provided an update on the Technical Subcommittee. He will serve as Chair. Debbie was nominated as vice chair. Steve Clouse was nominated as secretary. The committee discussed the guiding principles and legislation.

Ms. Scott provided an update on the Outreach Subcommittee. The committee discussed the goals as well.

AGENDA ITEM NO.8: DISCUSSION REGARDING THE CONSULTANT'S WORK AND SCHEDULE

Mr. Ron Branyon, HDR, provided an update on the current efforts of the consulting team, with a focus on Tasks 3A and 3B. HDR's presentation and the recording for this meeting can be found on the Region 12 website at <http://www.region12texas.org>.

Mr. Boese motioned to approve the goals stated in Task 3B as amended by the committee today. Ms. Scott seconded the motion, motion passed.

AGENDA ITEM NO.9: NEGOTIATE AND EXECUTE RFP CONTRACT AMENDMENTS

Mr. Wegmann motioned to authorize the planning group sponsor to negotiate and execute an amendment to the Regional Flood Planning Group Grant Contract with the TWDB to incorporate additional funding for the first cycle regional flood planning, including necessary revisions to the contract scope of work and budget. Mr. Beasley seconded the motion, motion passed.

Mr. Wegmann motioned to authorize the planning group sponsor to negotiate and execute an amendment to the Regional Flood Planning Group Grant Contract with the technical consultant to incorporate additional funding for the first cycle regional flood planning, including necessary revisions to the contract scope of work and budget. Ms. Reid seconded the motion, motion passed.

AGENDA ITEM NO.10: PRESENTATION BY PLANNING GROUP SPONSOR ON CURRENT BUDGET EXPENSES TO DATE

Ms. Hayes provided an update to the planning group. There have been no invoices to this date. The technical consultant will be invoicing the River Authority in the coming weeks.

AGENDA ITEM NO.11: REGIONAL LIAISON UPDATES

Mr. Mauk provided an update on Region 13. They have been actively working in their subcommittees. He will decimate information from their technical subcommittee to the Region 12 planning group.

AGENDA ITEM NO. 12: PUBLIC COMMENTS:

Ms. Mary Johnson provided a public comment. She brought attention to San Antonio's inner city flooding issues within several neighborhoods.

AGENDA ITEM NO. 13: POTENTIAL DATE AND AGENDA ITEMS FOR NEXT MEETING

Next planning group meeting date is December 16, 2021, at 2:00 PM. The technical consultants will present Task 4A and 4B. The January meeting will be January 4, 2022, at 10:00 AM.

AGENDA ITEM NO. 14: ADJOURN

Mr. Boese motioned to adjourn. Ms. Reid seconded the motion, the motion passed. Meeting adjourned at 5:49 PM.



SARFPG Meeting

December 16, 2021



Agenda

- Schedule
- Outreach Update
- Task 4 Discussion

Critical Path Schedule

Task 3B – Goals Approval – November Meeting - **11/16/2021**



Task 4B – Approve Methodology – **December 16th RPG Meeting**

Review Draft Memo – **Provide to RFPG by e-mail Dec 17th – Comments due 12/31/2021**

Approve Draft Memo – **January 4th RFPG Meeting**

Technical Memo Due to TWDB – **January 7, 2022**

Outreach Update

- December 9th Public and Stakeholder Meeting – Bandera, TX
- January 11th Public Meeting – St. Hedwig, TX

SHARE YOUR FEEDBACK, BANDERA COUNTY!

REGION 12 FLOOD PLANNING PUBLIC MEETING

WHEN: Dec. 9, 2021, 10-11:30 a.m.

WHERE: Bandera County River Authority & Groundwater Conservation District
440 FM 3240, Bandera, TX 78003



SAN ANTONIO REGIONAL FLOOD PLANNING GROUP
Region12Texas.org
(210) 227-1373

Task 4A Flood Mitigation Needs Analysis

- Flood Needs Analysis Based On:
 - Flood prone areas identified in Task 2A/2B
 - Task 2A/2B Quick Status Update
 - Areas that don't have inundations maps
 - Areas with emergency need
 - Documented historic flooding

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

What is an FMP, FME and FMS?

☐ FMP – Flood Mitigation Project

- ☐ Structural - Bridges, culverts, storm drain, regional detention, nature-based projects
- ☐ Non-structural – Property or easement acquisition, flood warning system, flood proofing

☐ FME – Flood Mitigation Evaluation

- ☐ H&H Modeling, Flood Mapping Updates, Flood studies

☐ FMS – Flood Mitigation Strategy

- ☐ Proposed plan to mitigate flood hazard
 - ☐ Floodplain Managers Toolbox

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

- **Step 1:** FMP, FME, FMS Initial Screening
 - Related to a floodplain management goal
 - Meets emergency need
 - Drainage area of 1 square mile or greater
 - Reduces risk for the 100-year (1% annual chance) flood
 - Exemptions for critical facilities, transportation routes, other

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

- Step 2-1: FMP Screening – Flow Chart
 - No negative effect – Section 3.6 Technical Guidelines
 - Sufficient Data – Section 3.9 Technical Guidelines

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

- Step 2-2: FME Screening
 - Planning-level cost estimate
 - Willing sponsor
 - Identify structures, population, critical facilities, roadways, agricultural lands that are at risk in the study area

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

- Step 2-3: FMS Screening
 - Planning-level cost estimate
 - Willing sponsor
 - Quantifies the estimated flood risk being addressed and potential level of flood reduction

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations, Strategies and Projects

- **Step 3:** Tie FMPs, FMEs, FMSs to Goals developed in Task 3B
- **Step 4:** Detailed Evaluations of FMPs, FMEs, FMSs
 - Benefit-Cost Ratio greater than 1.0
 - Willing sponsor verified
 - No known insurmountable constraints or hurdles
- **Step 5:** Final Recommendation
 - Public Comment



Any Questions

Contact info: Ron Branyon
Email: Ronald.branyon@hdrinc.com
Phone: 210.912.7105

3.6 Definition of negative impact guidelines

One requirement placed on the Board in considering a Regional Flood Plan is whether the Plan affects a neighboring area. If the Board determines that an element of a Regional Flood Plan does negatively affect a neighboring area, the Board must coordinate with the affected area to adjust the plan to ensure that no neighboring area is negatively affected by the Plan as described in Texas Water Code 16.062(h) and (i). Additionally, the TWDB rules include a definition of Negative Effect to mean, “An increase in flood-related risks to life and property, either upstream or downstream of the proposed project. The RFPG may adopt a standard that is more restrictive than the standard provided in TWDB Technical Guidelines.” 31 TAC 361.10. Recognizing that “negative effect” or “negatively affect” are not terms commonly used among flood planning professionals, this Guidance document uses the term, “Negative Impact” to meet the intent and requirements of the Texas Water Code and TWDB rules.

In developing these guidelines, the TWDB had a survey performed of various entities across Texas on what they consider to constitute “no negative impact”. Based on the responses, research, and professional engineering experience the following information summarizes some examples of minimum and most stringent specifications regarding no negative impact that are already being used by entities in Texas. Although not specifically asked in the questionnaire, the specifications include considerations for one-dimensional (1D) and two-dimensional (2D) analysis. Many jurisdictions do not currently have regulations or standards regarding no negative impact. The table below excludes the jurisdictions that do not have regulations, and thus does not list ‘no minimum standards’ as a minimum.

Table 21: No negative impact Specifications already used by entities in Texas for the 100-year flood

Measurement	Minimum	Most Stringent
Water Surface Elevation – 1D Analysis	Maximum Increase of Water Surface Elevation = 1.0 foot at computation cross-sections	Maximum Increase of Water Surface Elevation = 0.0 feet at computation cross-sections
Water Surface Elevation – 2D Analysis	Maximum Increase of Water Surface Elevation = 0.5 feet in all computation cells	Maximum Increase of Water Surface Elevation = 0.0 feet in all computation cells
Discharge	Discharge increases are allowed as long as the water surface elevation increase does not exceed 1.0 feet	Maximum Increase in Discharge = 0.0 cubic feet/ second (cfs)
Velocity	Velocity increases are allowed as long as the water surface elevation increase does not exceed 1.0 feet	Maximum Increase in Velocity = 0.0 ft/second (fps)
Valley Storage / Flood Volume	Flood volume losses are allowed as long as the water surface elevation increase does not exceed 1.0 feet	Loss of Valley Storage / Flood Volume = 0.0 NCTCOG Corridor Development Certificate
Downstream Conveyance / Capacity	Must not exceed downstream conveyance or capacity	Downstream conveyance or capacity must have 1.0 feet of freeboard or no pressure flow in storm drainage systems

Using this information, the sections below provide recommended considerations to reduce the potential for negative impacts and meet the statutory requirement to: “...*not negatively affect a neighboring area*,” particularly as a result of structural flood mitigation projects.

3.6.A Definition

As stated by the Association of State Floodplain Managers in its white paper titled *NAI – No Adverse Impact Floodplain Management*, the minimum National Flood Insurance Program (NFIP) requirements standards, “were designed for the purposes of an insurance program and not necessarily to control escalating flooding” (Association of State Floodplain Managers, 2008). In accordance with the statutory requirement that a Regional Flood Plan not negatively affect a neighboring area, the recommended definition of No Negative Impact is as follows.

No Negative Impact means that a project will not increase flood risk of surrounding properties. Using best available data, the increase in flood risk must be measured by the 1 percent annual chance event water surface elevation and peak discharge. It is recommended that no rise in water surface elevation or discharge should be permissible and that the analysis extent must be vast enough to prove proposed project conditions are equal to or less than the existing conditions.

For the purposes of flood planning effort, a determination of **no negative impact** can be established if stormwater does not increase inundation of infrastructure such as residential and commercial buildings and structures.

Additionally, all of the following requirements should be met to establish **no negative impact**, as applicable:

1. Stormwater does not increase inundation in areas beyond the public right-of-way, project property, or easement.
2. Stormwater does not increase inundation of storm drainage networks, channels, and roadways beyond design capacity.
3. Maximum increase of 1D Water Surface Elevation must round to 0.0 feet (< 0.05ft) measured along the hydraulic cross-section.
4. Maximum increase of 2D Water Surface Elevations must round to 0.3 feet (< 0.35ft) measured at each computational cell.
5. Maximum increase in hydrologic peak discharge must be < 0.5 percent measured at computational nodes (sub-basins, junctions, reaches, reservoirs, etc.). This discharge restriction does not apply to a 2D overland analysis.

The RFPGs have flexibility to consider and accept additional ‘negative impact’ for requirements 1 through 5 listed above based on engineer’s professional judgement and analysis given any affected stakeholders are informed and accept the impacts. This should be well-documented and consistent across the entire region. Flexibility regarding negative impact remains subject to TWDB review.

The RFPGs must consider cumulative negative impacts of multiple projects if accepting any negative impact.

The no negative impact defined here is for the purpose of flood planning. This does not have any regulatory impact in relation to any FEMA, local or other regulatory requirements due to the approximate nature of planning.

The values in the table above reflect guidance for the 100-year flood, and flood planning efforts are generally focused on the 100-year assessment and mitigation. However, to ensure ‘no negative impact’ other storm frequencies analyzed during the planning process should also adhere to the maximum tolerances listed above. It is understood that models that assess impact at the planning level may subsequently undergo multiple revisions as specific mitigation actions proceed through preliminary design, final design, and even construction. At any of these future stages the modeling results may create more or less impact potential thus altering costs or designs, and in the most extreme cases

perhaps cause what was previously considered to be a feasible project during planning to no longer be feasible during design. RFPs are thus strongly encouraged to assess the reasonableness of impact assessments at the planning level and do their best to anticipate potential future issues related to flood impact.

3.6.B Impact analysis checklist

An engineer's certification of no negative impact is required. It is also recommended that the supporting engineering report should include discussion of the following topics.

1. Description of the Analysis – Specific data for the analysis is located in the Modeling and Mapping Recommendations Memorandum.
2. Description of the Proposed Improvements – Including maps of existing and proposed project flood/drainage components.
3. Impacts of the Proposed Improvements – Including a description of the conditions prior to mitigation and alternatives analysis to evaluate impacts.
4. Description of Mitigation Measures – Including graphics/tables quantifying the existing condition flood risk in relation to the proposed condition flood risk.
5. No Negative Impact Certification

3.6.C Mitigation measures

Mitigation measures including but not limited regional detention, drainage easement or right of way acquisition may be utilized to alleviate negative impact. Projects with design level mitigation measures may be included in the regional flood plans and could be finalized at a later stage to conform to the 'No Negative Impact' requirements prior to funding or execution of project. For example, if a proposed FMP has 0.08ft increase in 1D Water Surface Elevation (WSE) for a 1 percent annual chance storm event and identifies the proposed location, area and volume of a regional detention pond with supporting hydrologic analyses that shows the increase in WSE will be reduced to 0.0 ft with the incorporation of regional detention, the project can be included as FMP.

3.9 Project details

Texas Water Code Section 16.061 requires the state flood plan to include “A statewide, ranked list of ongoing and proposed flood control and mitigation projects and strategies necessary to protect against the loss of life and property...”

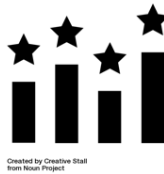
If the RFPGs do not have pertinent information in this planning cycle, it is acceptable to leave it blank. However, those fields will score as zero. If a field is not applicable, please add NA or Not Applicable.

The flood mitigation projects identified and recommended by each RFPG will be included in Texas’s first ever State Flood Plan as a single ranked list. In order to enable the ranking of all recommended projects in a single list, the RFPGs will provide projects details for each project identified. The specific criteria used and the and weight of each ranking criteria to be used in the state ranking will be determined during the State Flood Planning phase via a transparent process with public input.

Figure 14: Regional & State Flood Planning Long-Range Planning Process



Regional Flood Plans will identify flood risk and recommend FMEs, FMSs, and FMPs within regions.



State Flood Plan will rank recommended FMEs, FMSs, and FMPs statewide.



Future state financial assistance may be allocated using a to-be-determined prioritization criteria.*

*Funding to implement projects can also come from local, federal, or other sources.

The data associated with each recommended flood mitigation project must be provided by the RFPGs to the TWDB, including:

1. General Project Data Required; and
2. Other data for potential use in ranking projects in the state flood plan (to be determined based on final criteria and ranking guidelines selected during state flood planning process after stakeholder input).

The intent is that RFPGs will populate all required project data into an excel-based tool as depicted in Appendix 1 of this document. Upon completion of the Appendix 1 tool, the spreadsheet and associated GIS files required will be provided to the TWDB for their use in developing the single ranked list for the SFP. A checklist of all project data required to complete these efforts is provided in Appendix 2.

3.9.A General project data

General Project Data will need to be provided for each project including the Project Name, Region, Project Type, BCR, Estimated Cost, and other data listed in Sections 3.9.B and 3.9.C of this document.

To develop a single ranked list for the State Flood Plan, the TWDB must collect data by which to rank projects across the state. The intent of any eventual ranking is to reflect the State Flood Plan primary

objective of protecting against loss of life and property¹² while also accommodating a sufficiently wide range of project types and project geographies.

The following list includes data that may be used by the TWDB in the project ranking process. It is anticipated that a final set of ranking criteria will be developed by the TWDB for review and comment by TWDB stakeholders.

1. **Severity Level - Pre-Project Average Depth of Flooding (100-year):** indication of severity based on the baseline/pre-project average 100-year flood depth.
2. **Severity Level - Community Need (% Population):** indication of severity based on a community's need by percentage of project community affected by population.
3. **Flood Risk Reduction:** indication of reduced flood risk by percentage of structures removed from the 100-year floodplain in post-project condition.
4. **Flood Damage Reduction:** indication of flood risk reduction (property protection) by a percentage of 100-year damage reduction calculation.
5. **Critical Facilities Damage Reduction:** indication of reduced flood risk by percentage of critical facilities removed from the 100-year floodplain in post-project condition.
6. **Life and Safety (Injury/Loss of life):** indication of life/injury risk percentage using estimates of area hazard rating, area vulnerability rating, and historical loss of life injury data for project.
7. **Water Supply Benefit:** indication of a project's direct or indirect water supply benefits to a specific supply need identified in the most recently approved state or regional water plan.
8. **Social Vulnerability:** based on the Center for Disease Control SVI data for Texas, by calculating an average project SVI by census tract and classifying the vulnerability level.
9. **Nature-Based Solution:** Indication of the percentage of project cost that qualifies as nature based as reported by RFPG.
10. **Multiple Benefit:** indication of significant, measurable, expected benefits to: recreation, agriculture, transportation, social and quality of life, local economic impacts, meeting sustainability goals, and/or project resilience goals.
11. **Operations and Maintenance:** Indication of expected level of O&M needs and annual costs provided.
12. **Administrative, Regulatory, and other implementation obstacles/difficulty:** indication of project limitations and/or requirements in terms of administrative, regulatory, and other implementation obstacles.
13. **Environmental Benefit:** Indication of expected level of environmental benefits to be delivered by project to agricultural resources, water quality, cultural heritage, habitat, air quality, natural resources, and soils/erosion and sedimentation.
14. **Environmental Impact:** indication of expected level of adverse environmental impacts due to project affecting water quality, cultural heritage, habitat, air quality, natural resource protection, agricultural resources, and erosion and sedimentation.
15. **Mobility:** Indication of project improvement and protection of mobility during flood events, with particular emphasis on emergency service access and major access routes.

¹² Texas Water Code Section 16.061

3.9.B General project data required

The following listing includes the General Project Data Required for each project to provide the general background information needed for consideration.

Table 23: General project data required

General project data required	
Project ID:	FMP ID
Project Description:	Brief Project Description
Flood Region:	TWDB RFPG Region
Project Type:	Project Type based on Section 3.2 in this document
Project Watershed:	Project Watershed
Rural Project:	Project qualifies as a rural project per TWDB definition
Project Cost:	Total Estimated Project Cost
Benefit- Cost Ratio:	BCR value determined in Economic Analysis
Project Status:	Planning, Preliminary, Final, Bid-Ready
Population Served:	# Population within Project Service Area Boundary
Communities Served by Project:	Number of jurisdictions (Cities) within project service area
# Structures in 100-year (1% annual chance) Floodplain:	Pre-project 100-year structures count
# Structures with reduced 100-year (1% annual chance) Flood risk:	Post-project 100-year flood risk reduction
# Structures with removed from 100-year (1% annual chance) Floodplain:	Post-project 100-year structures count removed from floodplain extents
Cost/ Structure removed:	Project cost/# structures removed
GIS Shapefile for project:	GIS shapefile of project service area limits or location
Percentage Nature-based Solution (by cost)	Percentage cost of Nature Based solution
Water Supply Benefit	Yes/No; If Yes, provide Annual Yield in Acre-feet
Pre-Project Level-of-Service	Pre-Project LOS: 2-year through 100-year (50% ACE-1% ACE)
Post-Project Level-of-Service	Post-Project LOS: 2-year through 100-year (50% ACE-1% ACE)
Traffic Count for Low Water Crossings	Traffic Count (AADT) for low water crossing projects

3.9.C Proposed Project Scoring Guidelines, Data Required, and Approach Instructions

The following listings provide proposed scoring guidelines and data requirements for each TWDB ranking criteria, as well as approach instructions to develop the values required for the ranking tool.

A proposed scoring system with scores between 0-10 have been applied to each of the 16 criteria. With this approach it is recommended that only the specified scores are used to ensure objectivity. However, it is recognized that criteria for some projects may be hard to define and could fall between two score descriptions. In this instance, it is advised that the lower score be selected.

3.9.C.1 Severity level: pre-project average depth of flooding (100-year)

Table 24: Criteria, specific data required and level guidelines

Criteria	Severity: Pre-Project Average Depth of Flooding (100-year)
Data Requirements	<ul style="list-style-type: none"> ▪ Pre-project 100-year floodplain shapefile with elevations; ▪ Structure shapefile; ▪ first floor structure elevations; ▪ streambed elevations; ▪ Project shapefile in GIS; ▪ land elevations (LiDAR or DEM); ▪ Traffic Count (AADT) for low water crossings;
Proposed Scoring Guidelines:	Proposed score (out of 10):
baseline average flood depth > 3.5ft	10
baseline average flood depth > 2ft	8
baseline average flood depth > 1ft	6
baseline average flood depth > 0.5ft	4
baseline average flood depth < 0.5ft	2
not available (leave blank)	0

Approach for non-low water crossing projects:

1. To determine the Pre-Project Average depth of 100-year flooding (ft) measured in GIS at structures or crossings in GIS, overlay:
 - a. baseline pre-project 100-year floodplain: digital format available from FEMA Map Service Center at <https://msc.fema.gov/portal/advanceSearch>;
 - b. project shapefile;
 - c. land elevations (LiDAR if available <https://tnris.org/stratmap/elevation-lidar/>); and
 - d. structure shapefile (see below)
 - i. TWDB is processing various data sources, including LiDAR, to create a state-wide building footprint dataset. This dataset will be made available in the [Property](#) category of the TWDB Flood Planning [Data Hub](#). Inspect structures in floodplain and document water elevation depths for each structure compared to the first-floor structure elevations (difference represents the flooding depth).
 - e. If first floor elevations are not available in the structures shapefile used, they may be available for purchase at this link: https://truefloodrisk.com/#/plans_n_pricing
 - f. If first floor elevations are not used, the land elevation adjacent to the structure plus 0.5 ft may be used instead.
 - i. Record the depths at each structure and calculate the average flooding depth for the project.
2. Report the value of the average flooding depth for the project and score the category accordingly.

Approach for low water crossing projects:

1. In GIS, overlay baseline pre-project 100-year floodplain, streambed elevation, dataset, and land elevation.
2. Generate a shapefile of a 300-foot buffer around the low water crossing location.
3. Within the buffer area, compare the water elevation to the streambed elevation dataset (calculate the difference which represents the flooding depth). In areas within the buffer where the streambed elevation data is not available, use the land elevation instead.

- a. Report the value of the average flooding depth within the buffer area of the project and score the category accordingly.

3.9.C.2 Severity level: community need

Table 25: Severity level: community need

Criteria	Severity-Community need (% Population)
Data Requirements	<ul style="list-style-type: none"> ▪ population of community within floodplain ▪ Pre-project 100-year floodplain ▪ total population of community
Proposed Scoring Guidelines:	Proposed score (out of 10):
>75% of project community affected	10
50%-75% of project community affected	7
25%-50% of project community affected	4
<25% of project community affected	1
not available (leave blank)	0

Approach:

1. This category is based on an estimate of the population in the floodplain relative to the total population of community.
2. The community will be defined as the jurisdiction (City, County, etc.). Information on spatial boundaries and population statistics is available from the Texas Demographic Center (<https://demographics.texas.gov/Data/TPEPP/Estimates/>), or from the United States Census Bureau (<https://www.census.gov/geographies/mapping-files.All.html>)
3. An estimate of the population within the floodplain can be made in GIS based on the proportion of structures within the floodplain and the use of LandScan USA population data. See section 3.4 for details on calculating population using LandScan USA (<https://landscan.ornl.gov/>). The maximum of the daytime and nighttime population is considered the population in the floodplain.
 - a. Calculate the percentage of the community affected, report the value, and score the category accordingly:

$$\% \text{ project community affected} = \frac{\text{population in pre project floodplain}}{\text{total community population}} \times 100$$

3.9.C.3 Flood risk reduction

Table 26: Flood risk reduction

Criteria	Flood Risk Reduction
Data Requirements	<ul style="list-style-type: none"> ▪ pre-project 100-year floodplain shapefile with elevations; ▪ post-project 100-year floodplain shapefile with elevations; ▪ # structures in pre-project 100-year floodplain; ▪ # structures in post-project floodplain; ▪ structure shapefile; ▪ land elevations (LiDAR)
Proposed Scoring Guidelines	Proposed score (out of 10):
Reduced risk to >75% of structures in floodplain	10
Reduced risk to <75% of structures in floodplain	7
Reduced risk to <50% of structures in floodplain	4
Reduced risk to <10% of structures in floodplain	1

Reduced risk to 0 structures in floodplain	0
not available (leave blank)	0

Approach:

1. This category will only be relevant and included in the scoring for projects which reduce risk to structures within the floodplain. For projects which do not reduce floodplain, for example low water crossing projects, the TWDB may elect to remove category from the scoring system and the weighted total score.
2. Count of structures should include all habitable structures.
3. In GIS, overlay baseline pre-project 100-year floodplain shapefile with post-project 100-year floodplain shapefile, along with the structure dataset (shapefile), and land elevations.
4. Calculate the percentage of structures removed from 100-year floodplain, report the value, and score accordingly:

$$\% \text{ removed} = \frac{(\# \text{ structures removed from floodplain})}{\# \text{ structures in floodplain pre project}} * 100$$

3.9.C.4 Flood damage reduction**Table 27: Flood damage reduction**

Criteria	Flood Damage Reduction (Property Protection)
Data Requirements	<ul style="list-style-type: none"> ▪ pre-project average depth of 100-year flooding (from 3.10.C.1.); ▪ post-project 100-year flood shapefile, elevations, or average depth/reduction; ▪ Project shapefile (GIS); ▪ land elevations (LiDAR); ▪ structure shapefile; ▪ first floor structure elevations;
Proposed Scoring Guidelines:	Proposed score (out of 10):
flood damage reduction >95%	10
flood damage reduction > 75%	8
flood damage reduction > 50%	6
flood damage reduction > 25%	4
flood damage reduction < 25%	2
not available (leave blank)	0

Approach:

1. This category will use damage and benefit assessment data to determine flood risk reduction percentage of the project to assign a relative score. For ease of use, only direct flood damages relating to structures will be considered. This category will only be relevant and included in the scoring for projects which reduce risk to structures within the floodplain. For projects which do not reduce floodplain risk, for example low water crossing projects, the TWDB may elect to remove category from the scoring system and the weighted total score.
2. The Pre-Project Average Depth of Flooding (100-year, in feet) was calculated in 3.9.C.1.
3. Using the same methodology, calculate the Post-Project Average Depth of Flooding (100-year, in feet) using GIS at structures or crossings in GIS, by overlaying:
 - a. post-project 100-year floodplain shapefile;
 - b. project shapefile;
 - c. land elevations (LiDAR if available <https://tnris.org/stratmap/elevation-lidar/>); and
 - d. structure shapefile used in 3.9.C.1

4. Alternative to the GIS approach, if the average reduction in post-project 100-year flood depth is indicated by hydraulic modeling for the project reach and is available/reported, this depth reduction may be used for this criterion.
5. Using the Pre-Project Average Depth of Flooding (100-year) depth calculated for the project in 3.10.C.1., and property values of structures in the floodplain from the applicable County Appraisal District, use a USACE Damage Depth Function (DDF) to calculate total pre-project damages (100-year):
 - a. Refer to DDF for 1-story structures, and 2-story structures without basements on pages 6-7 of the *Economic Guidance Memorandum (EGM) 01-03, Generic Depth-Damage Relationships* (Johnson, 2000):
<https://planning.erd.c.dren.mil/toolbox/library/EGMs/egm01-03.pdf>
 - b. Damages= % damages from DDF x property value
6. Using the Post-Project Average Depth of Flooding (100-year) depth calculated or determined above, repeat the calculation for the post-project average flood depth to calculate total post-project damages (100-year).
7. Calculate the flood damage reduction percentage, report the value, and score accordingly:

$$\frac{\text{total pre project damages} - \text{total post project damages}}{\text{total pre project damages}} \times 100$$

3.9.C.5 Critical facilities damage reduction

Table 28: Critical facilities damage reduction

Criteria	Flood Damage Reduction (Property Protection)
Data Requirements	<ul style="list-style-type: none"> ▪ pre-project average depth of 100-year flooding (from 3.9.C.1); ▪ post-project 100-year flood shapefile, elevations, or average depth/reduction; ▪ # critical facilities in pre-project 100-year floodplain; ▪ # critical facilities in post-project floodplain;
Proposed Scoring Guidelines:	Proposed score (out of 10):
critical facilities reduction >95%	10
critical facilities reduction > 75%	8
critical facilities reduction > 50%	6
critical facilities reduction > 25%	4
critical facilities reduction < 25%	2
not available (leave blank)	0

Approach:

1. This category will only be relevant and included in the scoring for projects which reduce risk to critical facilities within the floodplain. For projects which do not reduce floodplain, for example low water crossing projects, the TWDB may elect to remove the category from the scoring system and the weighted total score.
2. In GIS, overlay the baseline pre-project 100-year floodplain shapefile with post-project 100-year floodplain shapefile, along with the critical facilities dataset ([Exist_Vuln]), and land elevations.
3. Calculate the percentage of critical facilities removed from the 100-year floodplain, report the value, and score accordingly:

$$\text{removed} = \frac{\# \text{ critical facilities in floodplain pre project} - \# \text{ critical facilities in flood plain post project}}{\# \text{ critical facilities in floodplain pre project}} \times 100$$

$$\% \text{ removed} = \times 100$$

3.9.C.6 Life and safety (injury / loss of life)

Table 29: Life and safety (injury / loss of life)

Criteria	Life and Safety (Injury / Loss of life)
Data Requirements	<ul style="list-style-type: none"> Structures shapefile; land/stream elevations (LiDAR); pre-project 100-year floodplain elevations; pre-project 100-year velocity (model, if available); flood-related death and injury data for affected county(ies) in past year: https://www.ncdc.noaa.gov/stormevents
Proposed Scoring Guidelines:	Proposed score (out of 10):
life/injury risk percentage >50%	10
life/injury risk percentage >40%	8
life/injury risk percentage >30%	6
life/injury risk percentage >20%	4
life/injury risk percentage <20%	2
not available (leave blank)	0

Approach:

- This category is based on the calculation of two parameters; a Hazard Rating and a Vulnerability Rating. The approach is based on principles used in the UK's DEFRA guidance for valuing the risk to life from flooding, which provides a simplified, less data intensive approach. It can be used for all types of projects, including low water crossings.
- Calculate the "area hazard rating" using the average flood depth, average flood velocity and debris factor:
 - Average flood depth: use the Severity (depth) approach to define the average flood depth at structures for non-low water crossing projects or within the buffer area of crossing for low water crossing projects.
 - Average flood velocity can be obtained from model results, if available. If model data is not available, it can be estimated based on the flooding depth or historic evidence (i.e., a source of typical flood velocities in Texas).
 - The debris factor is based on the flooding depth, velocity, and underlying land use. The lookup table provided below estimates the debris factor based on depth and land use:

Table 30: Debris factor lookup table

Debris factor lookup table ¹³			
Depths	Pasture / Arable	Woodland	Urban
0 to 0.25m (0 to 0.8ft)	0	0	0
0.25m to 0.75m (0.8ft to 2.5ft)	0	0.5	1
Depth > 0.75m (2.5ft) and/or Velocity >2m/s (6.6 ft/s)	0.5	1	1

- Area Hazard Rating is calculated as:

$$\text{Area Hazard Rating} = \text{depth}(\text{velocity} + 0.5) + \text{debris factor}$$

¹³ based on Table A.1 in Defra Flood and Coastal Defense Appraisal Guidance, Assessing the Valuing the Risk to Life from Flooding, UK

3. Calculate the “area vulnerability rating” using estimates of the speed of onset of flooding, the presence of a flood warning system, and the nature/development of the area. Each of these variables is scored between 1-3. The lookup table below provides estimated values of each variable. The vulnerability rating is the sum of each variable, calculated as:

- a. **Area Vulnerability Rating = (onset + flood warning + nature of area)**

Table 31: Area vulnerability lookup table

Area Vulnerability lookup table ¹⁴			
Parameter	Low risk area Score = 1	Medium risk area Score = 2	High risk area Score = 3
Speed on onset	Onset of flooding is very gradual (many hours)	Onset of flooding is gradual (an hour or so)	Rapid flooding
Nature of area	Multi-story apartments	Typical residential area, commercial and industrial properties	Bungalows, mobile homes, busy roads, parks, single story
Flood warning score	Flood warning system in place for all possible sources of flooding	Flood warning system in place for some of the possible sources of flooding	No flood warning system
Area vulnerability = sum of scores for ‘speed on onset’, ‘nature of area’ and ‘flood warning’			

1. Multiply the “Area Hazard Rating” by the “Area Vulnerability Rating” and convert to a life/injury risk percentage.
2. If the project area has a history of loss of life and/or injury caused by flooding, multiply the life/injury risk percentage by 1.5. If the area does not have an incident caused by flooding, multiply the life/injury risk percentage by 1.
3. Report the value and score accordingly.

3.9.C.7 Water supply benefit

Table 32: Water supply benefit

Criteria	Water Supply benefit	
Data Requirements	<ul style="list-style-type: none"> ▪ Water Supply benefits to a specific need identified in the most recently approved state or regional water plan 	
Proposed Scoring Guidelines:		Proposed score (out of 10):
Involves directly increasing water supply which requires both availability increase and directly connecting supply to user.		10
Directly benefits ‘water availability’, but no water user directly benefits (e.g. by injecting into aquifer, creating new raw water storage)		7
Indirectly benefits ‘water availability’ (e.g., recharges aquifers through natural infiltration)		4
No impact on water supply		0
not available (leave blank)		0

¹⁴ based on Table A.2 in Defra Flood and Coastal Defense Appraisal Guidance, Assessing the Valuing the Risk to Life from Flooding, UK

Approach:

1. A project's Water Supply component will be provided in the broader Project Description and General Project Data.
 - a. If a project indicates a Water Supply Benefit, report the project specific water supply benefit provided, and score accordingly.
2. The estimated share of the cost associated with a project's Water Supply benefit components must be 5 percent or greater of the estimated total project cost.
3. Projects must reference the specific water supply need and water user group(s) in the most recently approved state or regional water plan.

3.9.C.8 Social vulnerability**Table 33: Social vulnerability**

Criteria	Social vulnerability
Data Requirements	<ul style="list-style-type: none"> ▪ SVI GIS Shapefile from CDC download; ▪ Project shapefile
Proposed Scoring Guidelines:	Proposed score (out of 10):
SVI between 0.75-1.00 (high vulnerability)	10
SVI between 0.5-0.75 (moderate to high vulnerability)	7
SVI between 0.25-0.5 (low to moderate vulnerability)	4
SVI between 0.01-0.25 (low vulnerability)	1
not available (leave blank)	0

Approach:

1. Download the 2018 SVI shapefile for Texas, available on the [Flood Planning Data Hub](#). The shapefile contains SVI information for each of the individual census tracts in Texas.
2. Overlay the project shapefile with the SVI shapefile. The SVI for each census tract is reported in the GIS field "RPL_themes". This field has values between 0 and 1, with a high score (closer to 1) denoting greater vulnerability.
3. If the project shapefile intersects multiple census tracts, determine the SVI for all tracks and calculate the areal weighted-average SVI, report the value for the project, and score accordingly.

3.9.C.9 Nature-based solutions**Table 34: Nature-based solutions**

Criteria	Nature-based Solutions
Data Requirements	<ul style="list-style-type: none"> ▪ Percentage of project based on nature-based solutions by cost provided in general project data
Proposed Scoring Guidelines:	Proposed score (out of 10):
>75% of the project cost is nature-based	10
> 50% of the project cost is nature-based	7
>25% of the project cost is nature-based	4
<25% of the project cost is nature-based	1
not available (leave blank)	0

Approach:

1. The RFPs will have flexibility in determining what percent of the project is nature based. RFPs must be consistent in their approach for the entire region and provide justification for the basis of their determination.
2. This category is based on the proportion of the project that is a nature-based solution. The proportion is defined in cost terms whereby percentage of the project being nature-based is estimated by dividing the cost of the nature-based aspects of the project by the total project costs. Examples of nature-based solutions include: reforestation, green embankments; coastal mangroves, wetlands; urban parks, restorations.
 - a. Using the reported Nature based infrastructure percentage calculation provided in the General Project Data, report the value and indicate score accordingly.

3.9.C.10 Multiple benefit**Table 35: Multiple benefit**

Criteria	Multiple Benefit
Data Requirements	▪ Reported benefits in project description
Proposed Scoring Guidelines:	Proposed score (out of 10):
Project delivers benefits in four or more wider benefit categories	10
Project delivers benefits in three wider benefit categories	7
Project delivers benefits in two wider benefit categories	4
Project delivers benefits in only one wider benefit category	1
Project does not deliver any wider benefits	0
not available (leave blank)	0

Approach:

1. The scoring of this category is based on the number of different wider benefit categories which can be delivered by the project included in the project description.
2. The wider benefit categories may include:
 - a. Recreation benefits such as trails, parks, or sports fields.
 - b. Agricultural benefits such as field preservation, irrigation opportunities, or other benefits to forestry or farming lands.
 - c. Transportation benefits such as improved roads, bike paths, navigation, or parking facilities.
 - d. Social and quality of life benefits such as community centers, hospitals, or education benefits.
 - e. Local economic impacts such as providing business continuity or job creation.
 - f. Project's ability to meet specific sustainability goals based on the U.S. National Statistics for the U.N. Sustainable Development Goals (<https://sdg.data.gov/>)
 - g. Project resilience goals that indicate that project is planned to withstand a long-term service life (i.e., >50-years) and is designed with increased resilience.
 - i. Report the value (0-4+) and score accordingly.

3.9.C.11 Operations and maintenance

Table 36: Operations and maintenance

Criteria	Operations and Maintenance
Data Requirements	<ul style="list-style-type: none"> O&M needs/annual costs provided in Project description
Proposed Scoring Guidelines:	Proposed score (out of 10):
Project will not require any ongoing operation and maintenance (low);	10
Project requires regular, ongoing operation and maintenance; and/or O&M requirements are well defined (Regular);	7
Project will require ongoing operation and maintenance outside of the owner's regular maintenance practices; long-term O&M requirements are undefined; and/or high annual O&M cost > 1% of project (high);	4
Project will require extensive and/or specialist operations and maintenance outside of owner's regular maintenance practices; project O&M needs are uncertain; and/or high annual O&M cost > 5% of project (extensive);	1
not available (leave blank)	0

Approach:

1. This category is based on the reported expected level of O&M effort for the project infrastructure owner (City, County, River Authority, etc.), owner's experience/qualifications to operate, and/or overall proportion of annual O&M costs to the total project cost. Category also accounts for risk/uncertainty relating to O&M requirements.
2. O&M levels and/or annual costs should be included in the project description and general project data.
 - a. Report the value (low, regular, high, or extensive), and score accordingly.

3.9.C.12 Administrative, regulatory, and other implementation obstacles/difficulty

Table 37: Administrative, regulatory, and other implementation obstacles/difficulty

Criteria	Administrative, Regulatory and other implementation obstacles/difficulty
Data Requirements	<ul style="list-style-type: none"> Anticipated project requirements; Administrative, Regulatory, and other implementation obstacles/difficulty
Proposed Scoring Guidelines:	Proposed score (out of 10):
Project has few administrative, regulatory and implementation limitations / requirements	10
Project has a typical number of administrative, regulatory and limitations / requirements	6
Project has a high number of administrative, regulatory and limitations / requirements	2
not available (leave blank)	0

Approach:

1. The scoring of this category is based on the reported anticipated number of administrative, regulatory, and environmental requirements a project must achieve to go ahead in the project description.
2. Most projects will fall into the “typical” category unless specific exceptions (for few), or additional regulation requirements (for high) are documented in the description.
3. Ranking Definitions:
 - a. Few: project requires 2 or less local permits (i.e., City, County)
 - b. Typical: project requires 2 or more local permits (i.e., City, County), and standard reviews by state (i.e., TCEQ), and/or 2 or less property acquisitions.
 - c. High: project requires 3 or more local permits, state reviews (i.e., TCEQ), Federal Permits (USACE, USFWS, etc.), and/or 3 or more property acquisitions.
 - i. Report the value (few, typical, high) and score accordingly.

3.9.C.13 Environmental benefit**Table 38: Environmental benefit**

Criteria	Environmental Benefit
Data Requirements	▪ Environmental benefits of project, included in project description
Proposed Scoring Guidelines:	Proposed score (out of 10):
Project will deliver a high level of environmental benefits (benefits in 4+ categories)	10
Project will deliver a moderate level of environmental benefits (benefits in 2-3 categories)	6
Project will deliver a low level of environmental benefits (benefits in only 1 category)	3
Project does not provide any environmental benefits	0
not available (leave blank)	0

Approach:

1. The scoring of this category is based on the level of environmental benefit that a project is anticipated to provide which must be documented in the broader project description.
2. An environmental benefit is defined as an improvement on the current environmental condition (the condition prior to the project).
3. The potential environmental benefit categories include:
 - a. water quality (i.e., project adds a new water quality pond, vegetated filter strips, rain garden(s), or flood level reduction reduces risk of wastewater overflows during storm events);
 - b. cultural heritage (i.e., project removes a Texas Historical Commission (THC) identified site with antiquities from floodplain);
 - c. habitat, biodiversity and ecology (i.e., project provides habitat protection, creates intertidal habitat, wetland areas, or wildlife corridors);
 - d. air quality (i.e., project creates open space, recreation areas, or parks; includes tree and/or vegetation plantings; utilizes sustainable construction techniques with planning to minimize air quality impacts);
 - e. natural resources (i.e., project includes protection measures for natural resources, creates habitat, coastal grazing marshes, wetlands, or woodlands);

- f. agricultural resources/properties (i.e., agricultural properties removed from floodplain or floodway);
 - g. soil quality, erosion and sedimentation (i.e., project provides reduced velocities, and/or stream armoring; project increases organic matter/soil health to support increased infiltration)
4. Report the value and score accordingly.

3.9.C.14 Environmental impact

Table 39: Environmental impact

	Environmental Impact
Data Requirements	Environmental impacts of project, included in project description
Proposed Scoring Guidelines:	Proposed score (out of 10):
Project has no adverse environmental impacts	10
Project will have adverse environmental impacts in 1 environmental category	6
Project will have adverse environmental impacts in 2-3 environmental categories	3
Project will have adverse environmental impacts in 4+ categories	0
not available (leave blank)	0

Approach:

1. The scoring of this category is based on the anticipated level of environmental impacts which must be documented in the broader project description.
2. An adverse environmental impact is defined as a negative change compared to the current environmental condition (the condition prior to the project), after appropriate mitigation has been implemented.
3. Environmental net impact categories include:
 - a. Impacts to water quality (i.e., project includes work in a watershed identified by TCEQ's Watershed Action Planning list of impaired or special interest areas; increases velocities; increases surface water run-off pollution, or requires relocation of wastewater discharge into sensitive area);
 - b. Impacts to cultural heritage (i.e., project work proposed in areas with Texas Historical Commission identified antiquities);
 - c. Impacts to habitat, biodiversity and ecology (i.e., proposed work in area with endangered, protected, or sensitive species);
 - d. Impacts to air quality (i.e., project requires tree and/or other vegetation removal; reduction of green spaces; increases air pollution during construction and/or operation);
 - e. Impacts to natural resources (i.e., project impacts designated coastal natural resource areas, or wetland);
 - f. Impacts to agricultural resources/properties (i.e., agricultural properties acquired for detention or channel improvements);
 - i. Impacts to soils/erosion and sedimentation (i.e., increased velocities during more frequent events such as the 2-year storm)
4. Report the impact level and score accordingly.

3.9.C.15 Mobility**Table 40: Mobility**

Data Requirements	<ul style="list-style-type: none"> ▪ Project Shapefile ▪ TxDOT Functional Classification Shapefile ▪ pre-project 100-year floodplain shapefile with elevations; ▪ post-project 100-year floodplain shapefile with elevations; 	
Proposed Scoring Guidelines:	Proposed score (out of 10):	
Project will protect major and minor access routes in floodplain and emergency service access to EMS, police stations, and fire stations. Allows emergency services access to their entire administrative area.	10	
Project will protect all major access routes in floodplain and all emergency service access. Minor access routes are still flooded or have restricted access in local areas.	7	
Project will protect some major access routes in floodplain and the majority (>50%) of emergency service access. Some major and many minor access routes will remain flooded, and emergency services access may be restricted in some areas (i.e. >50% of floodplain by area inaccessible).	4	
Project provides no change to major, minor, or emergency access routes in the project area.	0	
not available (leave blank)	0	

Approach:

1. The scoring of this category is based on improved mobility during flood events, with particular emphasis on emergency service access and major access routes.
2. Overlay the Project shapefile with the pre- and post-project 100-year floodplain shapefiles, and a download of the TxDOT Functional Classification Shapefile: <http://gis-txdot.opendata.arcgis.com/datasets/txdot-functional-classification>
3. Roadway classifications are included in the TxDOT shapefile variable "FC_DESC":
 - a. Major access routes: Major Collector, Principal Arterial, Interstate
 - b. Minor access routes: Minor Collector, Minor Arterial
 - i. Report the project value (no access change, minor access protection, major access protection, or major/emergency access protection) and score accordingly.

Task 4B – Identification and Evaluation of Potential Flood Management Evaluations and Potentially Feasible Flood Management Strategies and Flood Mitigation Projects

TWDB requirements for Task 4B state that each RFPG is to develop and receive public comment on a “...proposed process to be used by the RFPG to identify and select flood management evaluations, flood mitigation strategies, and flood mitigation projects”. This process, once adopted by the RFPG, is to be documented and such documentation is to be included in the Technical Memorandum, the Initial Draft Regional Flood Plan, and the adopted Regional Flood Plan.

The following describes the proposed process being considered by the RFPG and on which public comment will be taken, both during the December RFPG meeting and via written comments submitted through the RFPG’s website. The process, as described below, was designed to conform with TWDB requirements as expressed in the rules, the scope-of-work for the regional flood planning process, and technical guidelines.

Step 1: Conduct an initial screening of Projects, Evaluations, and Strategies that were received by or developed in conjunction with floodplain management communities/project sponsors:

In this first step, screening is conducted based on minimum TWDB requirements. The screening criteria applied in this step are:

- The evaluation/strategy/project is related to a flood mitigation or floodplain management goal.
- The evaluation /strategy/project meets an emergency need.
- The evaluation /strategy/project addresses a flood problem with drainage area of 1 square mile or greater.
- The evaluation /strategy/project reduces flood risk for the 100-year (1% annual chance) flood.
- Exceptions for level of flood risk reduction or problem area size include instances of flooding of critical facilities, transportation routes, or other factors as determined by the RFPG.

Step 2-1: Screening of Projects (FMPs):

In the second step, potential Flood Mitigation Projects

(FMPs) are subjected to a screening-level evaluation based on the TWDB Technical Guidelines for Regional Flood Planning (April 2021) and specifically Figure 5 FMP flowchart (Attachment A). If a potential FMP does not satisfy the screening criteria in this step, it will then become a potential Flood Management Evaluation. There are three criteria that are applied in this step are: “sufficient data”, “no negative effect”, and “project details”.

- Sufficient data - The data upon which an assessment of no negative effect has been made must be reliable and have minimal uncertainty. H&H modeling, mapping, and basis for mitigation analysis must generally meet Section 3.5 of TWDB technical guidelines.
- No negative effect - The potential Project must not have negative impact on the 100-year (1% annual chance) flood event. It must not raise the flood elevation or increase discharge of the

100-year flood event. Any of the following will disqualify the potential project in this screening step:

- Potential project increases inundation on homes or commercial buildings.
 - Potential project increases inundation beyond existing or proposed ROW or easements.
 - Potential project increases inundation beyond existing drainage infrastructure capacity.
- Project details – Data used to define the potential project must include sufficient project details as described in Section 3.9 of TWDB technical guidelines, including but not limited to the following:
 - Flood severity level metrics
 - Flood risk/damage reduction metrics
 - Estimated capital and O&M costs
 - Benefit/Cost ratios
 - Environmental benefits/impacts
 - Implementation constraints
 - Water supply benefits

Step 2-2: Screening of Evaluations (FMEs):

Flood Management evaluations may fall into one of three general categories:

1. Potential projects (FMPs) that did not meet screening criteria Step 2-1.
2. Planned flood studies or flood risk reduction alternatives analyses provided by or developed in conjunction with floodplain management communities/project sponsors.
3. Potential flood studies or flood risk reduction alternatives analysis needs identified by the technical consultant in Task 4A.

In this step potential studies are screened based on the following criteria from TWDB technical guidelines and illustrated in the flowchart in Attachment B:

- Potential evaluation must identify structures, population, and critical facilities at risk within the flood problem area being studied.
- Potential evaluation must identify roadways impacted by flooding within the flood problem area being studied, if applicable.
- Potential evaluation must quantify area of agricultural land at risk within the flood problem area being studied, if applicable.
- Potential evaluation must have willing sponsor(s) identified that are willing to commit resources and some level of potential cost sharing.
- Potential evaluation must have reasonable planning-level cost estimate.

If there is sufficiently detailed H&H analysis and flood mitigation alternatives analysis, then the Evaluation may be considered as Project (FMP) or Strategy (FMS)

Step 2-3: Screening of Strategies (FMSs):

Strategies are proposed plans or actions that reduce flood risk or mitigate flood hazards to life or property. Any proposed action that doesn't meet the criteria to qualify as an evaluation or as a project can potentially be considered as a strategy. Strategies can also be flood studies or flood risk reduction

alternatives analysis needs that are identified in Task 4A. In general, RFPG has flexibility with what qualifies as Strategies.

In this step, Strategies are screened based on the following criteria from the TWDB technical guidelines:

- Potential strategies must include a planning-level cost estimate.
- Potential strategies must have an identified sponsor(s) that are willing to commit resources and some level of potential cost sharing.
- Potential strategies must quantify the estimated flood risk being addressed and potential level of flood risk reduction.

Step 3: Sorting of Projects, Evaluations and Strategies by Flood Mitigation and Floodplain Management Goals:

In the third step, the projects, evaluations, and strategies identified will be assigned to one of more of the goals defined in Task 3B.

Step 4: Detailed assessment of selected Projects, Evaluations, and Strategies:

In the fourth step, potential evaluations, strategies, and projects that meet the criteria in the initial screening processes described in Steps 1 and 2 are to be evaluated further for potential feasibility and must meet the following:

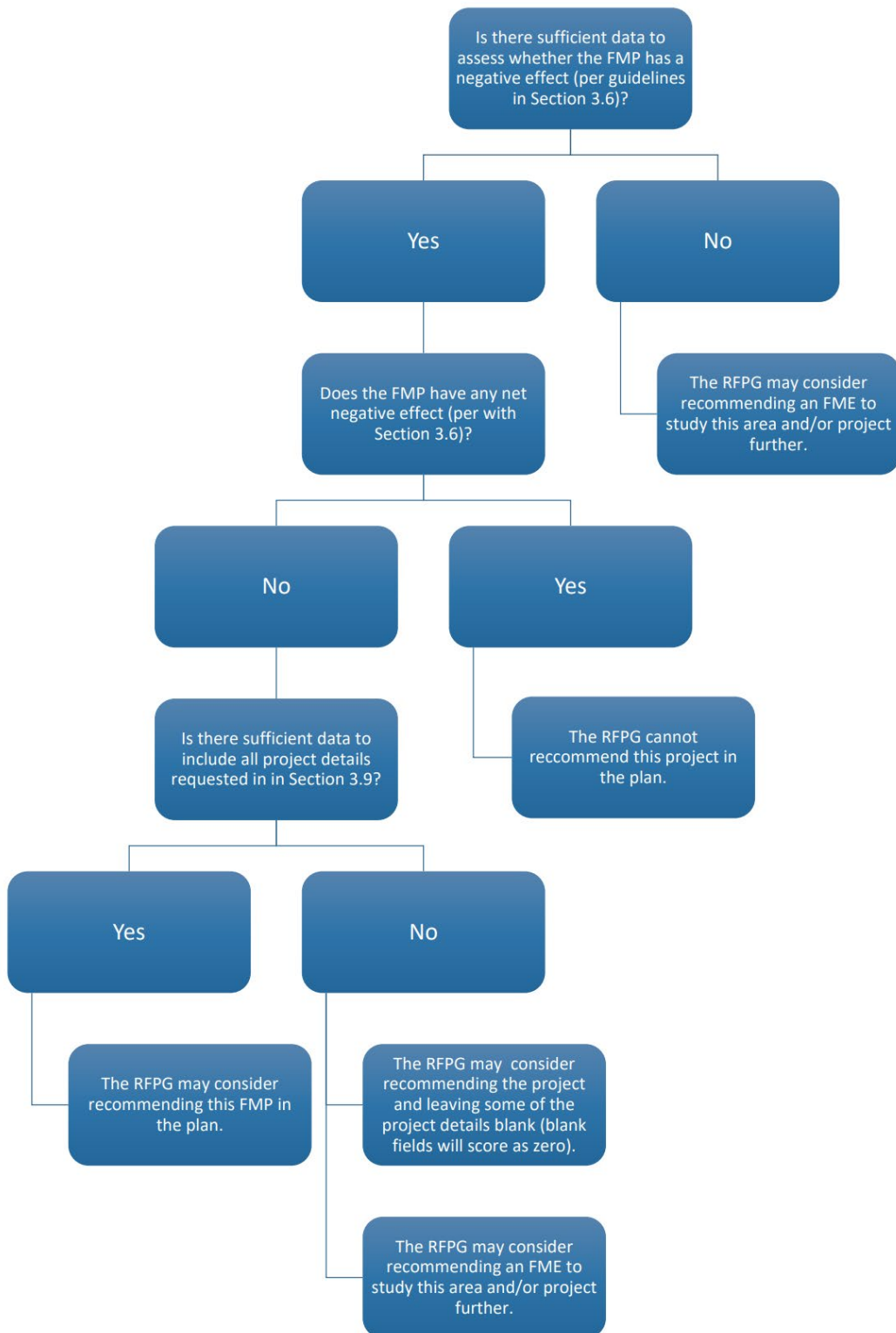
- Potential projects must have an estimated benefit-cost ratio greater than 1.0.
- Potential evaluations, strategies, and projects must have a willing sponsor(s) that has been verified.
- There must be no known insurmountable implementation constraints or hurdles, such as ROW acquisitions, utility conflicts, and/or permitting issues.

Step 5: Final recommendation of Projects, Evaluations, and Strategies:

In this final step recommended studies, strategies, and projects are to be incorporated in the initial draft and final regional flood plan. The regional flood plan must also include:

- Public comments and RFPG response on the recommended FMPs, FMEs and FMSs
- Initial and final adoption

Attachment A



RFP Technical Guidelines Figure 5: FMP Flowchart

Attachment B

