AGENDA ITEM REQUEST FORM
CITY OF JOHNSON CITY, TEXAS
CITY COUNCIL

ITEM NO. 9

MEETING DATE: **September 20, 2022**

AGENDA PLACEMENT:

☐ Ceremonial
☒ Consent
☐ Individual
☐ Closed Session

CAPTION:

Approval of a Resolution of the City Council of the City of Johnson City, Texas supporting the draft 2022 Lower Colorado-Lavaca Regional Flood Plan, including, but not limited to, the Report's inclusion of emergency management, drainage, and floodplain projects within Blanco County and Johnson City; authorizing the Chief Administrative Officer to take all necessary steps to implement the provisions of this Resolution; incorporating recitals; providing for severability; and adopting an effective date. (Staff)

STRATEGIC WORK PLAN:

☐ Not Applicable
☐ Goal 1: Increase Housing Diversity
☐ Goal 2: Expand Quality Lodging
☒ Goal 3: Improve Code Enforcement
☐ Goal 4: Improve Streetscaping & Signage
☒ Goal 5: Improve Fire Safety
☒ Goal 6: Improve Streets
☐ Goal 7: Increase Publicity & Promotion of the Community
☐ Goal 8: Increase Economic Development Activities

EXECUTIVE SUMMARY:

In 2019, Senate Bill No. 8 was enacted by the Texas Legislature to create a State Flood Plan. Pursuant to State Law, the Texas Water Development Board (TWDB) has prepared the draft 2022 Lower Colorado-Lavaca Regional Flood Plan and is currently seeking public review and comment. Public comments are due by October 17, 2022.

The draft Flood Plan includes the following projects affecting Blanco County and the City of Johnson City:

- Blanco County – Update and Maintain Emergency Management Plan;
- Blanco County – Upgrade Low Water Crossings;
- Johnson City – Citywide Drainage Plan; and

- Johnson City – Develop New / Updated Floodplain Maps.

FINANCIAL:

Entity	Project	Est. Cost	Proposed Entity Share	Proposed Other (Federal, State, Etc.) Share
Blanco Co.	Update and Maintain Emergency Management Plan	$25,000.00	10%	90%
Blanco Co.	Upgrade Low Water Crossings	$100,000.00	10%	90%
Johnson City	Citywide Drainage Plan	$250,000.00	10%	90%
Johnson City	Develop New / Updated Floodplain Maps	$250,000.00	10%	90%

ATTACHMENTS: Proposed Resolution

SUGGESTED ACTION:

Motion to approve a Resolution of the City Council of the City of Johnson City, Texas supporting the draft 2022 Lower Colorado-Lavaca Regional Flood Plan, including, but not limited to, the Report's inclusion of emergency management, drainage, and floodplain projects within Blanco County and Johnson City; authorizing the Chief Administrative Officer to take all necessary steps to implement the provisions of this Resolution; incorporating recitals; providing for severability; and adopting an effective date.

PREPARED BY: City Staff

DATE SUBMITTED: 9/16/22

RESOLUTION NO. 22-094

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF JOHNSONCITY, TEXAS SUPPORTING THE DRAFT 2022 LOWER COLORADO-LAVACA REGIONAL FLOOD PLAN, INCLUDING, BUT NOT LIMITED TO, THE REPORT'S INCLUSION OF EMERGENCY MANAGEMENT, DRAINAGE, AND FLOODPLAIN PROJECTS WITHIN BLANCO COUNTY AND JOHNSON CITY; AUTHORIZING THE CHIEF ADMINISTRATIVE OFFICER TO TAKE ALL NECESSARY STEPS TO IMPLEMENT THE PROVISIONS OF THIS RESOLUTION; INCORPORATING RECITALS; PROVIDING FOR SEVERABILITY; AND ADOPTING AN EFFECTIVE DATE.

WHEREAS, in 2019, Senate Bill No. 8 was enacted by the Texas Legislature to create a State Flood Plan; and

WHEREAS, the Texas Water Development Board (TWDB) has prepared the draft 2022 Lower Colorado-Lavaca Regional Flood Plan and is currently seeking public review and comment; and

WHEREAS, the draft Flood Plan includes the following projects affecting Blanco County and the City of Johnson City:

- Blanco County – Update and Maintain Emergency Management Plan;
- Blanco County – Upgrade Low Water Crossings;
- Johnson City – Citywide Drainage Plan; and
- Johnson City – Develop New / Updated Floodplain Maps.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF JOHNSON CITY, TEXAS THAT:

Section One. ***Support.*** The City of Johnson City supports the draft 2022 Lower Colorado-Lavaca Regional Flood Plan, attached hereto as Exhibit A, including, but not limited to, the Report's inclusion of emergency management, drainage, and floodplain projects within Blanco County and Johnson City.

Section Two. ***Authorization.*** The Chief Administrative Officer is hereby authorized to take all necessary steps to implement the provisions of this Resolution.

Section Three. ***Effective Date.*** This Resolution shall take effect immediately upon its adoption.

Section Four. ***Recitals.*** The City Council finds all the above recitals to be true andcorrect and incorporates the same in this Resolution as findings of fact.

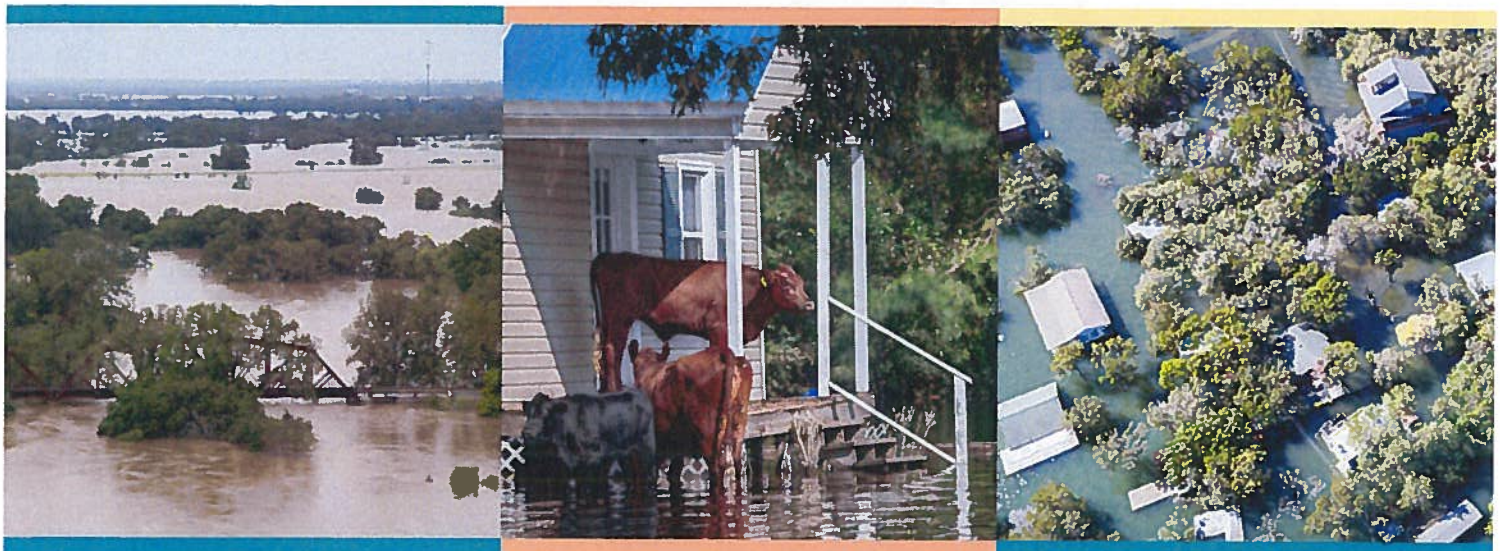
Section Five. ***Severability.*** If any section, subsection, sentence, clause, or phrase of this Resolution is for any reason held to be unconstitutional or illegal, such decision shall not affect the validity of the remaining sections of this Resolution. The City Council hereby declares that itwould have passed this Resolution, and each section, subsection, clause, or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared void.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF JOHNSON CITY, TEXAS THIS 20th DAY OF SEPTEMBER 2022.

_____
Rhonda Stell, Mayor

ATTEST:

_____
Whitney Walston
City Secretary



2022

DRAFT LOWER COLORADO-LAVACA REGIONAL FLOOD PLAN

Lower Colorado-Lavaca
REGIONAL FLOOD PLANNING GROUP

REGION 10

Submitted by the Lower Colorado-Lavaca Regional Flood Planning Group
to the Texas Water Development Board | August 1, 2022

Members of Lower Colorado-Lavaca Regional Planning Group (Region 10)

Executive Committee

Chair:	Judge Phillip Spenrath
Vice Chair:	Ann Yakimovicz
Secretary:	Kelly Payne, P.E.
At-Large:	Brandon Klenzendorf, Ph.D., P.E.
At-Large:	Jason Ludwig

Voting Membership

NAME	INTEREST CATEGORY
Terry Been	Agricultural interests
Judge Phillip Spenrath	Counties
Jason Ludwig	Electric generating utilities
Kirby Brown	Environmental interests
G. Nicholas Textor	Flood districts
Brandon Klenzendorf, Ph.D., P.E.	Industries
Matt Hollon	Municipalities
Frances Acuna	Public
Patrick Brzozowski, P.E.	River authorities
Kelly Payne, P.E.	River authorities
Ann Yakimovicz	Small business
VACANT (at time of printing)	Water districts
Hank Smith	Water utilities

Technical Committee

Chair:	Kelly Payne, P.E.
Vice Chair:	Brandon Klenzendorf, Ph.D., P.E.
Secretary:	Ann Yakimovicz
	Kirby Brown
	Matt Hollon

Technical Consultants

HALFF

FREESE NICHOLS HDR WaterPRE

Lower Colorado-Lavaca Regional Flood Plan

August 2022 Draft Plan

Prepared for:

Texas Water Development Board

Prepared by:

Lower Colorado-Lavaca Regional Flood Planning Group (Region 10)

with assistance from Technical Consultant Team:

Halff Associates, Inc. (TBPELS Firm #312) including subconsultants Freese and Nichols, Inc. (TBPELS Firm #2144), HDR, Inc. (TBPELS Firm #316), and WaterPR

PRELIMINARY – FOR INTERIM REVIEW

These draft documents are for interim review purposes only.
They were prepared by, or under the supervision of the following.

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Task Lead | WaterPR
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Executive Summary

Source: Lower Colorado River Authority

In 2019, the Texas Legislature enacted Senate Bill 8 directing the creation of the first-ever State Flood Plan to be prepared by the Texas Water Development Board (TWDB) and to follow a similar regional "bottom-up" approach that has been used for water supply planning in Texas for more than 20 years. As outlined by the Texas Water Code, the purpose of the regional and state flood plans is to:

- provide for orderly preparation for and response to flood conditions to protect against the loss of life and property
- guide state and local flood control policy
- contribute to water development, where possible

As depicted in *Figure ES.1*, draft Regional Flood Plans (RFP) are to be submitted to the TWDB by August 1, 2022 and final adopted RFPs by January 10, 2023. Subsequently, the regional flood plans will be amended to incorporate any new or additional information by July 14, 2023. Regional Flood Plans will then be used to prepare the first State Flood Plan for adoption by TWDB by September 1, 2024. Regional and state flood plans are to be updated every five years.

Figure ES.1 TWDB Timeline

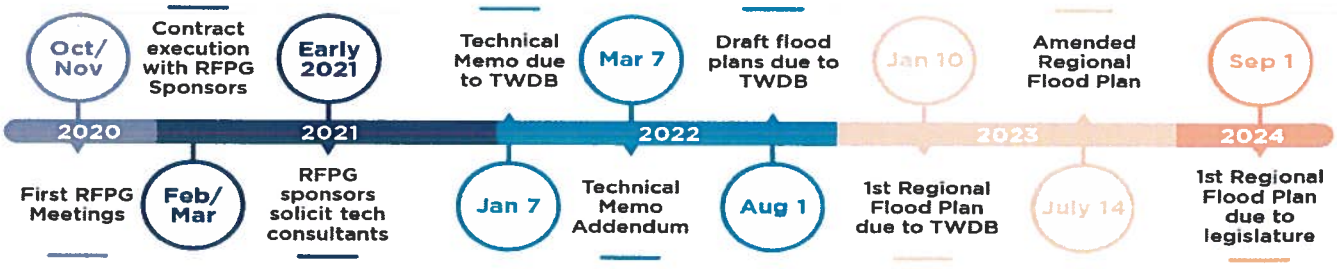
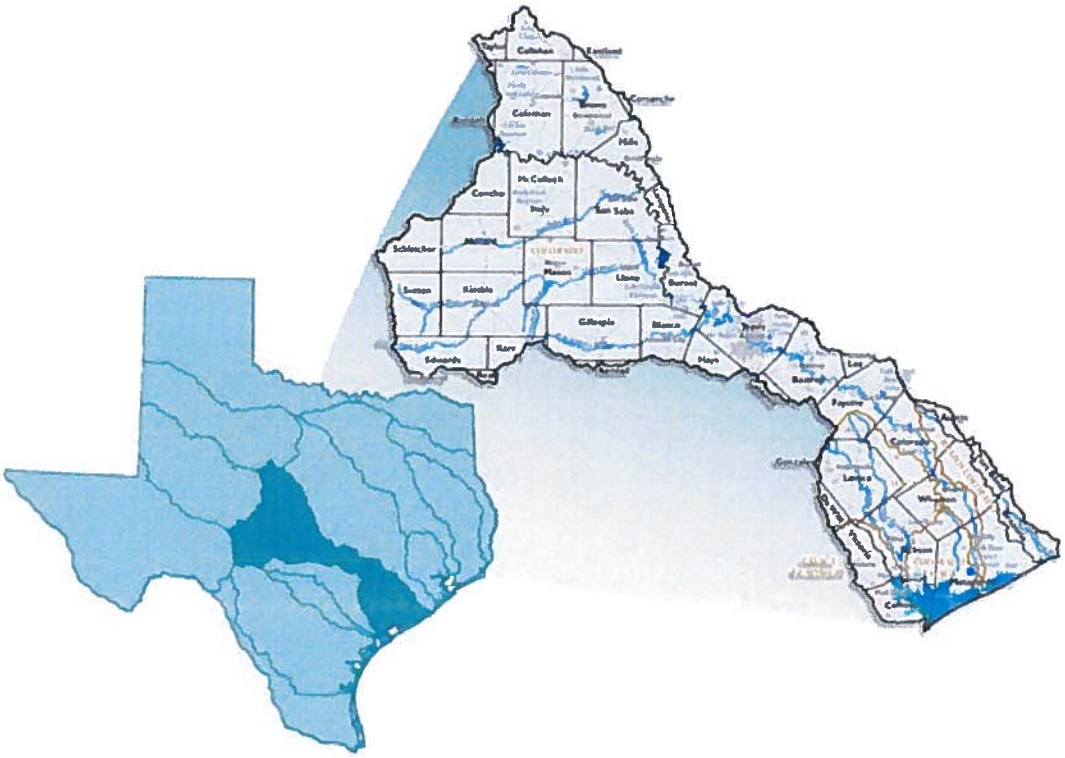


Figure ES.2 shows the river basin delineations of the 15 flood planning regions established by the TWDB, as well as the boundaries (dark green) of the Lower Colorado-Lavaca Flood Planning Region enlarged to

show its 43 counties. The TWBD has also designated the region as Region 10. The region encompasses the Lower Colorado, Lavaca, and San Bernard River Basins, an area of more than 24,000 square miles and nearly 55,000 miles of streams. A few "quick facts" about the region are presented in *Figure ES.3*.

Figure ES.2 Lower Colorado-Lavaca Flood Planning Region



Who is Preparing the Regional Flood Plans?

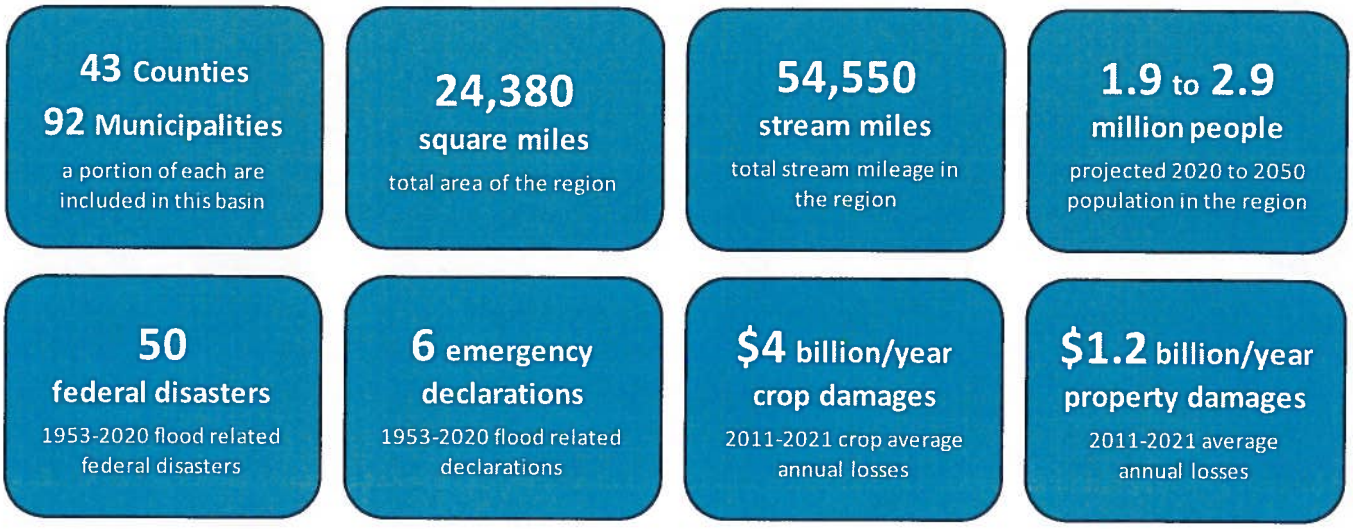
Early in the implementation of the regional flood planning process, the TWDB established and convened Regional Flood Planning Groups (RFPG) for each of the 15 regions. The responsibilities of the Regional Flood Planning Group's include directing the work of technical consultants, soliciting and considering public and stakeholder input, identifying specific flood risks, and identifying, evaluating, and recommending flood management studies, strategies, and projects to reduce flood risk. To ensure a diversity of perspectives throughout the planning process, the TWDB appointed RFPG members representing 11 interest groups:

- Agriculture
- Counties
- Electric Generation Utilities
- Environmental Interests
- Industry
- Municipalities
- Public
- River Authorities
- Small Businesses
- Water Districts
- Water Utilities

The TWDB has administered the regional flood planning process through a contractual relationship with a sponsor selected by the RFPG, the Lower Colorado River Authority (LCRA). LCRA's role as the sponsor is to provide administrative and logistical support for RFPG meetings and required public meetings, to

develop and manage the RFPG's website, to administer a contract with the project technical consultant team, and administer grant funds provided by the TWDB for the regional flood planning process.

Figure ES.3 Quick Facts – Lower Colorado-Lavaca Flood Planning Region



Regional Flood Planning Tasks

The TWDB rules, scope-of-work, and technical guidelines for regional flood planning prescribe a process consisting of 13 tasks, as outlined in *Table ES.1*.

Table ES.1 Regional Flood Planning Tasks

Task	Description
1	Planning Area Description
2	Existing and Future Condition Flood Risk Analysis
3	Floodplain Management Practices and Flood Mitigation and Floodplain Management Goals
4	Flood Mitigation Needs Analysis and Identification and Evaluation of Potential Flood Management Evaluations (FMEs), Potentially Feasible Flood Management Strategies (FMSs), and Flood Mitigation Projects (FMPs)
5	Recommendation of FMEs and FMSs and Associated FMPs
6	Impacts of Regional Flood Plan and Contributions to and Impacts on Water Supply Development and the State Water Plan
7	Flood Response Information and Activities
8	Administrative, Regulatory, and Legislative Recommendations
9	Flood Infrastructure Financing Analyses
10	Public Participation and Plan Adoption
11	Outreach and Data Collection to Support Tasks 1 – 9
12	Identified Flood Management Evaluations, Identify, Evaluate, and Recommend Additional Flood Mitigation Projects
13	Preparation and Adoption of an Amended Regional Flood Plan

The results of the regional flood planning process for the Lower Colorado-Lavaca Region – key findings and recommendations - are reported in this Regional Flood Plan in 10 chapters, each corresponding to the first 10 tasks listed above. Because of its importance to the entire regional flood planning process, from start to finish, public outreach and engagement activities performed under Task 10 are discussed first.

Public Outreach and Engagement

From the beginning to the conclusion of the regional flood planning process, public and entity outreach and engagement have been a high priority of the Lower Colorado-Lavaca RFPG. This has included how the Lower Colorado-Lavaca RFPG meetings have been conducted; the development and maintenance of a robust and user-friendly website (LowerColoradoLavacaFlood.org); an online survey to gather information from the public and local entities; the use of email blasts, social media, and press releases to notify the public and local entities of upcoming RFPG meetings and the availability of draft documents for review; and direct outreach to local entities, particularly to local sponsors of Flood Management Evaluations (FME) and Strategies (FMS) and Flood Mitigation Projects (FMP).

The Lower Colorado-Lavaca RFPG convened its first meeting in November 2020, at which time it elected a chairperson, a vice-chairperson, a secretary, and two additional RFPG to serve on an Executive Committee. At its December 2021 meeting, the RFPG established a Technical Committee to review, on behalf of the full RFPG, potential FMEs, FMPs, and FMSs for possible inclusion as recommendations in the Regional Flood Plan. Five members of the RFPG were selected to serve on the committee.

All meetings of the Lower Colorado-Lavaca RFPG have been conducted following the requirements of the Texas Open Meetings Act (Chapters 551 and 552, Government Code), the Public Information Act, COVID-related disaster proclamations issued by Governor Abbott, and the RFPG's bylaws. Throughout the planning process, all RFPG meetings have been convened either virtually via the Zoom webinar platform or in a hybrid (virtual and in-person) format. At each meeting since February 2021, the RFPG has provided two opportunities for public comment, one at the beginning of the meeting and the other at the conclusion.

The LCRA has been responsible for posting all meetings of the RFPG and its committees following the requirements of the Texas Open Meetings Act. The LCRA also distributes agendas and meeting materials via email to all voting and non-voting RFPG members, as well as to any person or entity who has requested notice of RFPG meetings and activities.

Key Findings and Recommendations

An overview of key findings and recommendations included in this Regional Flood Plan follows:

Existing and Future Flood Risk, Exposure, and Vulnerability

Assessment of flood risk is a critical early step in the regional flood planning process. The objective is to identify flood hazard areas within the Lower Colorado-Lavaca Region and assess the exposure and vulnerability of people, property, critical facilities, and public infrastructure that to flood risk under both existing and future conditions. This three-part analytical process is represented below in *Figure ES-4*.

Figure ES.4 Flood Risk Analysis Framework

Perform existing and future condition **flood hazard analyses** to determine the location and magnitude of both the 1% annual chance (100-year) and 0.2% annual chance (500-year) flood events

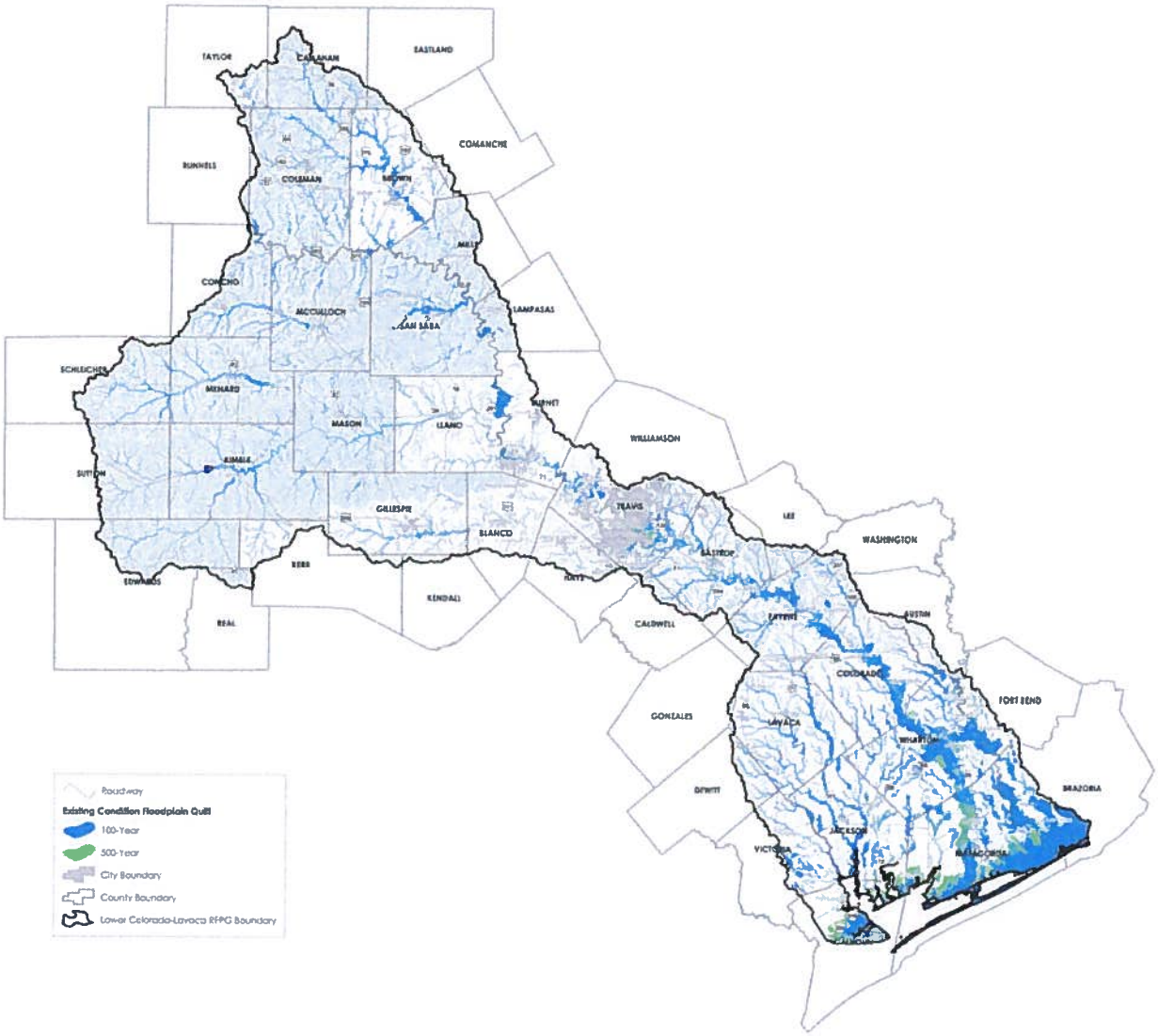
Develop existing and future condition **flood exposure analyses** to identify who and what might be harmed by both 1% annual chance (100-year) and 0.2% annual chance (500-year) flood events

Perform existing and future condition vulnerability analyses to identify vulnerability of communities and critical facilities

A key step in analyzing current and future flood risk was to assemble a "floodplain quilt" for the region. This analysis was performed for both the 1 percent annual chance flood (100-year) and the 0.2 percent annual chance flood (500-year). The floodplain quilt combines data layers from the Federal Emergency Management Agency (FEMA), including effective floodplain maps, preliminary maps, base level elevation (BLE) maps, and data from other federal agencies. Data and information from local and sub-regional flood studies was also used to develop quilt "patches". Any remaining gaps in the floodplain quilt were filled using the Fathom dataset provided by the TWDB. The RFPG ultimately decided to assemble the existing condition floodplain quilt using the data source hierarchy outlined below. The resultant floodplain quilt is displayed in *Figure ES.5*.

1. Local Studies
2. FEMA National Flood Hazard Layer
    - Pending and Preliminary Data
    - Effective Data for Detailed Study Areas (Zone AE, AO, AH, and VE)
3. Base Level Engineering
4. National Flood Hazard Layer
    - Effective Data for Approximate Study Areas (Zone A and V)
5. Fathom Data

Figure ES.5 Existing Condition Flood Hazard Map



The exposure analysis for the Lower Colorado-Lavaca Region considered floodplain areas, buildings including residential and non-residential properties, populations, critical facilities, and public infrastructure including industrial and power generating facilities, roadways, and agricultural areas within the region. *Table ES.2* displays the results of the exposure analysis for the region for the existing condition 1 percent (100-year) and 0.2 percent (500-year) annual chance flood events.

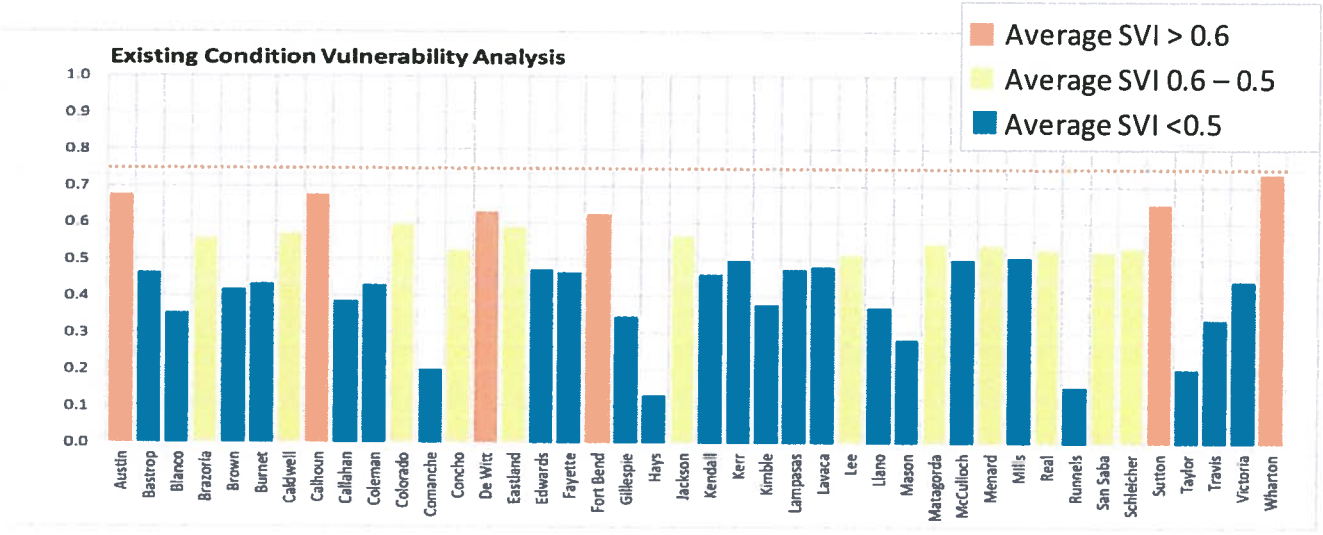
The number of buildings and associated population exposure to flood hazards are likely less than estimated. The estimated exposure identified building footprints and associated populations located within floodplain boundaries regardless of building elevations.

Table ES.2 Summary of Existing Condition Exposure in the Lower Colorado-Lavaca Region

Exposure Category	1% (100-year) Floodplain	0.2% (500-year) Floodplain	Difference
Floodplain Area (square miles)	4,526	5,252	*+726*
Buildings	67,824	102,301	+34,477
Residential Structures	*45,799*	*71,243*	*+25,444*
Non-Residential Structures	*22,025*	*31,058*	*+9,033*
Population (All Buildings)	149,830	244,664	+94,834
Critical Facilities	118	205	+87
Industrial and Power Generating Facilities	*13*	*18*	*+5*
Roadway Low Water Crossings	1,109	1,132	+23
Roadway Segments (miles)	2,374	3,285	+911
Area of Agriculture (square miles)	3,545	4,155	+610

The third component of the existing conditions analysis is the consideration of the social vulnerability of communities in the region in terms of potential negative impacts of flooding. The 2018 Social Vulnerability Index (SVI) data developed by the United States Centers for Disease Control and Prevention (CDC) was used to assess social vulnerabilities within the Lower Colorado-Lavaca Region. Social vulnerability is the measure of the capacity of a community to weather, resist, or recover from the impacts of a hazard in the long and short term. SVI values between 0.75 and 1 denote populations with high vulnerability. Figure ES.6 shows the SVI results associated with structures within the existing condition 1 percent annual chance (100-year) floodplain. This figure shows the largest clusters of buildings with the highest vulnerabilities are within Wharton and Matagorda counties. Austin, Calhoun, De Witt, Fort Bend, Sutton, and Wharton counties all have a mean SVI of over 0.6. All but Sutton County are located in the lower third of the Lower Colorado-Lavaca Region.

Figure ES.6 Existing Condition Vulnerability Analysis for Exposed Buildings and Critical Facilities in the 100-Year Floodplain



The existing condition flood risk analysis also served as the basis for assessing potential future flood risk conditions in the Lower Colorado-Lavaca Region. This is a characterization of future conditions for the planning area based on a "no-action" scenario of approximately 30 years of continued development and population growth under current development trends and patterns, existing flood regulations and policies, as well as anticipated climate and land use changes. To project potential future conditions for a no-action scenario, a floodplain quilt was developed for the region using the following methods:

- utilize the existing condition 0.2 percent annual chance (500-year) floodplain as a proxy for the potential future condition 1 percent annual chance (100-year) floodplain
- estimate the potential future condition 0.2 percent annual chance (500-year) floodplain using a horizontal buffer based on the measured difference (delta) between the existing condition 1 percent annual chance (100-year) and the existing 0.2 percent annual chance (500-year) floodplain

The resultant future conditions floodplain quilt provided the basis for estimating future conditions flood risk, exposure, and vulnerability. The results of this analysis and the complete results of the existing conditions analysis are presented in Chapter 2.

Recommended Floodplain Management Practices and Flood Mitigation Goals

Chapter 3 of this Regional Flood Plan presents the results of Task 3 in two parts. The first part assesses current floodplain management practices within the region (Task 3A), while the second part presents the flood mitigation and floodplain management goals adopted by the Lower Colorado-Lavaca RFPG to guide the planning process (Task 3B).

Overall, the current state of floodplain management practices, as measured by the number of counties and cities in the region that have adopted and enforced floodplain management standards and regulations, can be considered "excellent." Nearly all counties and cities in the region have adopted and enforce at least minimum floodplain management standards and regulations, and many have adopted "higher" standards. Notably, all but two of 43 counties and 11 of 92 cities in the region are currently participating in the National Flood Insurance Program (NFIP). In the aggregate approixmately 90 percent of the land area of the regaion and virtually 100 percent of the population of the region is within areas that have and enforce floodplain management standards and regulations. TWDB-required Table 6 in *Appendix B* provides an overview of the current state of floodplain management in the Lower Colorado-Lavaca Region.

In addition to assessing the state of floodplain management practices in the region, the Lower Colorado-Lavaca RFPG was required to consider whether to adopt and require region-specific floodplain management standards as a prerequisite for the inclusion of recommended FME, FMS, or FMP in the regional flood plan. The Lower Colorado-Lavaca RFPG believes that existing state and federal requirements combined with the very high level of NFIP participation in the region is sufficient. The RFPG therefore does not recommend adopting region-specific floodplain management standards and regulations for this initial regional flood planning cycle. However, the RFPG has adopted

recommendations that, if implemented by local entities, will strengthen or enhance floodplain management in many areas of the region that have not adopted higher standards The RFPG's recommendations are:

- if appropriate, communities in the region that are not currently participating in the NFIP are encouraged to do so
- communities in the region are also encouraged to adopt "higher" or enhanced standards for floodplain management and land development and are encouraged to consider participation in the FEMA Community Rating System (CRS)
- updating outdated floodplain maps and associated models is a priority and should occur as soon as possible, particularly in areas affected by updated Atlas 14 rainfall statistics (i.e., increased rainfall rates)
- cities and counties, within the limits of their authority, should consider flood hazards, floodplain management, and stream corridor protection in their comprehensive land use plans and associated land use regulations (e.g., zoning, subdivision platting)

As noted, Chapter 3 also includes flood mitigation and floodplain management goals adopted by the Lower Colorado-Lavaca RFPG. Importantly, in addition to guiding the overall flood planning process for the region, every recommended FME, FMS, and FMP must be tied to at least one goal. In total, the RFPG adopted 14 goals in six focus areas: education and outreach (1), flood warning and readiness (1), flood studies and analysis (3), flood prevention (5), non-structural flood infrastructure projects (2), and structural flood infrastructure projects (2).

Areas with the Greatest Flood Mitigation and Flood Risk Study Needs

Utilizing the results of the flood risk analysis reported in Chapter 2, a high-level assessment was performed to identify areas within the Lower Colorado-Lavaca Region with the greatest flood risk and the greatest need for flood management and mitigation activities and projects. A related objective was to identify areas with the greatest gaps in terms of knowledge and understanding of flood risk. The analysis results are presented in Chapter 4 of the Regional Flood Plan.

The region-wide assessment of flood risk, flood mitigation needs, and knowledge gaps was performed using a geospatial analysis process using data collected for Tasks 1 through 3. The spatial scale of the analysis was performed at the level of a Hydrologic Unit Code (HUC)-12, of which there are 560 HUC-12 watersheds in the Lower Colorado-Lavaca Region, with an average area of 43 square miles. Ten data categories were used in the geospatial analysis (see *Figure ES.7*). A uniform scoring scale of one to five was applied and each HUC-12 was assigned an appropriate score for each of the 10 categories. The scores for each HUC-12 for each of the 10 categories were then summed to obtain a total score, which reveals the areas of greatest known flood risk and the greatest need for mitigation activities. These areas are depicted in *Figure ES.8*.

Figure ES.7 Flood Mitigation Needs Analysis Categories

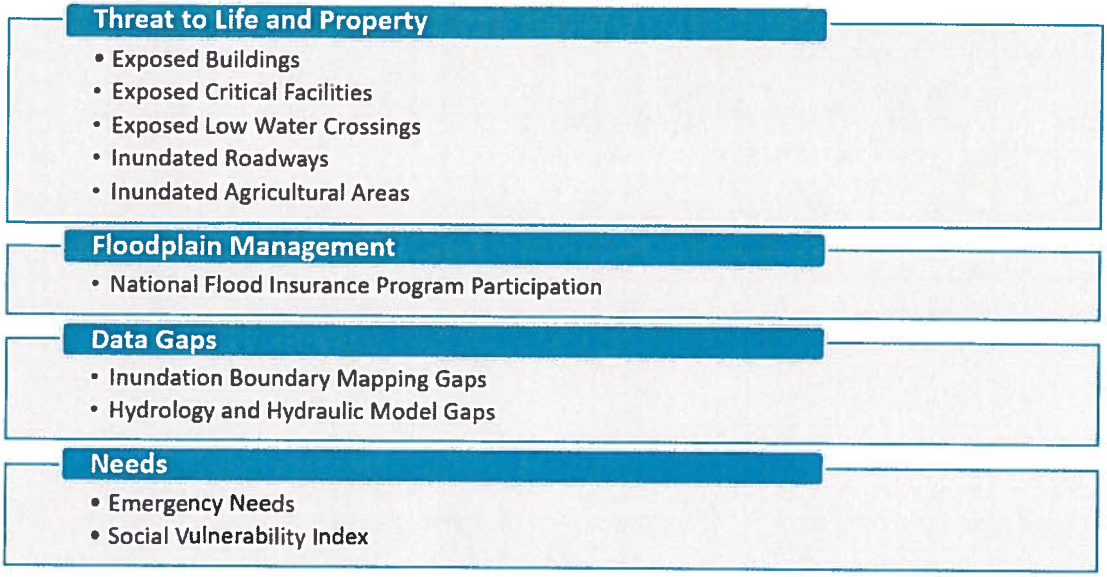
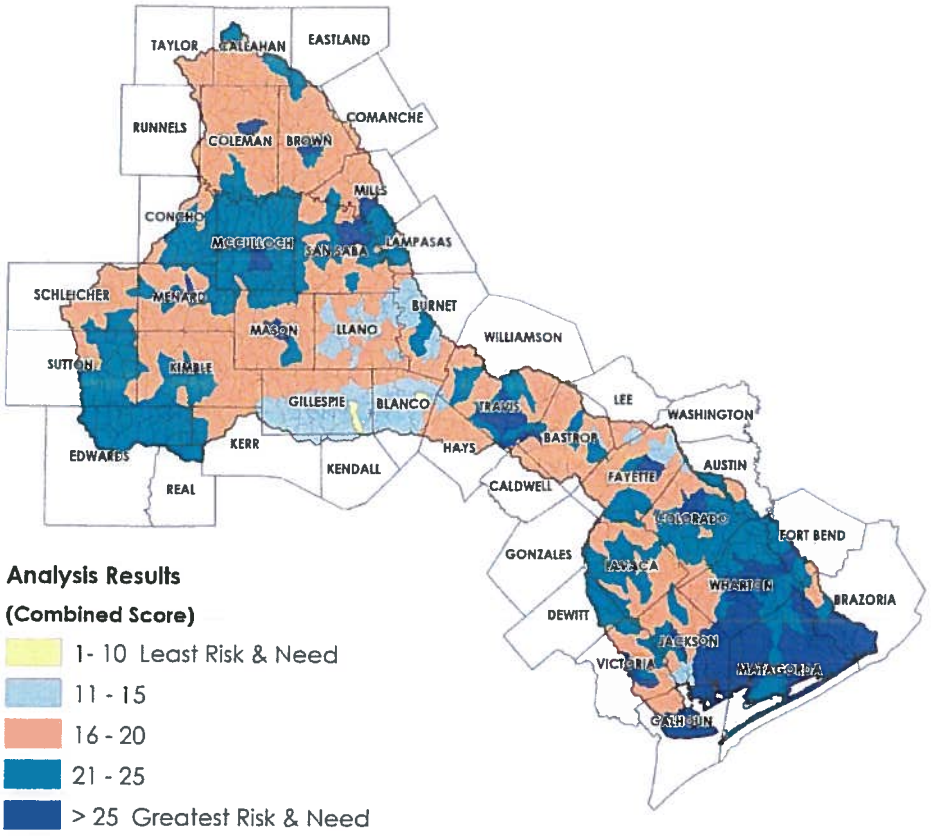


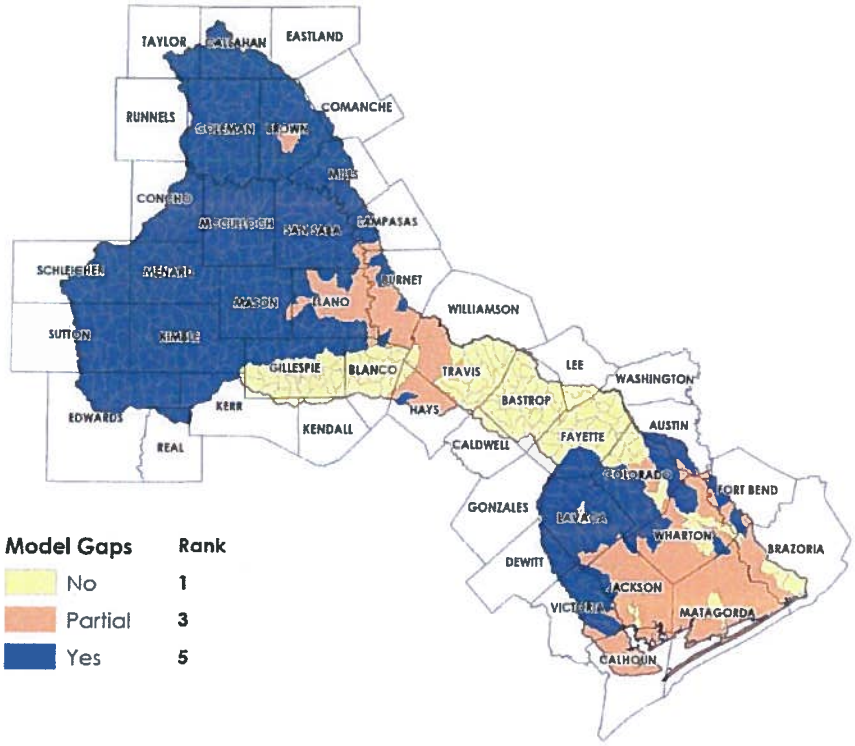
Figure ES.8 Scoring of Flood Mitigation Needs Analysis



The analysis to identify areas of the Lower Colorado-Lavaca Region with the greatest flood risk information gaps was based on the availability of, or lack thereof, hydrologic and hydraulic (H&H)

models. The H&H model gap areas exclude areas where local studies, base level engineering (BLE), and FEMA detailed or limited detailed studies are available. Scoring was determined based on whether a HUC-12 watershed had total, partial, or no coverage of model-based floodplains. The results of the analysis are displayed in *Figure ES.9*. As indicated, large areas of the region lack H&H models and therefore lack accurate floodplain maps and knowledge of flood risk. These areas are, by and large, rural with low and dispersed populations, hence flood risk exposure in these areas is likely limited. Importantly, the urbanized and more densely populated areas, particularly in and around the Austin Metropolitan Area, do not have significant H&H model gaps or have only partial gaps. That said, as discussed in various chapters of the regional water plan, even these areas have an immediate need to update existing H&H models and floodplain maps, particularly in the areas affected by updated Atlas 14 rainfall data. And as discussed elsewhere, such updates are underway in some of the most populous areas of the region.

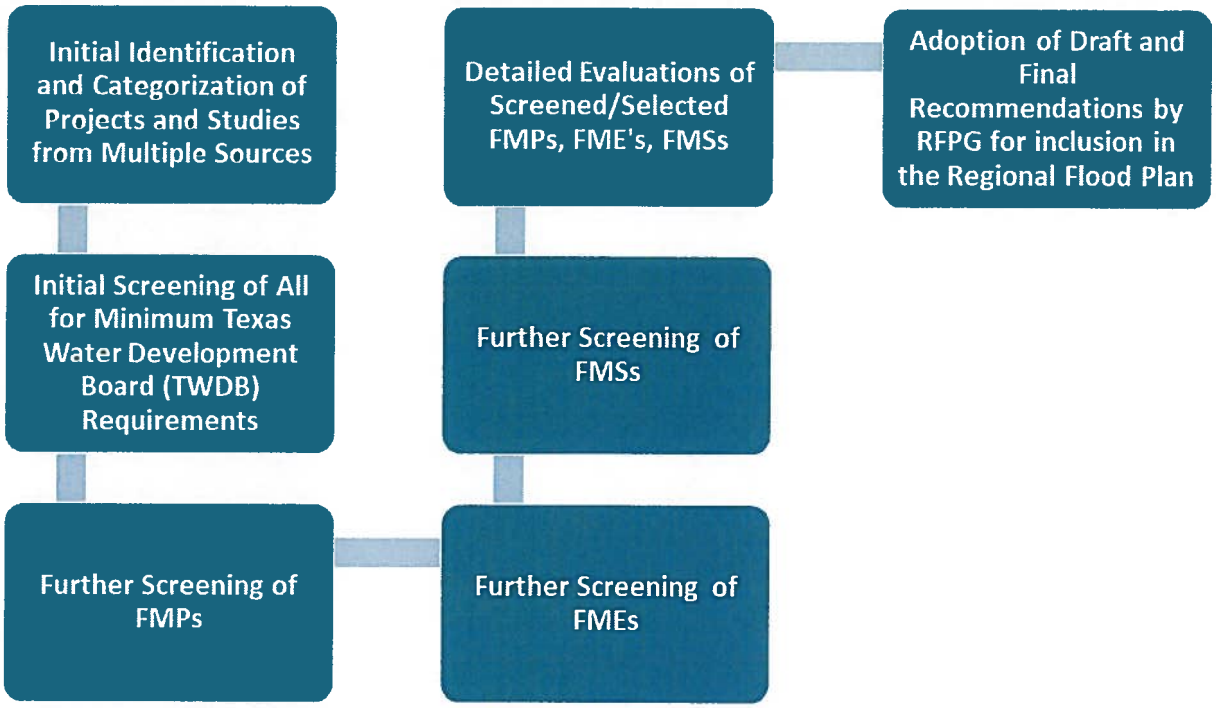
Figure ES.9 Scoring of Hydrologic and Hydraulic Model Gaps



Overview of Recommended FMEs, FMSs, and FMPs

Chapter 5 of this Regional Flood Plan presents the results of Tasks 4B and 5. In Task 4B, potentially feasible FMEs, FMSs, and FMPs were identified and screened for compliance with the TWDB requirements. Those that were deemed potentially feasible were further evaluated in Task 5 and ultimately were considered by the Lower Colorado-Lavaca RFPG for inclusion in the Regional Flood Plan. As noted previously, a Technical Committee of the RFPG was established to assist with the evaluation process, which was adopted by the RFPG and is depicted in *Figure ES.10*.

Figure ES.10 Process Overview Flow Diagram of Tasks 4B and 5



The Lower Colorado-Lavaca RFPG opted to take an inclusive approach to evaluate and recommend FMEs, FMSs, and FMPs. If an evaluation, strategy, or project generally met the TWDB requirements, was aligned with the RFPG's flood mitigation and floodplain management goals, seemed reasonable, and had the support of a local sponsor, the RFPG chose to give deference to the local sponsor and included those actions in the Regional Flood Plan. The conclusion of this process resulted in the RFPG's recommendations to include a total of 209 flood studies, projects, and strategies in the Regional Flood Plan. Each category of flood management/mitigation actions is summarized below. Note that individual single-page summaries were developed for each recommended action and are included in *Appendix C*.

Recommended Flood Management Evaluations

A flood management evaluation (FME), by the TWDB definition, is "a proposed flood study of a specific, flood-prone area that is needed to assess flood risk and/or determine whether there are potentially feasible FMSs or FMPs." There are five general categories of FMEs as described below in *Table ES.3*.

Table ES.3 Summary of Recommended FMEs

FME Type	FME Type	Description	Number
Watershed Planning	Drainage Master Plans, Other Community-Scale Plans	Supports the development and analysis of hydrologic and hydraulic models to evaluate flood risk within a given jurisdiction, evaluate potential alternatives to mitigate flood risk, and develop a capital improvement plan; Planning is often at a community scale.	7
Watershed Planning	Floodplain Modeling, Mapping, and Risk Assessment Studies	Studies to quantify flood risk in areas where significant flood risk is thought to exist but lacks flood risk data or has insufficient or outdated flood risk data. An example of this type of FME is a floodplain modeling and mapping study of a chronic flood-prone area with a certain population at risk that has not been previously. Often floodplain map products are approved and adopted at NFIP Flood Insurance Rate Maps (FIRMs).	14
Project Planning	Feasibility Studies	Studies typically employ flood hazard and flood risk/exposure data for a known flood problem area to evaluate structural and non-structural flood mitigation alternatives or FMP -types to provide the greatest flood risk reduction benefit for the least capital cost, taking into account adverse impacts and other factors. These FMEs typically include benefit-cost analysis and evaluations of other factors such as ongoing O&M costs, environmental constraints permitting requirements, land acquisition and utility relocation requirements, constructability, and public input and social factors	84
Project Planning	Preliminary Engineering	Detailed evaluation of a preferred flood risk reduction solution(s) to verify feasibility (e.g., technical, economic, environmental) often includes a full engineering assessment and engineering design up to 30 percent	30
Preparedness	Flood Emergency Preparedness Studies and Planning	Studies need to develop flood emergency action plans such as hurricane evacuation plans, flood emergency response and recovery plans, and dam breach emergency action plans.	16

Recommended Flood Mitigation Projects

By the TWDB definition, a flood mitigation project is "a proposed project that has a non-zero capital cost or other non-recurring costs and that when implemented will reduce flood risk and mitigate flood hazards to life or property".[1] FMPs are further categorized as either structural or non-structural. Structural FMPs is defined as building or modifying infrastructure to alter flood characteristics to reduce flood risk and are infrastructure projects with advanced analysis and 30 percent to 100 percent design development, including construction plans, specifications, and cost estimates.

Non-structural FMPs are flood mitigation projects or actions that change how people interact with flood risk and move people out of harm's way. These types of projects do not involve modifications to the watershed or flood infrastructure and therefore do not negatively impact adjacent areas or environmental impacts. Of note is that in some situations, the preferred solution to a flooding problem is a combination of structural improvements and non-structural actions. As shown in *Table ES.4,* there are six types of FMPs, 53 in total, that are recommended in this Regional Flood Plan.

Table ES.4 Summary of Recommended FMPs

FMP Type	General Description	Number
Stormwater Infrastructure Improvements	Improvements to stormwater infrastructure, including channels, ditches, ponds, stormwater pipes, etc.	9
Roadway Drainage Improvements	Improvements to roadway drainage infrastructure, including side ditches, culvert crossings, bridge crossings, etc.	12
Regional Detention Facilities	Runoff control and management via detention facilities	0
Property Acquisition	Voluntary acquisition of flood-prone structures	12
Flood Warning Systems	Install gauges, sensors, or barricades to monitor streams and low water crossings for potential flooding and support emergency response	10
Emergency Generators	Purchase and install emergency generators at critical facilities	11

Recommended Flood Management Strategies

By the TWDB definition, a Flood Management Strategy is "a proposed plan to reduce flood risk or mitigate flood hazards to life or property. A flood management strategy may or may not require associated Flood Mitigation Projects to be implemented". The Lower Colorado-Lavaca RFPG has recommended five regional FMSs, as displayed in *Table ES.5*.

Table ES.5 Summary of Recommended FMSs

FMP Name	FMP Description
Floodplain Management and Regulation	This strategy will consist of education, outreach, and direct technical assistance to cities and counties throughout the Lower Colorado-Lavaca Region, with a particular focus on providing targeted assistance to cities that are eligible but not currently participating in the NFIP; and other communities with the identification, evaluation, adoption, and implementation of enhanced floodplain management practices and regulations and land development, land use, and comprehensive drainage regulations.

FMP Name	FMP Description
Flood Awareness and Preparation Education and Outreach	This strategy includes the Lower Colorado-Lavaca RFPG continuing its public outreach and engagement efforts through ongoing TWBD funding. This would include periodic e-mail news blasts, additional public meetings to present the initial Regional Flood Plan, and continuing outreach to key stakeholders (e.g., state and local elected officials, floodplain administrators, and emergency coordinators).
Low Water Crossing Assessment, Prioritization, and Mitigation	There are an estimated 1,352 low-water roadway crossings within the Lower Colorado-Lavaca Region. Many of these crossings experience frequent flooding but may have relatively minor flood risk in terms of public safety and/or the integrity of the roadway. This strategy is for the Lower Colorado-Lavaca RFPG to provide technical assistance to communities assessing flood risk at low water crossings.
Stream Corridor Protection and Restoration	This strategy is focused on encouraging public/private partnerships to enhance the protection and restoration of stream corridors. The essence of this strategy is open space acquisition, either through fee simple purchases of property within stream corridors or through voluntary agreements (i.e., conservation easements) between governmental and/or non-governmental organizations and private landowners.
Watershed Modeling and Floodplain Mapping	This strategy is intended to address the need for immediate region-wide effort and funding to update watershed models, floodplain mapping, and associated geospatial products needed to understand flood risk and exposure; provide effective floodplain management; identify and evaluate flood risk reduction solutions and enhance flood emergency preparedness and response.

Estimated Cost to Implement the Regional Flood Plan

Overall, the estimated cost to implement recommended FMEs and FMPs is $416 million. Of that amount, it is estimated that as much as $374 million may be needed from state and federal sources. The breakdown of estimated cost by category of flood risk reduction actions is shown in *Table ES.6*.

Table ES.6 Estimated Costs to Implement Recommended FMEs, FMPs, and FMSs

Recommended Flood Risk Reduction Actions	Estimated Implementation Costs
Flood Management Evaluations	$32,905,000
Flood Mitigation Projects	$382,899,000
Flood Management Strategies	*TBD*
Total	**$415,804,000**

Impacts of the Regional Flood Plan

Implementing this Regional Flood Plan, specifically the implementation of recommended Flood Mitigation Projects, will directly benefit (i.e., reduce flood risk) the areas targeted by those FMPs and will not negatively impact flooding in neighboring areas within or outside of the region. Benefits will vary from one location to another due to the highly variable and location-specific nature of flood hazard areas. At a regional level, implementing the recommended FMPs is expected to reduce the number

and/or spatial extent of areas with high flood hazard and exposure. For example, previously impacted flood risk areas will see a reduction in the spatial extent of current flood risk by approximately 0.2 percent or a reduction of approximately 9.35 square miles (see *Table ES.7*). Implementation of the plan is also expected to remove an estimated 2,169 at-risk structures and five critical facilities from flood-prone areas. Most importantly, although not readily quantifiable, implementation of the plan will unquestionably reduce the future risk of loss of life and injury to residents of the region by reducing the frequency and severity of flooding, improving flood early warning capabilities and coverage, removing or reducing risk at low water crossings, and by improving the protection and management of floodplains and stream corridors.

Table ES.7 Reduction in Existing Flood Impacted Areas

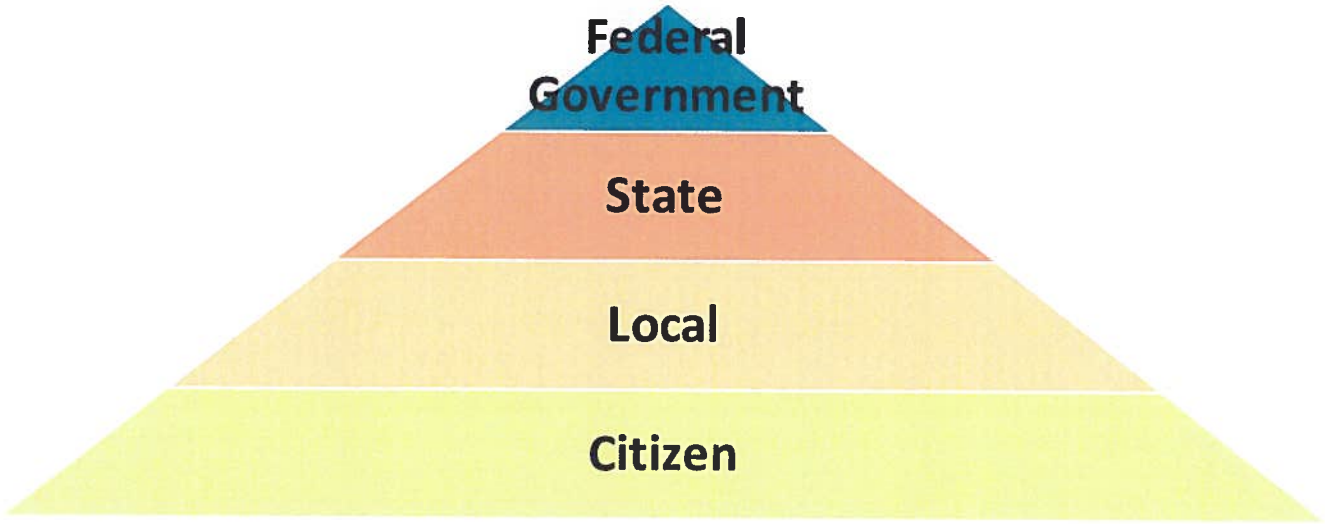
Annual Chance Event Flood Risk	Area in Floodplain (square miles)	Reduction of Floodplain after Implementation (square miles)
1%	4,526	7.05
0.2%	726	2.30
Total	**5,252**	**9.35**

As noted above, implementing the FMPs recommended in this plan will not negatively or adversely affect other areas. Similarly, it has been determined that there will be no measurable impacts, beneficial or adverse, from implementing the recommended FMPs on water supply, water availability, or projects in the State Water Plan.

Flood Preparedness

Responsibility for flood emergency preparedness, response, and recovery is a shared responsibility between multiple federal agencies, the states (as well as tribes and territories), and communities (i.e., individuals, businesses, and local government) operating within a national emergency management framework. In many respects, it's a "bottom-up" framework with much of the responsibility and authority for emergency management resting with local government and the communities they serve. This allows emergency management processes and activities to be tailored to only those areas affected by a natural disaster, such as a flood emergency. That said, federal and state agencies play a critical and often central role in coordinating emergency management activities and by providing support and assistance to local entities with emergency preparedness planning and training, emergency response, and post-disaster recovery.

Figure ES.11 Emergency Management Support



Source: Emergency Management Institute, Are You Ready?

Looking at the state of "flood response information and activities" as a whole for the Lower Colorado-Lavaca Region, the RFPG has concluded that the region is relatively well-prepared, in some areas more so than others, and always with the potential for improvement. Importantly, in the most populated areas of the region, there is a well-developed understanding of flood risk, ready access to real-time weather and hydrologic data and forecasts, and notification systems in place to alert the media and public to impending or ongoing flood conditions. There is also support for ongoing flood education and awareness. Importantly, local emergency management officials throughout the region operate within a well-established national framework for emergency preparedness, response, and recovery.

Figure ES.12 Example Advertising and Outreach Campaigns from the City of Austin Watershed Protection Department

Overview of Policy Recommendations

The regional flood planning process also allowed the RFPGs to consider and adopt policy recommendations. Chapter 8 of this regional flood plan presents legislative, regulatory, and administrative recommendations (Task 8) adopted by the Lower Colorado-Lavaca RFPG. Recommendations are also provided regarding improvements to the regional flood planning process. The RFPG adopted 26 policy recommendations - eight legislative recommendations, nine regulatory and administrative recommendations, and nine flood planning recommendations. The legislative recommendations are:

- extend Local Government Code, Title 13, Subtitle A, Chapter 552 to allow counties to establish drainage utilities and collect drainage utility fees in unincorporated areas
- TWDB should investigate legal impediments and potential legislative or other remedies to the use of local government funds for the elevation and/or floodproofing of privately-owned structures at-risk of severe flooding
- establish and provide state budget appropriations and/or assess fees to fund the implementation of a levee safety program similar to the TCEQ dam safety program
- enact legislation updating the state building code to a more recent edition (e.g., the 2018 edition of the International Building Code and International Residential Code)
- provide ongoing state appropriations to the TWDB for additional grant funding for RFPGs to continue functioning during the interim between planning cycles
- increase state funding and technical assistance to develop accurate watershed models and FEMA Flood Insurance Rate Maps (FIRMs)
- TWDB should consider mapping updates as a high priority for future flood planning grants through the Flood Infrastructure Fund
- establish and fund a state program to assist counties and cities with assessing and prioritizing low water crossings
- funding should be provided on a cost-sharing basis to implement structural and/or non-structural flood risk reduction measures at high-risk, low water crossings
- consider establishing property tax incentives to protect stream corridors by private landowners

Role of the State in Flood Infrastructure Finance

The TWDB requires that each RFPG conduct a survey to assess and report on how Sponsors propose to finance recommended Flood Management Evaluations (FME), Flood Management Strategies (FMS), and Flood Mitigation Projects (FMP). The objective of the survey was to understand Sponsors' funding needs and the methods they use to fund projects; and inform RFPG recommendations regarding the state's role in financing recommended FMEs, FMSs, and FMPs. Chapter 9 presents the results of the Sponsor survey and provides an overview of the various means and sources of funding and financial assistance available to local entities for flood-related activities and projects (see *Table ES.8*). Chapter 9 also presents the Lower Colorado-Lavaca RFPG's recommendation regarding the role of the state in flood infrastructure finance, in which the RFPG expresses support for an expanded state role in financing flood-related activities, programs, and flood mitigation infrastructure and that ongoing and increased

funding for both technical and financial assistance should be made available through existing financial assistance programs administered by the TWDB and the Texas State Soil & Water Conservation Board (TSSWCB).

Table ES.8 Common Sources of Flood Infrastructure Funding in Texas

Source	Federal Agency	State Agency	Program Name	Grant (G)	Loan (L)	Post-Disaster (D)
Federal	FEMA	TDEM	Hazard Mitigation Grant Program (HMGP)	G	-	D
Federal	FEMA	TWDB	Flood Mitigation Assistance (FMA)	G	-	-
Federal	FEMA	TDEM	Building Resilient Infrastructure and Communities (BRIC)	G	-	-
Federal	FEMA	TCEQ	Rehabilitation of High Hazard Potential Dam Grant Program (HHPD)	G	-	-
Federal	FEMA	*TBD*	Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM)	-	L	-
Federal	FEMA	TDEM	Public Assistance (PA)	G	-	D
Federal	HUD	GLO	Community Development Block Grant – Mitigation (CDBG-MIT)	G	-	D
Federal	HUD	GLO	Community Development Block Grant Disaster Recovery Funds (CDBG-DR)	G	-	D
Federal	HUD	TDA	Community Development Block Grant (TxCDBG) Program for Rural Texas	G	-	-
Federal	USACE	-	Partnerships with USACE, funded through Continuing Authorities Program (CAP), Water Resources Development Acts (WRDA), or other legislative vehicles*	-	-	-
Federal	EPA	TWDB	Clean Water State Revolving Fund (CWSRF)	G**	L	-
State	-	TWDB	Flood Infrastructure Fund (FIF)	G	L	-

Source	Federal Agency	State Agency	Program Name	Grant (G)	Loan (L)	Post-Disaster (D)
State	-	TWDB	Texas Water Development Fund (Dfund)	-	L	-
State	-	TSSWCB	Structural Dam Repair Grant Program	G	-	-
State	-	TSSWCB	Operation and Maintenance (O&M) Grant Program	G	-	-
State	-	TSSWCB	Flood Control Dam Infrastructure Projects - Supplemental Funding	G	-	-
Local	-	-	General fund	-	-	-
Local	-	-	Bonds	-	-	-
Local	-	-	Stormwater or drainage utility fee	-	-	-
Local	-	-	Special-purpose district taxes and fees	-	-	-

**Opportunities to partner with the United States Army Corps of Engineers (USACE) are not considered grant or loan opportunities but shared participation projects where USACE performs planning work and shares in the construction cost.*

***The CWSRF program offers principal forgiveness, similar to grant funding.*

Identification Number	Activity Type	County	Sponsor	Action Name	File Name	Page Number
101000012	FME	Bastrop	Bastrop (County)	Old Sayers Rd & Little Sandy Creek	FME_1	11
101000013	FME	Bastrop	Bastrop (County)	Paffen Rd & Grassy Creek Draw	FME_1	12
101000014	FME	Bastrop	Bastrop (County)	Meduna Rd & Barton Oaks Draw 1	FME_1	13
101000015	FME	Bastrop	Bastrop (County)	Pine Canyon Dr & Wet Weather Creek	FME_1	14
101000016	FME	Bastrop	Bastrop (County)	Hall Rd & Young's Branch	FME_1	15
101000017	FME	Bastrop	Bastrop (County)	Friendship Rd & Turner Creek A and B	FME_1	16
101000018	FME	Bastrop	Bastrop (County)	Patterson Rd & Barton's Creek	FME_1	17
101000019	FME	Bastrop	Bastrop (County)	Upper Elgin River Rd & Cotton Creek	FME_1	18
101000020	FME	Bastrop	Bastrop (County)	Old Sayers Rd & Big Sandy Creek	FME_1	19
101000021	FME	Bastrop	Bastrop (County)	Caldwell Rd & Wet Weather Creek	FME_1	20
101000022	FME	Bastrop	Bastrop (Municipality)	Farm Street, Pine Street, Chestnut Road, MLK Drive	FME_1	21
101000023	FME	Bastrop	Bastrop (Municipality)	Gills Branch	FME_1	22
101000027	FME	Bastrop	Bastrop (County)	FM 812 at Little Alum Creek	FME_1	23
101000028	FME	Bastrop	Bastrop (County)	FM 812 at Alum Creek South	FME_1	24
101000102	FME	Bastrop	Bastrop (County)	Piney Creek Benching	FME_1	25
101000103	FME	Bastrop	Bastrop (County)	Drainage System Improvements - JC Madison Addition	FME_1	26
101000125	FME	Bastrop	Bastrop (County)	Alum Creek - Tributary 8, Bowie Drive	FME_1	27
101000155	FME	Bastrop	Elgin (Municipality)	Taylor Lane Drainage Improvements	FME_1	28
101000156	FME	Bastrop	Elgin (Municipality)	Storm Water Detention at Morris Park	FME_1	29
101000001	FME	Bastrop	Smithville (Municipality)	Willow-Gazley Local Drainage Alternative 3	FME_1	30
101000026	FME	Bastrop	Smithville (Municipality)	Smithville Recreation Center Expansion	FME_1	31
101000104	FME	Bastrop	Smithville (Municipality)	Citywide Drainage System Improvements	FME_1	32
101000105	FME	Blanco	Blanco (County)	Update and Maintain Emergency Management Plan	FME_1	33
101000106	FME	Blanco	Blanco (County)	Various Locations - Upgrade Low Water Crossings	FME_1	34
101000107	FME	Blanco	Johnson City (Municipality)	Citywide Drainage Plan	FME_1	35
101000108	FME	Blanco	Johnson City (Municipality)	Develop New/Updated Floodplain Maps	FME_1	36
101000136	FME	Brazoria	Jones Creek (Municipality)	Highway Drainage	FME_1	37
101000109	FME	Brazoria	Sweeny (Municipality)	CR 332 Drainage Improvements	FME_1	38
101000110	FME	Brazoria	Sweeny (Municipality)	Various Culverts Along Stevenson Slough	FME_1	39
101000137	FME	Brown	Brown (County)	CR257 at Pecan Bayou (Tenmile Crossing)	FME_1	40
101000029	FME	Brown	Brownwood (Municipality)	Magnolia St	FME_1	41
101000111	FME	Brown	Brownwood (Municipality)	Adopt Flood Insurance Rate Maps	FME_1	42
101000112	FME	Brown	Brownwood (Municipality)	Willis Creek Detention	FME_1	43
101000160	FME	Brown	Brownwood (Municipality)	Delaware Creek Flood Study	FME_1	44
101000031	FME	Burnet	Burnet (County)	County Road 328 at Cow Creek	FME_1	45
101000113	FME	Burnet	Burnet (County)	Burnet County Flood Early Warning Systems	FME_1	46
101000114	FME	Burnet	Burnet (Municipality)	Shade Grove Flood Study	FME_1	47
101000138	FME	Burnet	Burnet (Municipality)	Dam Emergency Action Plan	FME_1	48
101000159	FME	Burnet	Burnet (Municipality)	Wastewater Treatment Plant Flood Study	FME_1	49
101000161	FME	Burnet	Burnet (Municipality)	VFW Flood Study	FME_1	50