

Task 3: Floodplain Management Practices and Flood Protection Goals



Source: Llano River Dam, Llano, TX

Task 3 of the regional flood planning process consists of two interrelated subtasks. For Task 3A - Evaluation and Recommendations on Floodplain Management Practices, the Regional Flood Planning Group (RFPG) is to “Consider the extent to which a lack of, insufficient, or ineffective current floodplain management and land use practices, regulations, policies, and trends related to land use, economic development, and population growth, allow, cause, or otherwise encourage increases to flood risks to both: a. existing population and property, and b. future population and property.” Based on this analysis, the RFPG is to make recommendations regarding future floodplain management, land use, and economic development practices that entities in the Lower Colorado-Lavaca Region should implement. At its discretion, the RFPG may also opt to make recommendations regarding minimum floodplain, land use, or other standards that are specific to the Lower Colorado-Lavaca Region or for sub-regions of the flood planning region. Such standards, if recommended by the RFPG, are to be adopted by the sponsors of any recommended Flood Management Evaluations or Strategies and Flood Mitigation Projects as a prerequisite for their inclusion in the Regional Flood Plan. For Task 3B, the RFPG is to adopt “...specific and achievable flood mitigation goals along with target years to meeting those goals...”. This includes short-term goals and performance measures (10 years) and long-term goals and measures (30 years).

This chapter presents the findings and recommendations associated with these subtasks in two corresponding sections.

Task 3A: Evaluation and Recommendations on Floodplain Management Practices

Minimum Standards and Regulations

The National Flood Insurance Program (NFIP) is the foundation for floodplain management throughout the U.S. and the logical starting point for evaluating the current state of floodplain management in the Lower Colorado-Lavaca Region. The NFIP, established by Congress in 1968 and administered by the Federal Emergency Management Agency (FEMA), provides subsidies for private flood insurance for property owners in communities that participate in the NFIP. The overall goal of the NFIP is to reduce exposure to flood risk and protect public safety and prevent or minimize damage to property and public infrastructure.



FEMA

National Flood Insurance Program (NFIP) Floodplain Management Requirements

A Study Guide and Desk Reference for Local Officials

This study guide and desk reference can serve two purposes. First, it can be used as a study guide to enhance the knowledge and skills of local officials responsible for administering and enforcing local floodplain management regulations. It is also intended to broaden their understanding of floodplain management strategies that can be applied at the local level. Local officials and others can use the study guide to help them study for the exam for the Association of State Floodplain Manager's (ASFPM) Certified Floodplain Manager designation.

Secondly, the study guide can be used as a desk reference that you can refer to when specific issues arise as you implement your floodplain management ordinance. Guidance is included on how to handle many of the issues and information provided that will help you explain the requirements to citizens of your community.

While any interested person may use this study guide and desk reference, it is written specifically for the local official who is responsible for administering his or her community's floodplain management regulations.

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February 2005

Minimum NFIP Standards and Requirements

- Adoption and enforcement of a flood damage prevention ordinance (or court order)
- Require permits for all types of development in floodplains
- Ensure that building sites are reasonably safe from flooding
- Estimate flood elevations for areas that lack FEMA determinations
- Require that new or substantially improved buildings be constructed at or above the Base Flood Elevation
- Require Elevation Certificates to document compliance
- Require other buildings to be elevated or floodproofed
- Conduct inspections and cite violations
- Resolve/remedy non-compliance and violations
- Minimize variances
- Inform FEMA when updates to flood maps are needed

Source: Quick Guide – Floodplain Management in Texas, Texas Floodplain Management Association, 2015

Local entities become eligible to participate in the NFIP by adopting and enforcing minimum regulatory standards for land use, development, and other activities within floodplains. The delineation of regulatory floodplains is based on data provided by FEMA, which may include floodplain boundaries, base flood elevations (BFE), Flood Insurance Rate Map (FIRM) zones and floodway boundaries, Flood Boundary Floodway Map, and/or a Flood Insurance Study.

The NFIP minimum standard for floodplain regulation is the Base Flood Elevation (BFE), which is the water surface elevation resulting from a flood with a 1 percent chance of equaling or exceeding that level in any given year commonly referred to as the 100-year floodplain (*FEMA*). Of note is that communities are encouraged by FEMA to go beyond minimums and adopt higher or more restrictive standards and requirements. Also of note is that NFIP participants are subject to audit by FEMA and/or the Texas Water Development Board (TWDB) to ensure that they are in compliance with minimum requirements.

Regarding the overall state of floodplain regulation in the Lower Colorado-Lavaca Region, it can be considered “excellent” as, at present, 122 of the 135 counties and cities within the Lower Colorado-Lavaca Region are participants in “good standing” in the NFIP. All counties except Edwards and McCulloch Counties participate in the NFIP and all cities except Cross Plains, Goldthwaite, Lawn, Melvin, Mullin, Novice, Richland Springs, Round Mountain, Santa Anna, and Webberville are NFIP participants.

A table summarizing the current status of floodplain management and regulation in the Lower Colorado-Lavaca Region is included in *Appendix B*. This required table includes NFIP participation status, whether a

county or city has adopted “higher” floodplain standards and requirements, a qualitative assessment of the level of enforcement, and whether a city has established a drainage or stormwater utility. Local Government Code, Title 13, Subtitle A, Chapter 552 authorizes cities to establish stormwater utilities and assess stormwater utility fees, also referred to as drainage fees. Only cities have the authority to establish and assess stormwater utility fees. As indicated in the table in Appendix B, only three cities within the Lower Colorado-Lavaca Region have drainage utilities and assess drainage fees – Austin, Fredericksburg, and Sunset Valley.

Many participating NFIP communities are using floodplain data and maps that are outdated. Older floodplain maps are often based on outdated and somewhat inaccurate topographic data, outdated rainfall and hydrologic data, and/or outdated hydrologic and hydraulic models. To the extent that communities are using outdated maps for floodplain regulation, the current level of protection from flood damages through floodplain regulation may be less than the minimum level required by the NFIP (i.e., less than the benchmark 1 percent annual chance or 100-year event).

As discussed in Chapter 1, the National Weather Service published an updated rainfall statistical analysis for Texas in 2018 using additional historical data through 2017. This study, known as Atlas 14, shows that a large area of Texas, including roughly two-thirds of the Lower Colorado-Lavaca Region, has experienced more intense rainfall, resulting in a greater amount of flood risk than previously thought. As depicted in *Figure 1.17* in *Task 1*, the entire lower portion of the Lower Colorado-Lavaca Region downstream of the Highland Lakes has increased rainfall rates per Atlas 14. To illustrate, in the Austin area, existing FEMA floodplain maps for the 1 percent annual chance flood event are based on approximately 10 inches of rainfall in 24 hours (the 1 percent annual chance event). The updated Atlas 14 rainfall data shows that the 24-hour rainfall rate is nearly 13 inches in some areas (e.g., Onion Creek watershed).

Consequently, the City of Austin, Travis County, and other communities in the Austin Metropolitan Area have started updating floodplain maps using the new Atlas 14 rainfall rates. It is expected that updated floodplain maps for these areas and other areas within the Lower Colorado-Lavaca Region will be available for the second cycle of regional flood planning. Of note is that until new floodplain maps based on Atlas 14 data are available, both Austin and Travis County are using the pre-Atlas 14 FEMA 500-year floodplain maps as a proxy for post-Atlas 14 100-year floodplain.

The Lower Colorado-Lavaca Region RFPG has included a recommended Flood Management Strategy (ID No. 102000005) and a related policy recommendation in Chapter 8 to address the need for floodplain map updates as well as the need for additional federal and state funding for map updates.

Higher Standards

Both FEMA and the State of Texas encourage participating NFIP communities to adopt higher or enhanced standards and requirements for floodplain management and regulation. At the federal level, FEMA offers incentives through the Community Rating System (CRS), established in 1990, to encourage, recognize, and reward NFIP participating communities that have adopted floodplain management practices that exceed NFIP minimums and, in doing so, support the three goals of the CRS program:

1) reduce flood damages to insurable properties; 2) strengthen the insurance aspects of the NFIP; and 3) support a comprehensive approach to floodplain management. The incentive for participating in CRS is discounted flood insurance premium rates awarded in 5 percent increments according to ratings from 1 to 10. Class 1 communities receive a 45 percent discount, while Class 10 communities receive no discount.

Participation in the CRS program is voluntary and requires submittal of a letter of interest, a “Quick Check” application, and verification by FEMA, as well as periodic audits to remain a CRS participant in good standing. Classifications or ratings are based on scores assigned to various floodplain management practices or activities, as shown in *Table 3.1*.

Table 3.1 CRS Example Floodplain Management Practices or Activities

Categories	Example Floodplain Management Practices or Activities
Community Self-Assessment	<ul style="list-style-type: none"> • Inventory of the floodplain (e.g., structures, natural functions) • Describe and map hazards • Identify specific flood problem areas • Analyze flood problem areas • Assess flood hazards, exposures, and activities
Mapping and Flood Data	<ul style="list-style-type: none"> • Develop new maps and data • Maintain and provide maps and data • Make data and maps available to the public • Map special flood-related hazards (e.g., coastal erosion)
Managing Future Development to Minimize Future Flood Risk and Damages	<ul style="list-style-type: none"> • Preserve open space • Protect natural floodplain functions • Regulate development in floodplains • Regulate development in watersheds • Maintain designations of special flood-related hazards
Development and Adoption of a Community Floodplain Management Plan	<ul style="list-style-type: none"> • Plan development process • Risk assessment • Mitigation strategies • Plan maintenance
Reduced Flood Risk and Losses to Existing Development	<ul style="list-style-type: none"> • Acquire or relocate flood-prone structures • Protect flood-prone structures in place (e.g., increased elevation, flood-proofing) • Improve drainage system maintenance • Address repetitive loss properties
Improved Emergency Preparedness and Response	<ul style="list-style-type: none"> • Flood warning and response planning • Warning and response for areas protected by levees • Warning and response for areas downstream of a dam

Categories	Example Floodplain Management Practices or Activities
Public Information and Outreach	<ul style="list-style-type: none"> • Overall plan for public information program • Flood awareness and preparedness outreach • Providing detailed information on potential flooding and protecting against flood losses (e.g., online access to floodplain maps)

Five entities in the Lower Colorado-Lavaca Region currently participate in the CRS program. These communities have a CRS class rating between Class 9 and Class 6, representing a 5 to 20 percent discount on flood insurance premiums. The CRS participants in the Lower Colorado-Lavaca Region are Bastrop County and the cities of Austin, Pflugerville, Sunset Valley, and Wharton.

The TWDB guidance provides a much narrower definition of the term “higher standard” as compared to the many “creditable” CRS actions listed above that a community might implement. The TWDB’s definition has three elements: additional freeboard, stormwater detention requirements, and floodplain fill restrictions. Freeboard is generally considered the single most important enhancement to floodplain standards and regulations. Freeboard refers to the additional elevation of the lowest occupied floor of a structure above the Base Flood Elevation (100-year floodplain). It is intended to provide an extra margin of safety for structures built in regulatory floodplains.

The online survey conducted on behalf of the Lower Colorado-Lavaca RFPG included a question about whether an entity has adopted any higher standards and specifically whether an entity has adopted freeboard requirements. Survey response options were:

- At or above current Base Flood Elevations
- BFE + 1 foot (current 1% ACE conditions)
- BFE + 1 foot (future 1% ACE conditions)
- BFE + 2 feet (current 1% ACE conditions)
- BFE + 2 feet (future 1% ACE conditions)
- BFE + 3 feet (current 1% ACE conditions)
- Blank / unknown

In addition to the online survey, the number of counties and cities in the Lower Colorado-Lavaca Region that have adopted and enforced higher standards has also been estimated by the Texas Floodplain Management Association (TFMA), which conducts a “Higher Standards Survey.” The results of the TMFA survey for 2019-2020 show that 19 entities in the Lower Colorado-Lavaca Region self-report as having freeboard one or more feet above the Base Flood Elevation for current or fully developed conditions. As shown in *Table 3.2*, 18 of the total number of entities that responded to both the online and TMFA surveys have not adopted freeboard requirements above the current BFE. However, almost as many, 16 report adopting freeboard requirements above the BFE. Only one entity reports that it has adopted a future condition freeboard requirement at two feet above the BFE, based on watershed modeling assuming full development build-out of a given watershed.

Table 3.2 Summary of Freeboard Requirements in the Lower Colorado-Lavaca Region

Freeboard	Current 1% ACE Conditions	Future 1% ACE Conditions
At or above current base flood elevations	18	0
BFE + 1 foot	6	0
BFE + 2 feet (current 100-year conditions)	7	1
BFE + 2 feet (current 500-year conditions)	2	0
BFE + 3 feet	1	0
Total	34	1

Note: The Lower Colorado-Lavaca Region Data Collection Tool and Interactive Webmap

The TWDB guidance for regional flood planning also classifies existing floodplain management practices as:

- **Strong** - Significant regulation that exceeds the NFIP standards with enforcement or community belongs to the Community Rating System
- **Moderate** - Some higher standards, such as freeboard, detention requirements, or fill restrictions
- **Low** - Regulations meet the minimum NFIP standards
- **None** - No floodplain management practices in place

According to these classifications, entities with standards that exceed the NFIP minimum requirements but have self-reported through the RFPG’s online survey as having relatively low levels of enforcement are classified as having “moderate” floodplain management practices. Entities participating in the FEMA CRS have “strong” floodplain management practices.

For those entities in the Lower Colorado-Lavaca Region that self-reported through the online survey as having adopted requirements for structures to be built at or above Base Flood Elevation, floodplain management practices are classified as “low.” If an entity has some form of higher standards as determined from other information sources (e.g., TMFA survey, review of local ordinances) but did not respond to the survey or responded with “I do not know” with regard to enforcement, the floodplain management practices were also categorized as “low,” unless the known level of enforcement warranted a higher classification, or if the entity has adopted requirements for the elevation of structures above the BFE. In some instances, an entity responded that its level of enforcement was “none,” even though other information indicated that it had adopted some form of higher standards. In these situations, the floodplain management practices were classified as “none.” *Table 3.3* summarizes the classifications of local floodplain management practices based on survey responses and other information.

The responses to the online survey differ somewhat from the results reported in the TFMA 2019-2020 survey. To better understand and reconcile the differences, the RFPG’s Technical Consultant reviewed local floodplain ordinances for those entities that responded to the online survey and compared those

local standards to the results of the TFMA survey. Otherwise, the information provided in *Table 3.3* is derived almost entirely from self-reported information.

Table 3.3 Floodplain Management Practices as Self-Reported by Online Survey Respondents

Classification	Number of Responses	Percent
Strong	9	29%
Moderate	13	42%
Low	7	23%
None	2	6%
Total	31	100%

In all, 40 of the 122 cities and counties in the Lower Colorado-Lavaca Region that are NFIP participants, or 33 percent, have adopted some form of higher floodplain management standards, whether it be freeboard requirements, stormwater detention requirements, and/or floodplain fill restrictions.

Enforcement

Another question posed in the online survey pertains to enforcing floodplain standards and regulations. Specifically, respondents were asked to select a description that best represents the level of enforcement of their community’s floodplain regulations. The TWDB guidance provided the options to choose from and are as follows:

- **High** - Actively enforces all adopted requirements, performs multiple inspections throughout the construction process, issues fines for violations as appropriate, and enforces substantial damage and improvement policies
- **Moderate** - Enforces much of the ordinance, performs limited inspections, and is limited in issuing fines and violations
- **Low** - Provides permitting of development in the floodplain but may not perform inspections or issue fines or violation
- **None** - Does not enforce floodplain management regulations

Roughly 55 percent of those responding to this survey question describe the level of enforcement of their floodplain standards and regulations as moderate or high. The remaining 45 percent self-report as having low, none, or an unknown level of enforcement. *Table 3.4* summarizes these findings.

Table 3.4 Survey Participant Level of Enforcement of Floodplain Regulations (based on September 9, 2021, survey responses)

Level of Enforcement	Number of Responses	Percent
High Activity	10	29%
Moderate Activity	9	26%
Low Activity	8	23%
None	5	14%
I do not know	3	9%
Total	35	100%

Future Floodplain Management Practices and Flood Risk

As indicated above, all counties and nearly all eligible cities in the Lower Colorado-Lavaca Region are current NFIP participants. Very nearly 100 percent of the region's population is within jurisdictions that have adopted at least the minimum required standards for floodplain management. Consequently, by their nature and intent, existing floodplain regulations should prevent most additional future flood exposure by limiting new development in floodplains. In addition, periodic updates of models and maps for regulated floodplains should also help prevent increased future exposure to flood hazards. Map updates, using high-resolution hydrologic and topographic data and advanced watershed modeling technology, will enable local entities to stay current with potential climate and watershed changes due to development that could affect the spatial extent of regulatory floodplains.

However, several factors could lead to greater flood risk and increased exposure to populations and property in the Lower Colorado-Lavaca Region in the future. One factor is inadequate enforcement of existing floodplain standards and regulations. Regulations must be administered and enforced consistently and uniformly to realize the intended benefits. A related factor is that some communities do not explicitly consider and incorporate flood risk and avoidance of flood hazards in their comprehensive land use plans, associated regulations, and economic development plans and policies. Fortunately, flood risk is explicitly addressed in the land use plan adopted by the City of Austin, the largest municipality in the Lower Colorado-Lavaca Region.

Another consideration in assessing potential future flood risk and exposure is the potential effects of land development and urbanization in contributing watersheds of regulatory floodplains. Absent robust local regulations and standards for stormwater management in new development and specific restrictions on impervious cover and requirements to maintain some level of pre-development hydrology, the severity of downstream flooding could increase over time. To address this concern, some counties and cities, as reported, have adopted higher or enhanced standards that include limitations on impervious cover in new development, requirements that new development preserves a degree of pre-development hydrology or otherwise mitigates increases in peak flood flows during floods, and other measures to reduce current and future flood risk. The City of Austin, as a CRS participant, and other local entities in the Austin area have adopted these and other higher or enhanced floodplain standards and land use regulations.

Areas without floodplain maps or outdated or otherwise inaccurate watershed models and floodplain maps also raise concerns about the possibility of increasing exposure of populations and property to flood hazards. For example, Flood Rate Insurance Maps are typically based on current watershed conditions rather than conditions that may exist in the future with new development and urbanization. Some cities and counties in the Lower Colorado-Lavaca Region do, however, base their watershed modeling and mapping on both current and future conditions. Within the City of Austin, for example, FEMA Flood Insurance Rate Maps are used for flood insurance purposes, while the city regulates floodplain development based on projections of fully developed watershed conditions.

Another related concern is potential future climate changes, particularly increases in the amplitude – intensity and/or duration – of extreme storm events. As discussed previously above and in Chapter 1, the recent update of rainfall statistics for Texas, published in Atlas 14, shows significantly higher rainfall rates for extreme events (e.g., the 100-year storm) across a large east to west swath of Texas, including about two-thirds of the land area of the Lower Colorado-Lavaca Region. In the affected areas, rainfall rates, flood risk, and exposure may be significantly greater than we understood before. It is also possible that future Atlas 14 updates will result in benchmark design storm rainfall rate increases. Hence, updating watershed models and floodplain maps to account for higher rainfall rates is critical in maintaining the current and future level of protection provided by floodplain and land development regulations.



Changing climate conditions are projected to lead to substantial increases in flood variability over and above due to population growth (Swain et al. 2020). This will increase flood risk across the rural, suburban and urban spectrum and particularly impact our already developed areas (e.g., Shoal Creek in Austin).

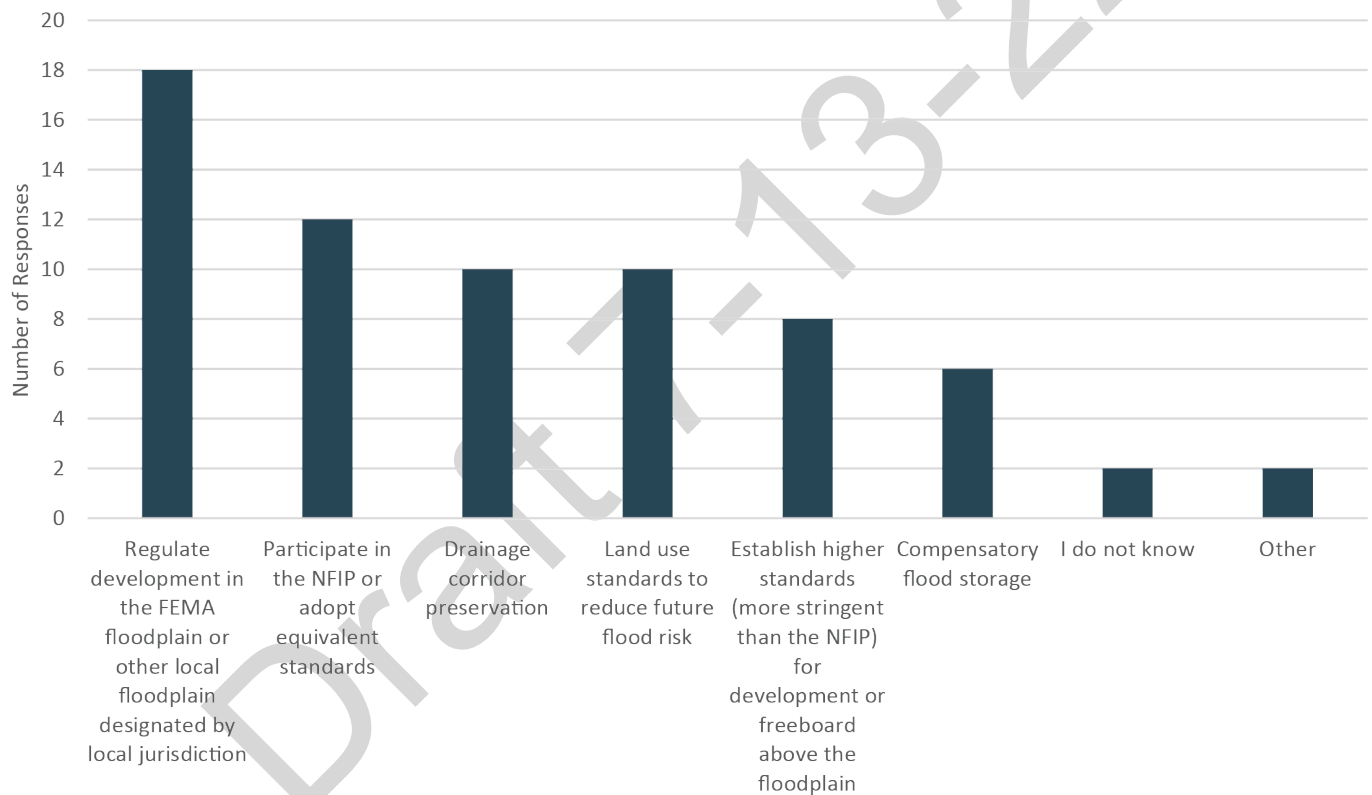
Recommended Floodplain Management Practices

The regional flood planning process requires the RFPGs to consider whether to recommend the adoption of consistent minimum floodplain management standards and land use practices for the entire region. To help inform the Lower Colorado-Lavaca RFPG's decisions and recommendations, several questions were included in the online survey about region-wide minimum floodplain management standards. Survey participants were asked if they thought the RFPG should recommend consistent minimum standards across the region. Thirty-five entities responded and answered a follow-up question about floodplain management practices that the RFPG should consider recommending. *Table 3.5* summarizes responses to the question of region-wide minimum floodplain management practices. *Figure 3.1* shows survey responses supporting various floodplain management practices (note that respondents were able to select multiple practices).

Table 3.5 Survey Responses for Potentially Recommending Consistent Minimum Floodplain Management Standards (as of September 9, 2021)

Description	Number of Responses	Percent
Yes	28	80%
No	2	6%
I don't know	5	14%
Total	35	100%

Figure 3.1 Survey Responses in Support of Potential Recommended Minimum Floodplain Management Standards (as of September 9, 2021)



Given the very high level of participation in the NFIP by eligible local entities in the Lower Colorado-Lavaca Region, it should not be surprising that a majority (57 percent were supportive of recommending it and 46 percent were supportive of requiring it) of survey respondents support having consistent minimum floodplain management standards for the Lower Colorado-Lavaca Region. Survey participants strongly support regulating development in the FEMA floodplain or floodplains designated by local jurisdictions. Responses also indicate strong support for participation in the NFIP or adoption and enforcement of equivalent standards. *Figure 3.2* and *Figure 3.3* show the percent support of these two potential recommended minimum standards.

Figure 3.2 Survey Participants in Support of Adopting/Requiring Consistent Minimum Standards Across the Entire Region (as of September 9, 2021)

Should the RFPG Adopt/Require Consistent Minimum Standards Across the Entire Region?

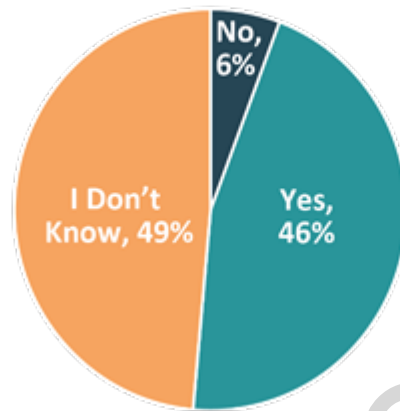
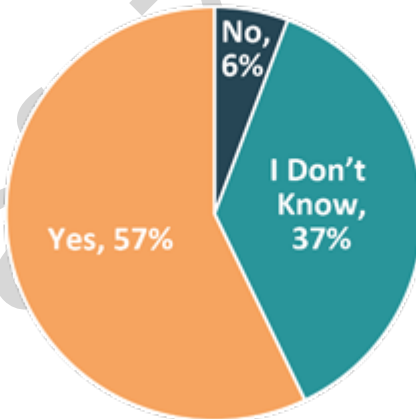


Figure 3.3 Survey Participants in Support of Recommending Consistent Minimum Standards Across the Entire Region (as of September 9, 2021)

Should the RFPG Recommend Consistent Minimum Standards Across the Entire Region?

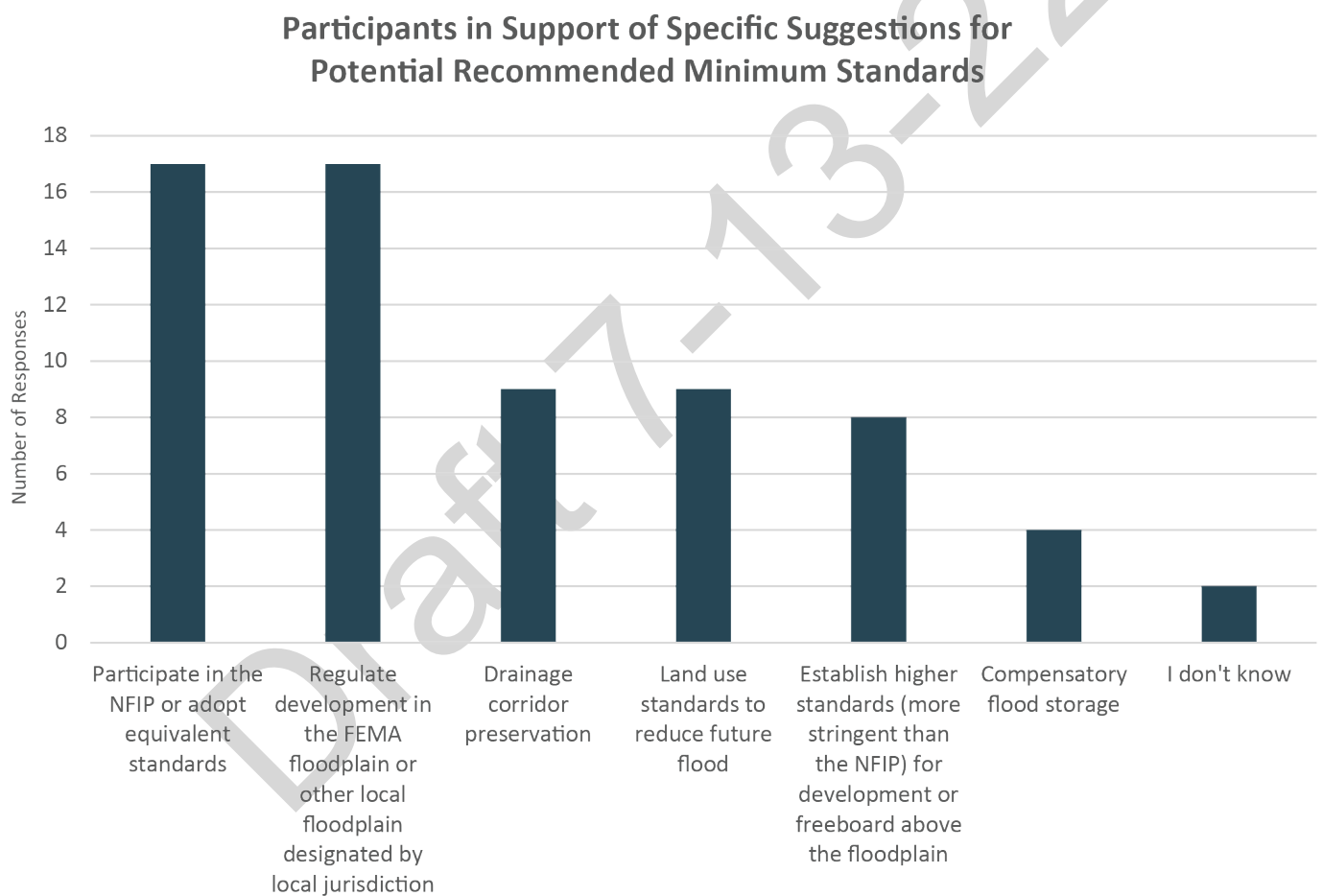


Survey respondents were also asked for their opinion as to whether the Lower Colorado-Lavaca RFPG should adopt consistent minimum standards across the entire region. The survey question clarified that such a requirement would require sponsors of Flood Management Evaluations and Strategies and Flood Mitigation Projects to adopt such standards as a prerequisite for their inclusion by the RFPG in the Regional Flood Plan. Again, 35 entities responded to the question and the results indicate significantly less support for requiring consistent minimum standards as a prerequisite for including Flood Management Evaluations (FMEs), Flood Management Strategies (FMSs), and Flood Mitigation Projects (FMPs) in the Regional Flood Plan. *Table 3.6* summarizes the participant responses, and *Figure 3.4* shows the number of survey participants supporting specific standards.

Table 3.6 Survey Responses for Potentially Adopting (Requiring) Consistent Minimum Floodplain Management Standards (as of September 9, 2021)

Description	Number of Responses	Percent
Yes	16	46%
No	2	6%
I don't know	17	49%
Total	35	100%

Figure 3.4 Survey Responses for Potential Adopted (Required) Minimum Floodplain Management Standards (as of September 9, 2021)



Again, the Regional Flood Planning process requires the RFPGs to consider whether or not to recommend the adoption of consistent minimum floodplain management standards and land use practices for the entire Region. Of note is that the State of Texas already requires by statute (*Texas Water Code Section 16.3145*) that “the governing body of each city and county shall adopt ordinances or orders, as appropriate, necessary for the city or county to be eligible to participate in the National Flood Insurance Program...”. Reinforcing this requirement are the TWDB rules for obtaining financial assistance through the Flood Infrastructure Fund (FIF) that require applicants to have and enforce regulations that

meet or exceed the NFIP minimum standards. In effect, state law and policy establish minimum standards for floodplain management applicable to the entire state per the requirements of the NFIP. Actual participation in the NFIP is, however, discretionary. As discussed, there is almost universal participation in the NFIP by eligible entities in the Lower Colorado-Lavaca Region.

Given these considerations and the feedback received from survey respondents, the Lower Colorado-Lavaca RFPG recommends the following with respect to current floodplain management practices in the Lower Colorado-Lavaca Region:

1. The RFPG does not recommend adopting region-specific floodplain management standards and regulations as a prerequisite for the inclusion of recommended Flood Management Evaluations and Strategies or Flood Mitigation Projects in this Regional Flood Plan. The RFPG believes that existing state and federal requirements combined with nearly 100 percent NFIP participation in the Lower Colorado-Lavaca Region are sufficient. The RFPG does recommend that the handful of local entities in the Lower Colorado-Lavaca Region that are not participants in the NFIP join the program. However, the RFPG recognizes that some or all of these rural communities may not have a compelling reason to participate in the NFIP, such as not having significant existing flood risk and very little or no anticipated future growth and development.
2. The RFPG encourages and supports the adoption of higher standards for floodplain management and land development but does not recommend requiring the adoption of higher standards at this time. The RFPG strongly encourages all counties and cities in the Region to consider adopting higher or enhanced standards for floodplain management and regulation, particularly those communities with significant existing flood risk and/or are experiencing or are expected to experience significant population growth and land development activity. Higher standards, if adopted, should include additional freeboard over and above the Base Flood Elevation (1 percent annual chance flood), impervious cover limitations, stormwater detention requirements in new development (with exceptions), and restrictions on the placement of fill-in floodplains or physical alteration of floodplains that could reduce channel storage. The RFPG further recommends that counties and cities in the Lower Colorado-Lavaca Region consider participation in the FEMA Community Rating System.
3. The RFPG recommends that all outdated Flood Insurance Rate Maps be updated as soon as possible, particularly in the areas affected by updated Atlas 14 rainfall statistics.
4. The RFPG recommends that municipalities in the Lower Colorado-Lavaca Region explicitly 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).
5. The RFPG recommends that counties in the region explicitly consider flood hazards, floodplain management, and stream corridor protection in the subdivision platting process.

Task 3B: Flood Mitigation and Floodplain Management Goals

As noted in the introduction to this chapter, for Task 3B, the RFPGs are to identify and adopt “...specific and achievable flood mitigation goals along with target years to meeting those goals...”. This includes short-term goals and associated performance measures (10 years) as well as long-term goals and performance measures (30 years). As set out in the TWDB rules for regional flood planning (Guidance Principles in 31 TAC §362.3), the intent of the goals adopted by the RFPGs is “...to protect against the loss of life and property.” This is further defined as:

1. Identification and reduction of the risk and impact to life and property that already exists, and
2. Avoid increasing or creating new flood risks by addressing future development within areas with existing or future flood risks.

The RFPG’s adopted goals, when implemented, must demonstrate progress towards achieving the overarching goals set by the state.

Early in the regional flood planning process, the Lower Colorado-Lavaca RFPG devoted significant time and effort to exploring values and discussing what they felt were reasonable goals for the Lower Colorado-Lavaca Region. This section presents the flood mitigation and floodplain management goals and associated performance measures adopted by the Lower Colorado-Lavaca RFPG for the Lower Colorado-Lavaca Regional Flood Planning Area.

Goal Focus Areas

The RFPG adopted goals covering six focus areas. These focus areas were defined to create a one-to-one connection with the Flood Management Strategy types as outlined in the TWDB Data Submittal Guidelines.

The adopted goals will guide the development of the Flood Management Strategies (FMSs), Flood Management Evaluations (FMEs), and Flood Mitigation Projects (FMPs) for the Lower Colorado-Lavaca Region. They build upon the TWDB regional flood planning guidance and provide a comprehensive framework for future strategy development focused on reducing flood risk to people and property while not negatively affecting neighboring areas.

The six-goal focus areas include:

1. Flood Education and Outreach
2. Flood Warning and Readiness
3. Flood Studies and Analysis
4. Flood Prevention
5. Non-Structural Flood Infrastructure Projects
6. Structural Flood Infrastructure Projects

The six focus areas are further detailed below and include specific goal statements that are achievable, measurable, and time-specific. Per the TWDB requirements and guidelines, the goals adopted by the RFPG must be specific and achievable and include the information listed below:

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

Lower Colorado-Lavaca Region Goals

The RFPG identified and adopted 14 goals within the six focus areas. They include:

Focus Area 1. Education and Outreach

Increase the amount of flood education and outreach opportunities to improve awareness of flood hazards and future participation throughout the Lower Colorado-Lavaca Region.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
1.1 Increase the number of public outreach and educational communications and activities conducted by the RFPG to improve awareness of flood hazards and the benefits of flood planning in the Flood Planning Region.	Baseline: 175 260 public communications (over the next two cycles)	Maintain	Number of public communications (emails, social media, news blasts, public service announcements, educational packets, etc.)

Focus Area 2. Flood Warning and Readiness

Improve the dissemination of information regarding early flood recognition and danger, emergency response procedures, and post-flood recovery actions.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
2.1 Increase the number of cities and counties which utilize real-time data from regional or local flood monitoring systems (e.g., LCRA Hydromet, City of Austin Early Warning System) to enhance flood warning, readiness, and other preparedness activities.	Establish a baseline through a survey of flood monitoring system users	Increase	Number of cities and counties which utilize real-time data from flood monitoring systems to improve flood preparedness

Focus Area 3. Flood Studies and Analysis

Increase the number and extent of regional flood planning studies and analyses to identify flood risk and better prepare entities for implementing flood mitigation projects.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
3.1 Increase the number of cities and counties that have updated watershed models and floodplain maps to reflect current data (e.g., Atlas 14 revised rainfall data).	Baseline: 7 of 135 Additional 60	Baseline: 67 of 135 Additional 34 which is 75%	Number of cities and counties that have updated watershed models and floodplain maps
3.2 Increase the number of cities and counties that have evaluated priority flood risk areas and risk reduction measures (e.g., alternatives analysis and preliminary engineering).	Baseline: 49 of 135 Additional 26	Baseline: 75 Additional 40	Number of cities and counties that identify risk reduction measures
3.3 Increase the number of counties with digital flood insurance rate maps (DFIRMs) that reflect current conditions.	Baseline: 19 of 43 Additional 5	Baseline: 24 of 43 Additional 10	Number of counties that have digital flood insurance rate maps (DFIRMS)

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Focus Area 4. Flood Prevention

Increase the number and extent of protective regulatory measures and programs to limit future risk and reduce flood damage in the Lower Colorado-Lavaca Region.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
4.1 Increase the number of cities and counties participating in the National Flood Insurance Program (NFIP).	Baseline: 122 of 135 100% NFIP participation	Maintain	Number of cities and counties that are participating in the NFIP
4.2 Increase the number of cities and counties that have adopted higher standards over and above NFIP minimum standards, including regulating to one or more feet above the Base Flood Elevation (BFE) for existing 1% annual chance event (100-year) conditions.	Baseline: 40 of 135 Additional 20	Baseline: 60 of 135 Additional 20	Number of cities and counties that regulate with higher standards (e.g., regulating to Base Flood Elevation (BFE) + 1 as part of the regulatory framework)
4.3 Increase the number of cities and counties that have adopted regulations to reduce the risk from localized flooding.	Establish baseline	Increase	Number of cities and counties that have local drainage protection requirements in their development code
4.4 Increase the number of cities and counties which provide alternate compliance options that allow or incentivize nature-based solutions to reduce future flood risk.	Establish baseline	Increase	Number of cities and counties that allow/incentivize nature-based solutions as part of alternate compliance
4.5 Increase the number of cities and counties in the flood planning region considering the 1% annual chance (100-year) floodplain on the entity’s future land use plans and development regulations.	Establish baseline	Increase	Number of cities and counties that consider 100-year floodplains on land use maps and development regulations

Area 5. Non-Structural Flood Infrastructure Projects

Reduce the amount of existing and future vulnerable properties within the flood planning region through property/easement acquisition, improved elevation, and other floodproofing programs and initiatives.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
5.1 Reduce the number of structures at risk of flooding through property/easement acquisitions, relocations, flood-proofing, and/or elevation.	Baseline: 68,000 structures in 100-year Reduce by 1,000 structures	Reduce by additional 1,500 structures	Number of at-risk structures mitigated by acquisitions, relocations, flood-proofing, and/or elevation
5.2 Increase the acreage of publicly protected open space in perpetuity to reduce future impacts of flooding through property buyouts, land conservation easements, acquisitions, or other comparable means.	Baseline: 133,000 acres Increase by 15%	Increase by additional 25%	Acreage of preserved land in the region

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Focus Area 6. Structural Flood Infrastructure Projects

Reduce flood risk and mitigate flood hazards to life and property by implementing structural flood infrastructure projects.

Specific Goal Statements	Short-Term (2033)	Long-Term (2053)	Metric
6.1 Reduce the number of structures and critical facilities at risk of flooding by implementing structural flood mitigation projects.	Baseline: 68,000 structures and 118 critical facilities in 100-year Reduce by 1,000 structures and three critical facilities	Reduce by additional 1,500 structures and five critical facilities	Number of at-risk structures mitigated by structural flood mitigation projects
6.2 Increase the number of entities that mitigate flood risk at vulnerable roadways or waterways (e.g., low-water crossings, irrigation canals).	Establish baseline	Increase	Number of entities that mitigate low-water crossings or vulnerable roadways or waterways

Benefits and Residual Risk after Goals are Met

The adopted goal statements were developed in a manner to set the stage for specific actions that can be quantified and measured through subsequent state flood planning processes, including future discovery data collection processes, or through the implementation of evaluations, strategies, and/or projects, rather than high-level goal statements associated with outcomes (e.g., reducing fatalities). The established baselines will be used for future measurements to determine progress towards achieving the goals. Implementation efforts will also demonstrate progress towards the overall purpose and intent of the regional flood planning process and will result in various benefits to individuals, communities, and the entire region. The benefits of implementing the Lower Colorado-Lavaca Regional Flood Plan are presented in *Table 3.7*.

Beyond protecting against the loss of life and property, the goals offer several benefits, including protecting infrastructure, water supply, and the environment and sustainability. The types of benefits to be realized by implementing the Lower Colorado-Lavaca Regional Flood Plan are presented in *Table 3.7*.

Table 3.7 Lower Colorado-Lavaca Region Flood Planning Goal Focus Areas and Benefits

Benefits/ Goals	1. Flood Education and Outreach	2. Flood Warning and Readiness	3. Flood Studies and Analysis	4. Flood Prevention	5. Non-Structural Flood Infrastructure Projects	6. Structural Flood Infrastructure Projects
Protect life	●	●	●	●	●	●
Protect infrastructure	●		●	●	●	●
Protect property	●	●	●	●	●	●
Protect the environment	●		●	●	●	●
Protect/ enhance water supply				●	●	●
Sustain the economy	●	●		●	●	●
Achieve co-benefits*				●	●	●
Increase public awareness	●	●	●	●	●	
Build community support	●	●	●	●		

● – Potential benefit ● – Direct benefit

* Co-benefits that could be achieved through flood protection include improved water supply, increased public recreation opportunities, etc.

Residual Risk

The residual risk should be minimal if the goals are fully achieved. However, residual risks should be anticipated for each overarching goal focus area. Overall, the focus areas fall into one or more of the following residual risks:

1. Storm events exceeding the design capacity of the infrastructure
2. Time and budget limitations
3. Human behavior
4. Funding limitations for maintenance
5. Policy and regulation changes

Table 3.8 Residual Risk After Achieving Goals

Focus Area	Residual Risk
Flood Education and Outreach	Flood education and outreach primarily provide benefits when implemented. The primary residual risks associated with public education and outreach are lack of reach (i.e., not reaching everyone), lack of attention to detail, and outright misunderstandings. Misunderstandings happen when the public becomes confused about the message, possibly due to its length or complexity.
Flood Warning and Readiness	Flood warning and readiness residual risk depends on public response to flood warnings. Drivers may ignore flood warning signs or barricaded roads for various reasons (e.g., despite an entity’s best effort, risk remains at low water crossings).
Flood Studies and Analysis	Reducing residual risk associated with improving flood analyses involves technology that is always changing and improving. Due to the change and updates to terrain, land use, precipitation, and other data, the risk associated with the floodplains may change over time. While a new development may be constructed outside the 1 percent ACE floodplain, future improvements in technology and other data (e.g., additional increase in rainfall rates) may change the floodplain boundary resulting in some structures being located within the floodplain.
Flood Prevention	Reducing residual risk through flood prevention depends on the local community’s floodplain management policies and political leaders. Getting every community within the Lower Colorado-Lavaca Region to adopt and enforce NFIP minimum standards, let alone higher standards, may prove to be challenging. The lack of local enforcement of floodplain regulations also creates residual risk.
Non-Structural Flood Infrastructure Projects	The primary residual risk associated with non-structural flood infrastructure projects relates to the level of application and/or participation in the non-structural solutions (e.g., not achieving 100 percent participation in elevating structures in a high-risk area).
Structural Flood Infrastructure Projects	Flood infrastructure improvements can only be expected to perform based on the design capacity. In other words, if any storm that exceeds the design capacity were to occur, the infrastructure would still be at risk. Due to cost constraints, most community stormwater collection systems are not designed to collect the 1 percent ACE. Even if the system were designed for that storm, a larger storm would still overwhelm the system. Likewise, storm intensities can overwhelm stormwater collection systems resulting in flooded roadways, bridges, culverts, and other damages. Also, routine infrastructure maintenance is required to maintain the design capacity. Maintenance is sometimes overlooked due to budget, staff, and time constraints.