

Example Model Ordinance Language for Nature-Based Solutions for Flood Resilience



Texas Water Development Board (TWDB)

Flood Priority Research Program

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Introduction

Adopting land use regulations is a potential, discretionary tool for communities seeking to strengthen flood resilience and manage growth responsibly. This Example model ordinance language was developed as a menu of optional examples to support the [Nature-Based Solutions for Flood Resilience Guidance Manual for Texas](#)¹. For more information on nature-based solutions (NBS) and assessing ordinances, incentives, and regulations see Chapter 4 of the *Guidance Manual*. Flood risk and vulnerability are influenced by land use factors such as impervious cover. The decisions that shape where and how communities grow are governed by local rules and policies. The purpose of this language is to provide a discretionary resource to communities that wish to incentivize or require the use of NBS through land use regulations. These illustrative examples of potential regulations are designed to reduce the impact of flooding to people and property while providing sustainable benefits to people and the environment

A community's choice to regulate land use in flood prone areas begins with establishing a strong legal and policy foundation. Communities that participate in the [National Flood Insurance Program \(NFIP\)](#)² must adopt FEMA's minimum regulatory standards for floodplain management and development in these areas. FEMA encourages communities to adopt and enforce higher standards than the NFIP minimum standards to reduce flood risk to life and property¹.

Some development and land use practices, such as open space conservation, buffer zones, and setbacks, contribute to credits under the Community Rating System (CRS) program. CRS is a voluntary program that encourages floodplain management practices that exceed the minimum requirements of the NFIP. Participating in CRS could lower flood insurance premium costs for residents within the community. For more information, see The Nature Conservancy's [Community Incentives for Nature-Based Flood Solutions: A Guide to FEMA's Community Rating System for Conservation Practitioners](#)³.

Land use regulations can be tailored to local conditions while protecting long-term community resilience. Communities are encouraged to use updated floodplain mapping, hydrologic modeling, rainfall data, and projected future land use to understand how current and future conditions affect flood hazards. Design manuals and other regulations in place can be reviewed to identify potential points of confusion or conflict. Newly adopted ordinances are advised to clearly define enforceable standards. The simpler the proposed criteria, the more easily it can be understood by policy makers, permitting staff, developers, and the community. By adopting clear, risk-based, and enforceable land use regulations communities can increase flood resilience.

The language provided in this document was gathered to offer an illustrative guide for updates to existing land use regulations, such as a zoning ordinance or a flood damage prevention ordinance. Many examples of best practices for flood prevention in development regulations across Texas were compiled by the North Central Council of

Government's [Model Development & Floodplain Ordinances Workshop](#).

If any of the example ordinance language in this document is considered for use, the portions indicated by **red text** should, in particular, be reviewed and updated by users to a value appropriate to local conditions.

It is important to note that the language provided in this document is illustrative and is being provided as a guide for potential use and modification at the discretion of each community. It is not inclusive nor is it a substitute for any existing regulations. Those wishing to incorporate any of the ideas presented in this document are encouraged to consult an attorney. If you are unsure how to apply the examples discussed here to your community, please email flood@twdb.texas.gov for assistance.

1. Compensatory storage

Compensatory storage regulations require the creation of an equivalent or greater volume of flood storage capacity to offset any storage loss due to development. While the NFIP floodway standard, 44 CFR 60.3(d), restricts new development from obstructing water flow and increasing water surface elevations, it does not directly address the need to maintain flood storage capacity. Communities that choose to adopt compensatory storage requirements therefore exceed NFIP minimum standards, providing a greater level of protection for life and property. These regulations are an important tool for preserving the hydrologic function of natural floodplains and help maintain the floodplain's ability to attenuate flood peaks and protect downstream communities from flood risk.

Compensatory storage regulations can encourage watershed NBS including floodplain reconnection projects which restore the hydraulic and ecological connectivity between a channel.

Example ordinance language:

1.1 Fill within the special flood hazard area and/or watersheds established by a drainage area greater than shall result in no net loss (0.0%) of natural floodplain storage. The volume of the loss of floodwater storage due to filling in the watershed (or special flood hazard area) shall be offset by providing an equal volume of flood storage by excavation or other compensatory measures at or adjacent to the development site².

2. Floodway and riparian setbacks and sensitive resource protection

Conservation buffers, riparian setbacks, and sensitive resource protection regulations restrict development within or adjacent to natural resources to preserve their hydrologic, hydraulic, and ecological functions. Buffer zones and setbacks are intended to remain free of construction, development, or other alterations. Vegetated riparian buffers slow water

traveling to channels due to higher hydraulic roughness compared to barren ground or pavement, allowing increased opportunities for sediment and debris to settle, as well as ponding, and infiltration of stormwater. Preserving these buffer areas is a form of land conservation NBS.

Communities could consider limiting new construction in areas at risk of erosion hazard. The City of Austin [Drainage Criteria Manual Appendix E 7](#) has Criteria for Establishing an Erosion Hazard Zone that can be utilized to delineate areas at risk of future stream erosion. Model language for a riparian buffer zone ordinance was developed based on LCRA Highland Lakes Watershed Ordinance³ and City of San Antonio, Texas Code of Ordinances⁴.

Common options:

- 2.1. Require setback from floodway or channel banks.*
- 2.2. Establish erosion hazard zones.*
- 2.3. Require the preservation of natural features.*

Example Ordinance Language:

- 2.1. Proposed development adjacent to riverine floodplains shall be setback **100 feet** from the floodway boundary, top of channel bank, or from the centerline of the stream if the floodway has not been delineated⁵.*
- 2.2. A development application may not be approved unless the proposed development will not result in additional adverse flooding impact on other property; to the greatest extent feasible, preserves the natural and traditional character of the land and the waterway located within the **1 percent (100-year) annual chance floodplain**; includes on-site control of the two-year peak flow; will not result in additional erosion impacts on other property; and locates all proposed improvements outside the erosion hazard zone⁸.*
- 2.3. All significant natural features, as defined in the open space plan and master plan, shall be preserved and, where necessary, protected by setbacks from development. Development shall be designed and sited to preserve and protect the **1 percent(100-year) annual chance floodplain**⁹. The planning and zoning commission may decline approval if due regard is not shown for the preservation of natural features, such as large trees, watercourses, scenic points, historical spots and similar community assets, which, if preserved, will add attractiveness, stability and value to the property¹⁰.*

3. Open space preservation

Open space preservation ordinances can regulate or incentivize the conservation of green open space. The example language in this section set minimum standards for the dedication and management of open space, the use of cluster development as an alternative to conventional subdivision design, and the delineation and protection of drainage and floodplain easements. Where applicable, land preserved under this section should be placed under a conservation easement which is a voluntary and permanent deed restriction that limits development and subdivision of property for the purpose of protecting conservation values. Conservation easements provide a durable, legally enforceable mechanism for ensuring that open space dedications and floodplain protections remain in place in perpetuity, regardless of changes in property ownership.

Common options:

- 3.1. Require green space and open space.
- 3.2. Allow for cluster development land use.
- 3.3. Require drainage and floodplain easements.

Example ordinance language:

- 3.1. *Subdivision plats shall contain a community green space dedication at a ratio of $\frac{1}{4}$ acre of green space for every 100 lots. Green space areas must be no smaller in size than $\frac{1}{4}$ acre and must be at least 20 feet in width in order to provide access and sufficient useable area. Subdivision plats that contain less than 100 lots shall dedicate a minimum of $\frac{1}{4}$ acre of green space. For the purposes of upkeep, permanent maintenance and ownership responsibilities of dedicated green space shall be conveyed to either an existing or newly formed entity established for the subdivision, and must be identified upon the recording of the final plat¹¹.*
- 3.2. *Cluster development is intended to provide open space, preserve unique environmental features, or protect the character of rural areas. It is a residential subdivision in which the lots are allowed to be smaller (in area and width) than otherwise required for the underlying, base zoning district, but in which the overall density of all the lots collectively does not exceed the maximum density limit for the underlying zoning district. Through the cluster development option, a subdivision can contain no more lots than would otherwise be allowed for a conventional subdivision in the zoning district, though the individual lots within the development can be smaller than required in a conventional subdivision. The average lot size in a cluster development must be less than the minimum lot size of the base zoning*

district. Smaller lot sizes within a cluster development are required to be offset by the provision of open space as set forth below¹².

*3.3. Drainage easements shall be the width of the drainage structure plus **five feet** on each side, rounding the total distance down to the nearest foot, or the width of the **50-year floodplain**, whichever is greater¹³.*

4. Low impact development and impervious cover limits

Section 26.177 of the Texas Water Code¹ authorizes municipalities to establish a water pollution control and abatement program; this authority can also serve as a framework for communities seeking to regulate stormwater quantity as part of a broader flood risk reduction strategy. This convergence of regulatory purpose allows municipalities to design stormwater programs that go beyond compliance, using water quality requirements as a vehicle to incentivize or mandate NBS that deliver co-benefits including habitat enhancement, urban heat island mitigation, groundwater recharge, and community amenity value.

Low Impact Development (LID) is an approach to land development and stormwater management that uses or imitates natural processes to manage rainfall at its source. By preserving or replicating pre-development hydrologic conditions, LID reduces the volume and rate of stormwater runoff generated by development, thereby reducing downstream flood risk, protecting water quality, and supporting broader NBS objectives. It is recommended that communities adopting LID-based stormwater regulations establish clear intent language recognizing the connection between increasing impervious cover, water quality degradation, and increased flood risk.

Impervious cover regulations should clearly define what surfaces are counted toward the impervious cover calculation and what surfaces are excluded or credited. Common examples of areas considered impervious could include roads, parking areas, buildings, pedestrian walkways and sidewalks, swimming pool water surface area, stormwater detention basins lined with impermeable materials, and densely compacted natural soils. Common examples of areas not considered impervious could include rock outcrops, landscaped areas and areas remaining in their natural state, stormwater detention basins not lined with impermeable materials, and permeable or porous pavers (typically credited at up to 50% impervious).

¹ Texas Legislature, n.d., *Texas Water Code § 26.177, Water pollution control duties of cities*, Austin, Texas, Retrieved from <https://statutes.capitol.texas.gov/?tab=1&code=WA&chapter=WA.26&artSec=26.177>

Common examples:

- 4.1. Require impervious cover to remain below a set percentage of site area.
- 4.2. Require standards of pollutant removal standards for new impervious cover.
- 4.3. Incentivize lower impervious cover through reduced requirements for permit approval.
- 4.4. Incentive lower impervious cover through stormwater fee reduction
- 4.5. Incentive lower impervious cover through density bonuses

Example ordinance language:

- 4.1. *Impervious cover shall not exceed the following: New development shall not exceed **forty percent (40%)**. Redevelopment of sites developed prior to adoption of this ordinance: a **maximum of 60%** impervious cover may be permitted via if the applicant submits a survey no older than one year prior to the date of application delineating existing impervious cover. A percolation test may be required to validate impervious cover greater than 40% existing on site currently¹⁴.*
- 4.2. *All new subdivision development or new commercial development that adds more than **5,000 square feet** of new impervious cover shall achieve the pollutant removal standards detailed in this section through the design and implementation of structural and non-structural stormwater best management practices (BMPs). The minimum volume of stormwater runoff for water quality control shall be the **first one-half inch (0.5")** of runoff plus an additional **one-tenth inch (0.1")** for each **ten-percentage point increase of the gross impervious cover over twenty percent (20%)** of the contributing drainage area to the water quality control¹⁵.*
- 4.3. *As an incentive to reduce impervious cover, all developments with less than 15% impervious cover are not required to provide technical demonstration for removal of pollutants but must incorporate sufficient water quality control measures. Development eligible for these alternate standards must meet the following requirements: The gross development impervious cover is 15 percent or less; and the street and drainage network is designed to include the use of open roadway sections, ribbon curb, grassy channels, and maximize sheet flow¹⁶.*

4.4. *As an incentive to reduce impervious cover and implement stormwater control measures (SCMs), property owners who install SCMs that exceed the legal requirements for development may be eligible for a reduction in their stormwater drainage fee. The discount shall be limited to the impervious surface area mitigated by the SCM. To qualify, applicants must be a current drainage utility customer or tenant of the benefitted property, and any SCM requiring a governmental permit or approval must show evidence of such approval. Customers receiving a discount must maintain the SCM in good working order and allow for periodic inspection to verify the SCM is functioning as designed¹⁷.*

*For residential developments that are **10 acres or larger** and in **medium to high density development** would have two options of development standards. One option would be the standard requirements the other option would be the stormwater management alternative. The nature-based stormwater management option would allow for reduced lot size, reduced lot depth, reduced front yard setback, and/or increased lot coverage if a storm water conservation area is provided. Storm water conservation areas may not be part of required usable open space, but may contain structural or other nonstructural storm water controls¹⁸.*

5. Native plant use ordinance

Vegetation is necessary for drainage facilities including grass-lined or earthen channels, detention basins, bioretention, and wetlands for infiltration, erosion control, pollutant filtration, and runoff temperature regulation. Native plants are plants that live or grow naturally in a particular region without direct or indirect human intervention. Invasive plants are non-native plants whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health. Adaptive or naturalized plants are non-native plants that were introduced long ago and are spreading without human intervention and without detriment to native landscape.

Native plants are important to incorporate in drainage facilities because they are adapted to the local climate, resistance to pest and diseases, and support local wildlife. It is recommended that hydraulic modeling consider the intended growth of vegetation. There is a wide range of native plant species in Texas, as it is a large state with numerous habitat types and multiple ecoregions. What plants are appropriate in one location may not be appropriate in another. Careful consideration of specific site conditions should be made

when selecting plant species, such as sun/shade, wet/dry, windy/calm, wildfire prone/protected, Hardiness Zone Map/Heat Zone Map, soil pH and soil structure. It is recommended that planting plans be completed and signed by a registered landscape architect.

Texas native grasses are catalogued by the [Native Plant Society of Texas](#)⁷ and the [Lady Bird Johnson Wildflower Center](#)⁷. Coordination with local Texas A&M AgriLife Extension Agents is recommended to determine invasive species. Additional information on invasive species can be found at the [Texas Invasive Species Institute](#)⁷, Natural Resources Conservation Service [PLANTS database](#)⁷, and from the [National Park Service](#)⁷.

Example ordinance language:

- 5.1. *Grasses: New or improved earthen channels, earthen retention facilities, and earthen detention facilities will be vegetated by seeding or sodding. New earthen facilities and alterations to existing facilities shall be planted with drought resistant, low growth, native species grasses which will allow unobstructed passage of floodwaters. (Johnson grass, giant ragweed, or specific invasive species of concern) and other invasive species shall not be planted or maintained in earthen facilities¹⁹.*

- 5.2. *Trees and shrubs: While allowing for reasonable improvement of land, it is stated public policy to maintain, to the greatest extent possible, existing trees and to add to the tree population to promote a high tree canopy goal. Recommended trees to be planted are native trees according to the Native Plant Society of Texas or the Lady Bird Johnson Wildflower Center. Trees should be located and spaced to allow them to achieve their natural shape and mature size. Shrubs should be located and spaced in a way that allows them to achieve their natural shape, mature size, and not create visual hazards. Biodiversity requirements for tree planting shall include a mixture of tree types that abide by the following percentages: No more than 10 percent of replacement trees can be of one species; No more than 20 percent of replacement trees can be of one genus; and No more than 30 percent of replacement trees can be of one family. The planting of invasive species is prohibited²⁰.*

Citations

- ¹ Texas Water Development Board, 2021, 2022 state water plan—Chapter 4, Future population and water demand: Austin, Texas Water Development Board, www.twdb.texas.gov/waterplanning/swp/2022/docs/SWP22-Water-For-Texas.pdf, accessed June 2026.
- ² Texas Floodplain Management Association (TFMA) Higher Standards Committee, 2018, A Guide for Higher Standards in Floodplain Management: Texas Floodplain Management Association (TFMA), adapted from the Association of State Floodplain Managers (ASFPM), https://cdn.ymaws.com/www.tfma.org/resource/resmgr/documents_smc/tfma_higher_standards_guide0.pdf.
- ³ Lower Colorado River Authority, 2022, Highland Lakes Watershed Ordinance: Austin, Lower Colorado River Authority, <https://www.lcra.org/download/highland-lakes-watershed-ordinance/?wpdmdl=11765>, accessed June 2026.
- ⁴ City of San Antonio, 1995, Code of ordinances—§ 34-912, Floodplain preservation area: San Antonio, City of San Antonio, https://library.municode.com/tx/san_antonio/codes/code_of_ordinances?nodeId=PTIICO_CH34WASE_ARTVIWAQUCOPOPR_DIV6AQREZOWAPR_SDDPOPRCR_S34-912FLPRAR, accessed June 2026.
- ⁵ City of San Antonio, n.d., Unified development code—Chapter 16, Vegetation, Section 16.2, General guidelines for recommended vegetation: San Antonio, City of San Antonio, https://library.municode.com/tx/san_antonio/codes/unified_development_code, accessed June 2026.
- ⁶ City of Denton, n.d., Environmentally sensitive areas primer: City of Denton, <https://www.cityofdenton.com/DocumentCenter/View/493/ESA-Primer-PDF>, accessed June 2026.
- ⁷ City of Arlington, 2020, Ordinance No. 2020-4319—Environmentally sensitive areas ordinance, revised January 2023: Arlington, City of Arlington, <https://aptx.gov/DocumentCenter/View/2033/ESA-ORD-2020-4319-Revised-Jan-2023>, accessed June 2026.
- ⁸ City of Austin, n.d., Code of ordinances—Title 25, Land development, Chapter 25-7, Drainage, Article 3, Requirements for approval, Section 25-7-61, Criteria for approval: Austin, City of Austin, https://library.municode.com/tx/austin/codes/code_of_ordinances?nodeId=TIT25LADE_CH25-7DR_ART3REAP_S25-7-61CRAPDEAP, accessed June 2026.
- ⁹ Town of Flower Mound, n.d., Code of ordinances—Chapter 98, Zoning, Article III, District regulations, Division 4, Section 98-307, Common open space standards: Flower Mound, Town of Flower Mound, https://librarystage.municode.com/tx/flower_mound/codes/code_of_ordinances?nodeId=SPBLADE_RE_CH98ZO_ARTIIIDIRE_DIV4SIMIESDICODE_S98-307CODEOPST, accessed June 2026.
- ¹⁰ City of Selma, n.d., Code of ordinances—Chapter 78, Subdivisions, Article V, Design standards, Division 7, Section 78-452, Preservation of natural features: Selma, City of Selma, https://library.municode.com/tx/selma/codes/code_of_ordinances?nodeId=PTIILADERE_CH78SU_ARTVDEST_DIV7PUSIOPSPPRNAFE_S78-452PRNAFE, accessed June 2026.
- ¹¹ Fort Bend County, n.d., Subdivision regulations—Section 7, Green space regulations: Richmond, Fort Bend County, <https://www.fortbendcountytexas.gov/sites/default/files/document-central/document-central/engineering-documents/regulations-subdivisions/Section7GreenSpaceRegulati.pdf>, accessed June 2026.
- ¹² City of College Station, n.d., Unified development ordinance—Appendix A, Article 8, Subdivision design and improvements, Section 8.3, General requirements, stormwater design with wildlife linkages: College Station, City of College Station, https://library.municode.com/tx/college_station/codes/code_of_ordinances?nodeId=SPBLADEOR_APXAUNDEOR_ART8SUDEIM_S8.3GEREMISTDESUWILI, accessed June 2026.

¹³ City of Cleburne, n.d., Code of ordinances—Section 154.045 Easement Standards, Cleburne, City of Cleburne, https://codelibrary.amlegal.com/codes/cleburne/latest/cleburne_tx/0-0-0-11094, accessed June 2026.

¹⁴ City of Bee Cave, 2026, Code of ordinances—Section 7.3, Nonpoint source regulations: Bee Cave, City of Bee Cave, <https://ecode360.com/40282174>, accessed June 2026.

¹⁵ City of Blanco, 2024, Code of ordinances—Division 3, Development pollution controls, Section 9.04.062, Performance standards for development: Blanco, City of Blanco, <https://ecode360.com/41109745>, accessed June 2026.

¹⁶ City of Bee Cave, 2026, Code of ordinances—Section 7.3, Nonpoint source regulations: Bee Cave, City of Bee Cave, <https://ecode360.com/40282174>, accessed June 2026.

¹⁷ City of Austin, 2024, Drainage criteria manual—Section 9, Drainage charge administration, Section 9.5.5, Impervious area: Austin, City of Austin, https://library.municode.com/tx/austin/codes/drainage_criteria_manual?nodeId=S9DRCHAD_9.5.0_CADRCH, accessed June 2026.

¹⁸ City of Tyler, 2026, Code of ordinances—Division B, Low impact development alternative, Section 10-42, Development incentives and alternate standards: Tyler, City of Tyler, https://codelibrary.amlegal.com/codes/tyler/latest/tyler_tx/0-0-0-82507, accessed June 2026.

¹⁹ City of San Antonio, n.d., Unified development code—Chapter 16, Vegetation, Section 16.2, General guidelines for recommended vegetation: San Antonio, City of San Antonio, https://library.municode.com/tx/san_antonio/codes/unified_development_code?nodeId=APXHCH16VE_S16.2GEGUREVE, accessed June 2026.

²⁰ City of San Antonio. (n.d.). *Unified Development Code: Chapter 16 - Vegetation, Section 16.2 - General Guidelines for Recommended Vegetation*. Municode. [CHAPTER 16 - VEGETATION | Unified Development Code | San Antonio, TX | Municode Library](#)