

Chapter 8 Environmental Design

8.1 FLOODPLAIN MANAGEMENT

A. STATUARY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND METHODS

1. Statutory authorization

The Legislature of the State of Texas has in the Flood Control Insurance Act, Texas Water Code, Section 16.315, delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Therefore, the City Council of Boerne, Texas does ordain as follows:

2. Findings of fact

- a. The flood hazard areas of Boerne are subject to periodic inundation, which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect the public health, safety and general welfare.
- b. These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood proofed or otherwise protected from flood damage.

3. Statement of purpose

It is the purpose of this ordinance to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- a. Protect human life and health;
- b. Minimize expenditure of public money for costly flood control projects;
- c. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- d. Minimize prolonged business interruptions;
- e. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;
- f. Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
- g. Ensure that potential buyers are notified that property is in a flood area.

4. Methods of reducing flood losses

In order to accomplish its purposes, this ordinance uses the following methods:

- a. Restrict or prohibit uses that are dangerous to health, safety or property in times of flood, or cause excessive increases in flood heights or velocities;
- b. Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- c. Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;
- d. Control filling, grading, dredging and other development which may increase flood damage;
- e. Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

B. GENERAL PROVISIONS SECTION

1. Lands to which this ordinance applies

The ordinance shall apply to all areas of special flood hazard (SFH) and local floodplain with the jurisdiction of Boerne.

2. Basis for establishing the areas of special flood hazard and local floodplain

The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering reports entitled, "The Flood Insurance Study (FIS) for City of Boerne, Texas, Kendall County," dated May 15, 2020 and December 17, 2010, with accompanying Flood Insurance Rate Maps and/or Flood Boundary-Floodway Maps (FIRM and/or FBFM) dated May 15, 2020 and December 17, 2010, and any revisions thereto are hereby adopted by reference and declared to be a part of this ordinance.

Local Flood Plains shall be designated as the area inundated by the one percent (1%) annual chance (100-year) flood for all watersheds draining 25 acres or more that do not have a regulatory floodplain and are defined as a drainageway per this ordinance. Local floodplains are further defined by a minimum 1-foot flow depth to exclude shallow concentrated or sheet flows from being identified as elevated risk zones per FEMA guidelines.

3. Establishment of development permit

A Floodplain Development Permit shall be required to ensure conformance with the provisions of this ordinance. A Floodplain Development Permit is required for all proposed construction and other development within a Special Flood Hazard Area or Local Floodplain.

4. Compliance

No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this ordinance and other applicable regulations.

5. Abrogation and greater restrictions

This ordinance is not intended to repeal, abrogate, or impair any existing laws, ordinances, regulations, easements, covenants, or deed restrictions. However, where this ordinance and another law, ordinance, regulation, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

6. Interpretation

In the interpretation and application of this ordinance, all provisions shall be;

- a. considered as minimum requirements;
- b. liberally construed in favor of the governing body; and
- c. deemed neither to limit nor repeal any other powers granted under State statutes.

7. Warning and disclaimer or liability

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the community or any official or employee thereof for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made hereunder.

C. ADMINISTRATION

1. Designation of the floodplain administrator

The City Manager shall designate a Floodplain Administrator to administer and implement the provisions of this ordinance and other appropriate sections of 44 CFR (Emergency Management and Assistance - National Flood Insurance Program Regulations) pertaining to floodplain management.

2. Duties & responsibilities of the floodplain administrator

Duties and responsibilities of the Floodplain Administrator shall include, but not be limited to, the following:

- a. Maintain and hold open for public inspection all records pertaining to the provisions of this ordinance.
- b. Review permit application to determine whether to ensure that the proposed building site project, including the placement of manufactured homes, will be reasonably safe from flooding.
- c. Review, approve or deny all applications for development permits required by adoption of this ordinance.
- d. Review permits for proposed development to assure that all necessary permits have been obtained from those Federal, State or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.
- e. Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the Floodplain Administrator shall make the necessary interpretation.
- f. Notify, in riverine situations, adjacent communities and the State Coordinating Agency which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality (TCEQ), prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.
- g. Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.
- h. When base flood elevation data has not been provided in accordance with the Provisions for Flood Hazard Reduction, the Floodplain Administrator shall require the owner of the property, or his representative, to perform the necessary hydraulic studies to determine the one percent (1%) annual chance (100-year) flood plain, base flood elevation and floodway to obtain a Letter of Map Revision (LOMR) from FEMA.
- i. The Floodplain Administrator may obtain, review and reasonably utilize any base flood elevation data, hydrology and floodway data available from a Federal, State or other source, in order to administer the provisions of floodplain management.
- j. When a regulatory floodway has not been designated, the Floodplain Administrator must require that no new construction, substantial improvements, or other redevelopment or development (including fill) shall be permitted within local floodplains, Zones A 1-30 and AE on the community's FIRM, unless that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- k. Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain redevelopment in Zones A 1- 30, AE, AH, on the community's FIRM which increases the water surface elevation of the base flood provided that the community first completes all of the provisions required by Section 65.12.

3. Permit procedures

Application for a Floodplain Development Permit shall be presented to the Floodplain Administrator on forms furnished by him/her and may include, but not be limited to, plans in duplicate drawn to scale showing the location, dimensions, and elevation of proposed landscape alterations, existing and proposed structures, including the placement of manufactured homes, and the location of the foregoing in relation to areas of special flood hazard. Additionally, the following information is required:

- a. Elevation (in relation to mean sea level), of the lowest floor (including basement) of all new and substantially improved structures;
- b. Elevation in relation to mean sea level to which any nonresidential structure shall be flood proofed;
- c. A certificate from a registered professional engineer or architect that the nonresidential flood proofed structure shall meet the flood proofing criteria of the Provisions for Flood Hazard Reduction;
- d. Description of the extent to which any watercourse or natural drainage will be altered or relocated as a result of proposed development;
- e. Maintain a record of all such information in accordance with Duties and Responsibilities of the Floodplain Administrator;
- f. A form board survey with elevations signed by a Registered Public Land Surveyor (RPLS) will be required before framing begins. Approval must be given by the Flood Plain Administrator to begin framing if the survey meets all requirements;
- g. A completed elevation certificate with the necessary base flood elevations, hydrological and hydraulic data as needed, must be submitted when the structure is completed.
- h. Approval or denial of a Floodplain Development Permit by the Floodplain Administrator; shall be based on all of the provisions of this ordinance and the following relevant factors:
 - i. The danger to life and property due to flooding or erosion damage;
 - j. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - k. The danger that materials may be swept onto other lands to the injury of others;
 - l. The compatibility of the proposed use with existing and anticipated development;
 - m. The safety of access to the property in times of flood for ordinary and emergency vehicles;
 - n. The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;
 - o. The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;
 - p. The necessity to the facility of a waterfront location, where applicable;
 - q. The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

4. Variance procedures

- a. The Planning and Zoning Commission, shall hear and render judgment on requests for variances from the requirements of this ordinance.
- b. The Commission shall hear and render judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the Floodplain Administrator in the enforcement or administration of this ordinance
- c. Any person or persons aggrieved by the decision of the Commission may appeal such decision in the courts of competent jurisdiction.
- d. The Floodplain Administrator shall maintain a record of all actions involving an appeal and shall report variances to the Federal Emergency Management Agency upon request.
- e. Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this ordinance.
- f. Variances may be issued for new construction and substantial improvements to be erected on a lot of 1/2 acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing the relevant factors in the floodplain permit application have been fully considered. As the lot size increases beyond the 1/2 acre, the technical justification required for issuing the variance increases.

- g. Upon consideration of the factors noted above and the intent of this ordinance, the Commission may attach such conditions to the granting of variances as it deems necessary to further the statement of purpose, section 8.3(A)(3), and objectives of this ordinance.
 - h. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
 - i. Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
5. Prerequisites for granting variances:
- a. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
 - b. Variances shall only be issued upon:
 - i. showing a good and sufficient cause;
 - ii. a determination that failure to grant the variance would result in exceptional hardship to the applicant, and
 - iii. a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
 - c. Any application to which a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.
 - d. Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that:
 - i. the Variance procedure criteria outlined in 8.3 (C)(4)(A-I) are met, and the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

D. PROVISIONS FOR FLOOD HAZARD REDUCTION

1. General standards

In all areas of special flood hazards the following provisions are required for all new construction and substantial improvements:

- a. All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- b. All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
- c. All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
- d. All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are elevated to meet the requirements of UDC 8.1(D)(1)(j);
- e. All new and replacement water supply systems shall be designed to City of Boerne standards to minimize or eliminate infiltration of flood waters into the system;
- f. New and replacement sanitary sewage systems shall be designed to City of Boerne standards minimize or eliminate infiltration of flood waters into the system and discharge from the systems into flood waters; and,
- g. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.
- h. New construction and substantial improvements, when located in multiple flood zones with varying base flood elevations or in same flood zone with multiple base flood elevations must meet the requirements for the flood zone with the most stringent requirements and the highest base flood elevation.

- i. The developer of new construction, substantial improvements, and other development proposals must assure that all necessary permits have been obtained from those governmental agencies from which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act, as amended, or by other regulating agencies.
- j. For all construction (residential and non-residential) and substantial improvements within, where allowed, or adjacent to the 1% annual chance (100-year) local or FEMA floodplain limits, the lowest floor (including basements), shall be elevated as follows:

<u>Basis of Study</u>	<u>Minimum building slab elevation</u>
Atlas 14 Rainfall Evaluation	1.0 foot above the Base Flood Elevation
Rainfall other than Atlas 14 Evaluation	2.0 feet above the Base Flood Elevation

A registered professional engineer, architect, or land surveyor shall submit a FEMA Elevation Certificate to the Floodplain Administrator that the standard of this subsection is satisfied.

- k. Filling or the disposal of any materials which will diminish the water flow capacity of any waterway or floodplain defined by this ordinance must be compensated with remedial action. An equal amount of storage volume must be created in another location of the same local watershed to compensate for the storage capacity lost.

2. Specific standards for A & AE zones

In all areas of special flood hazards where base flood elevation data has been provided as set forth in this Chapter, the following provisions are required:

Compliance with the above General Standards, 8.3(D)(1).

a. Residential Construction

- i. New Construction on existing undeveloped lots
- ii. New Construction of a habitable structure on existing platted lots, platted prior to the effective date of this ordinance, is allowed if the proposed structure is located outside the 1% annual chance (100-year) local or FEMA floodplain.
- iii. Modifications (additions, redevelopment, etc.) of existing habitable structure, other than rebuilding activity due flood or fire damage, within the 1% annual chance (100-year) local or FEMA floodplain limits is not allowed. Rebuilding activity shall raise the finished floor above the Base Flood elevation as described in the above General Standards, Chapter 8.3(D)(1) .

b. Nonresidential Construction

New construction and substantial improvements of any commercial, industrial or other nonresidential structure shall have the lowest floor (including basement) elevated, as required in the above General Standards, 8.1 (D)(1)(j), above the base flood level.

c. Floodplain Encroachments

Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted FEMA floodplain, except for activities allowed within drainageway protection zones, and it has been demonstrated through hydrologic

and hydraulic analysis that the allowed encroachment would result in no-rise /no-impact to the floodplain.

d. Enclosures

- i. New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.
- ii. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:
 - (a) A minimum of two openings on separate walls having a total net area of not less than 1 square inch for every square foot of enclosed area subject to flooding shall be provided.
 - (b) The bottom of all openings shall be no higher than one foot above grade.
 - (c) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

e. Manufactured Homes

- i. Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.
- ii. Require that manufactured homes that are placed or substantially improved within Zones A 1-30, AH, and AE on the community's FIRM on sites (i) outside of a manufactured home park or subdivision, (ii) in a new manufactured home park or subdivision, (iii) in an expansion to an existing manufactured home park or subdivision, or (iv) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as a result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to a minimum of 1' above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.
- iii. Require that manufactured homes be placed or substantially improved on sites in an existing manufactured home park or subdivision with Zones A 1-30, AH and AE on the community's FIRM that are not subject to the provisions the Manufactured Homes, paragraph (F) of this section, be elevated so that the lowest floor of the manufactured home is elevated to a minimum of 1' above the base flood elevation.

f. Recreational Vehicles

Require that recreational vehicles placed on sites within Zones A 1-30, AH, and AE on the community's FIRM either (i) be on the site for fewer than 180 consecutive days, or (ii) be fully licensed and ready for highway use, or (iii) meet the permit requirements of the Permit Procedures, 8.3(C)(3), and the elevation and anchoring requirements for "manufactured homes" in the Manufactured Homes, paragraph (F), of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached additions.

3. Standards for subdivision and development plat proposals

- a. All subdivision and development plat proposals including the placement of manufactured home parks and subdivisions shall be consistent with the standards of this Chapter.

- b. All proposals for the development of subdivisions including the placement of manufactured home parks and subdivisions shall meet Floodplain Development Permit requirements of this Chapter.
- c. Base flood elevation data, for local and regulatory floodplains, shall be generated for subdivision proposals and other proposed development including the placement of manufactured home parks. Elevations for regulatory floodplains shall be submitted to FEMA as a Letter of Map Revision (LOMR) for inclusion in the City of Boerne FIRM maps.
- d. All subdivision and development plat proposals including the placement of manufactured home parks and subdivisions shall have adequate drainage provided to reduce exposure to flood hazards.
- e. All subdivision and development plat proposals including the placement of manufactured home parks and subdivisions shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage.
- f. Existing drainageways shall not be modified, except for as allowed for activities within drainageway protection zone as described in the Chapter 8, Environmental Design Floodplain engineering and procedures requirements for subdivision within FEMA or United States Corps of Engineers official flood prone areas shall conform to the engineering criteria as set out in the Engineering Design Manual.
- g. All proposed subdivisions and development plat proposals shall have unflooded access, the area is accessible to high ground by a street elevated above the one percent (1%) annual chance (100-year) flood the base flood, i.e., no "island" will be considered for platting, unless adequate connecting structures, capable of passing the base flood, are provided to high ground (not subject to the controlling flood of the same floodplain).
- h. Unflooded access shall be accessible to an arterial street that is not adjacent to the development or to a distance of one-quarter (1/4) mile, whichever is less, during a four percent (4%) annual chance (twenty-five year) flood event.
- i. All proposed Residential subdivisions shall layout the lots as follows:

(a) Lot size less than 1.0 acres

All residential lots, with an acreage of less than 1.0 acres, shall be designed such that no portion of the lot is located within the 1% annual chance (100-year) local or FEMA floodplain limits.

(b) Lot size of 1.0 acres or greater

All residential lots, with an acreage of 1.0 acres or greater, may allow the construction of habitable structures outside the 1% annual chance (100-year) local or FEMA floodplain. Any lot traversed by an area of local or special flood hazard where the "buildable" portion of the subdivision is severed by the floodplain shall be provided with adequate access. Adequate access shall be a structure that will pass the 1% annual chance (100-year) storm without overtopping the structure. Upstream property must not be affected by backwater, and velocities in the vicinity of the structure must be controlled to prevent scour, erosion or structural damage.

4. Standards for areas of shallow flooding (AO/AH Zones)

Located within the areas of special flood hazard are areas designated as shallow flooding.

- a. These areas have special flood hazards associated with flood depths of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow; therefore, the following provisions apply.
- b. Compliance with the above General Standards, 8.3 (D)(1).
- c. All new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated to the highest adjacent grade at least 1' above the depth number specified in feet on the community's FIRM (at least three feet if no depth number is specified).
- d. All new construction and substantial improvements of non-residential structures; must

- e. have the lowest floor (including basement) elevated to the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least 2 feet if no depth number is specified), or
- f. together with attendant utility and sanitary facilities be designed so that below the base specified flood depth in an AO Zone, or below the Base Flood Elevation in an AH Zone, level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.
- g. A registered professional engineer or architect shall submit a certification to the Floodplain Administrator that the standards of this Section are satisfied.
- h. Require within Zones AH or AO adequate drainage paths around structures on slopes, to guide flood waters around and away from proposed structures.
- i. Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted FEMA floodplain, except for activities allowed within drainageway protection zones and it has been demonstrated through hydrologic and hydraulic analysis that the allowed encroachment would result in no-rise /no-impact to the floodplain.

5. Local floodplain

- a. Local Floodplain shall be designated as the area inundated by the one percent (1%) annual chance (100-year) flood for all watersheds draining 25 acres or more that do not have a FEMA regulatory floodplain and are defined as a drainageway per this ordinance. Local floodplains are further defined by a minimum 1-foot flow depth to exclude shallow concentrated or sheet flows from being identified as elevated risk zones per FEMA guidelines.
- b. In all areas of local floodplain, the following provisions are required for all new construction and substantial improvements:
- c. Compliance with the above General Standards, 8.3 (D)(1)
- d. Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the local floodplain, except for activities allowed within drainageway protection zones and it has been demonstrated through hydrologic and hydraulic analysis that the allowed encroachment would result in no-rise /no-impact to the floodplain.

6. Floodways

Floodways - located within areas of special flood hazard established in current FIS and FIRM maps as defined in Section 8.3(B). Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

- a. Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway, except for activities allowed within drainageway protection zones and it has been demonstrated through hydrologic and hydraulic analysis that the allowed encroachment would result in no-rise /no-impact to the floodplain.
- b. Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program Regulations, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first completes all of the provisions required by Section 65.12.

7. Existing structures and uses within a floodway shall not be expanded or enlarged. No-Rise / No-Impact Certification

The Engineering No-Rise / No-impact certification and supporting technical data must stipulate NO impact or NO changes to the 25 year and 100 year base flood elevations, floodway elevations, floodway widths at the new cross sections and at all existing cross sections anywhere in the model. Therefore, the revised computer model should be run for a sufficient distance upstream and downstream of the development site or at the discretion of the Floodplain Administrator to insure proper No-Rise /No Impact certifications.

8. Natural Resources Conservation Service (NRCS) lakes.

- a. There are a number of Natural Resources Conservation Service (NRCS) assisted watershed dams and lakes within the extraterritorial jurisdiction of the city. These dams and lakes were constructed to NRCS (previously Soil Conservation Service) and TCEQ standards. Although the land and lakes are in private ownership, the dams are maintained according to the operations and maintenance agreement pertaining to each dam. NRCS lakes provide stormwater retention and water quality enhancement as a design feature. This retention volume was considered in the design of the structure and shall be maintained with regard to their original design to collect silt from stormwater runoff and to provide regional flood control. The city and county is responsible for floodplain management of those areas upstream, downstream, and adjacent to the lakes.
- b. The city and county shall control future development upstream, downstream, and adjacent to all NRCS dams and lakes. Planning for future development that impacts on or is impacted by NRCS dams shall require a detailed engineering study to provide a technical basis for development. Design for upgrading dams shall comply with other sections of this article and the engineering design manual. Furthermore, the dam shall be upgraded as follows:
 - i. Provide principal spillway capacity adequate to discharge the routed 100-year flood event based on fully developed watershed conditions and limited to constraints including both hydraulic capacity and channel stability immediately downstream;
 - ii. Provide total capacity of the dam structure, including principal and auxiliary spillways to accommodate the probable maximum flood (PMF);
 - iii. Maintain existing flood storage and planned sediment storage capacities;
 - iv. Prohibit upstream development within the contour line determined by the auxiliary spillway crest elevation plus two feet, or the routed 100-year flood elevation (based on fully developed watershed conditions and the improved dam) plus two feet, whichever elevation is greater. In addition, the areas required for reasonable maintenance access to the lake, dam, and associated appurtenances and for safe operation of the spillway for the existing and rehabilitated dam shall be preserved and protected from encroachment through easement. These easements shall be described by a metes and bounds survey; and
 - v. Restrict development and improvements within the floodplain established by a breach flow analysis from the dam to the downstream limit of the dam breach impact. Commercial development may be allowed below NRCS dams that have been rehabilitated to safely pass the PMF, if conditions warrant and with approval of the flood plain administrator.
 - vi. The detailed study of the NRCS floodwater retarding structure shall include an evaluation of the existing lake sediment level.
 - vii. At the discretion of the City Manager, a developer may, in lieu of upgrading an NRCS floodwater retarding structure, offer a contribution toward the future upgrade of the structure. However, easements as described in this section shall be required.
 - viii. A metes and bounds description of an easement with elevation two feet above the emergency spillway elevation or an elevation two feet above the routed 100-year flood elevation, whichever is higher, shall be provided on a plat prior to filing.

9. Severability

If any section, clause, sentence, or phrase of this Ordinance is held to be invalid or unconstitutional by any court of competent jurisdiction, then said holding shall in no way affect the validity of the remaining portions of this Ordinance.

10. Penalties for noncompliance

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this court order and other applicable regulations. Violation of the provisions of this court order by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this court order or fails to comply with any of its requirements shall upon conviction thereof be fined not more than \$1000 for each violation, and in addition shall pay all costs and expenses involved in the case. E Nothing herein contained shall prevent the City of Boerne from taking such other lawful action as is necessary to prevent or remedy any violation.

8.2 WATERSHED PROTECTION

A. WATERSHED PROTECTION ZONES

1. Watershed protection zones established.

Drainageway Protection Zones (DPZ)

- a. The City of Boerne has a vested interest in protecting water quality conditions within the Upper Cibolo Creek Watershed. A primary tool used to maintain and improve water quality within streams and lakes is the establishment and management of riparian zones. Riparian zones are vegetated buffers that form along rivers and streams. Riparian vegetation filters contaminants from stormwater, stabilizes streambanks which decreases erosion potential and helps to reduce the energy of floodwaters. The establishment of Drainageway Protection Zones will ensure riparian vegetation is protected along stream corridors and simultaneously help improve in-stream water quality conditions.
 - i. Protection Zone 1 is approximately the width of the riparian zone and is measured from the drainageway center line.
 - ii. Protection Zone 1 is intended to protect or allow restoration of the physical and ecological integrity of natural stream corridors.
 - iii. Native vegetation must remain undisturbed to the maximum practical extent in this zone to assure proper functioning of this zone. Limited access to a permanent water course is allowed in private or publicly dedicated recreational areas.
- b. Protection Zone 2 is the outer protection zone and is measured from the outer edge of Protection Zone 1 and extend horizontally the remaining distance of the Total Protection Width. The outer zone is intended to prevent encroachment into the riparian zone, and to provide distance between development activity and the riparian zone.

Drainage Area (Acres)	Protection Zone 1	Protection Zone 2	Total Protection Width (each side)
≥25 acres and less than 128 acres	35'	20'	55'
≥128 acres and less than 320 acres	55'	30'	85'
≥320 acres and less than 640 acres	70'	50'	120'
≥640 acres	100'	50'	150'

- c. **Water Supply Protection Zones**
The Water Supply Protection Zone includes the land on all sides around the shores at normal pool of any lake which is used or intended to be used by the City as a surface water reservoir. The zone shall be a minimum of 200 feet.

2. Restrictions within watershed protection zones

- a. Drainageway Protection Zones (DPZ) 1 and 2 and the Water Supply Protection Zone (WSPZ) shall remain free of all construction activity, development and alterations unless otherwise indicated in this Section.
- b. Street Crossings in watershed protection zones

Neighborhood Local streets shall not cross a watershed protection zone. Perpendicular local street crossings may be authorized by the City Manager for extenuating circumstances, such as fire protection or street connectivity, if all of the following conditions are met:

- i. Proposed perpendicular street crossings are located a minimum of 1,000 feet from any existing or proposed perpendicular crossings.
 - ii. Street crossings that traverse any drainageway shall be designed to minimize any permanent impact to the drainageway crossing by designing street crossing such that no permanent improvements are within the ordinary high-water mark of the drainageway.
- c. Regional thoroughfares and all types of arterial and collector streets may cross a watershed protection zone only at right angles or as near as practicable to right angles in the judgment of the City Manager.
 - d. All streets in the watershed protection zone shall be designed and constructed with LID best management devices, as described in 8.2.B, to capture and treat the rainfall runoff from the roadway. In addition, all collector and arterial roadways in the zone shall be designed and constructed with hazardous material traps that will capture, contain and isolate a hazardous material spill in the street right-of-way. These hazardous material traps shall have a minimum volume of 10,000 gallons and they shall contain a self-draining outlet and an emergency cut-off to contain any spilled materials.
 - e. No drainage structure (private or public) shall discharge directly from the roadway surface into a watershed protection zone. All drainage structures shall be designed to transport stormwater off the drainage structure and into a sedimentation pond or filtration basin, or to provide equivalent water quality protection in the judgment of the City Manager.
 - f. Private driveways (residential or commercial) shall not cross a watershed protection zone. Perpendicular private driveways may be authorized by the City Manager for extenuating circumstances, such as fire protection, if all of the following conditions are met:
 - i. Proposed perpendicular private driveway crossing is the only available route from public street to the remaining portion of the property.
 - ii. Private drive crossings that traverse any drainageway shall be designed to minimize any permanent impact to the drainageway crossing by designing crossing such that no permanent improvements are within the ordinary high-water mark of the drainageway.
 - iii. Private driveway crossing is designed to safely pass the 1% annual chance (100-year) storm event.

3. Exceptions

- a. Drainageway Protection Zone 1 shall remain free of all construction activity, development and alterations, except for the following:
 - i. may allow those allowed perpendicular crossings (trails, utilities and street), as well as associated utilities within the street right-of-way. Disturbed areas within an ordinary highwater mark are subject to any USACE permitting requirements;
 - ii. Fences, perpendicular to flow of water, that do not obstruct the flow of water;
 - iii. Public and private parks and similar open spaces, in which development is limited to trails and facilities (other than stables and corrals for animals) for hiking, jogging, non-motorized biking, and nature walks.

- b. The Water Supply Zone and Drainage Protection Zone 2 shall remain free of all construction activity, development and alterations, except for the following:
 - i. Street crossings, as provided in this Section;
 - ii. Utilities, as provided in this Section;
 - iii. Fences, parallel to the flow of water, that do not obstruct the flow of water;
 - iv. Public and private parks and similar open spaces, in which development is limited to trails and facilities (other than stables and corrals for animals) for hiking, jogging, non-motorized biking, and nature walks;
 - v. Water quality or flood control systems with minimum disruption to the natural surface and natural vegetation.

4. Utilities in Drainageway Protection Zones

- a. All underground utilities, other than sanitary sewer mains, shall be located outside of the Drainageway Protection Zone 1, except for necessary perpendicular crossings.
- b. Underground utilities crossing the zone shall be co-located with street crossings wherever practical in the judgment of the City Manager. Before submitting an application for plat approval, the developer shall consult with the City Manager to evaluate possible alternatives for the location and design of wastewater mains in the Zone. Overhead electric, communications and cable TV may be placed within the cleared area of a trail on the side opposite the creek.

5. Tree Removal/Mitigation within Watershed Protection Zones

- a. All site disturbance within Drainage Protection Zone 1 and Drainage Protection Zone 2 must be revegetated to 85% coverage with a native seed mix approved by the City Engineer.
- b. Any alterations to the stream channel should be restored to pre-construction site conditions and stream banks stabilized to reduce erosion potential.
- c. All efforts should be made to preserve Protected trees within the construction and utility easements.
- d. Tree removal within Drainage Protection Zones will require mitigation and may utilize a combination of tree planting and fee mitigation as follows:

Table Mitigation methods for tree removal within DPZ.

Tree Classification	Tree Diameter Removed (DBH)	Tree Planting: Aggregate TC in inches of trees removed	Mitigation Fee per inch (TC) of tree removed
Standard	8.0"-11.9"	1:1	\$100
Legacy	12.0"- 23.9"	2:1	\$200
Heritage	24.0" or larger	3:1	\$400

- e. Mitigation fees as described in Table above for trees removed or tree mortality within 2 years of construction as a direct result of crown, trunk or root damage will be applied to the Tree Restoration Fund.
- f. Mitigation using existing trees is not applicable for drainage protection zones
- g. Mitigated tree replacement should occur within the construction easement or along streambank within the project limits. If no suitable locations exist for replanting within the project limits, mitigation trees will be planted within a designated drainage protection zone as identified by the City Manager.
- h. Replacement trees should at a minimum include 5 of the following species: bald cypress, American sycamore, black willow, cedar elm, eastern cottonwood, chinquapin oak, green ash, box elder, pecan, red mulberry.
- i. Replacement trees shall be container stock with a minimum of 3.0 caliper inches measured 6 inches from the soil line.

B. LOW IMPACT DEVELOPMENT FACILITIE

1. Specific Intent

It is the specific intent of this Section to:

- a. Value the design, function, appropriate application of LID features and BMPs either incorporated into areas of open space or constructed separately
- b. Design features in accordance with the LID Manual to reduce stormwater runoff volume and flow rate to pre-development conditions.
- c. For new development and redevelopment, a portion of the annual stormwater runoff volume shall be adequately treated prior to discharge from the site. This performance standard is presumed to be met if the stormwater quality management system is sized to treat the water quality treatment volume from the impervious and disturbed portions of the site. The water quality treatment volume is defined as:
- d. For new development on an undeveloped site, the runoff volume resulting from the first 1.66" of rainfall for all impervious area.
- e. For development that adds impervious cover to existing developed site, the runoff volume resulting from the first 1.66" of rainfall for the area of increased impervious area.
- f. For development that replaces existing development, the runoff volume resulting from the first 1.35" of rainfall for all area of impervious area.
- g. Adequate treatment of the water quality volume shall be defined as removal of 60% of the bacteria load and 80% of the calculated TSS particles.
- h. For any development upstream of a City water supply reservoir, the depth of water for volume determination shall be increased to 2.35" for all area of impervious area.
- i. Consider the context and multiple functions that open spaces can serve to support development.
- j. Provide criteria for LID construction documents and engineering reports that meet the intent of the LID Manual.
- k. Manage stormwater runoff both at the source and at the surface using plants and soil to slow, filter, cleanse and infiltrate runoff.

2. Obligations of Developer.

The developer shall install at his/her own cost and expense all of the improvements required by this ordinance. It shall be the developer's responsibility to ensure that all improvements are constructed in accordance with this ordinance and the LID Manual BMPs. The developer shall comply with all other provisions of this ordinance prior to acceptance of the subdivision by the City.

3. Engineer Responsible

The developer shall retain the services of a licensed professional engineer, licensed in the State of Texas, whose seal shall be placed on each sheet of the construction plans, and who shall be responsible for the design and supervision of all LID features constructed for the subdivision.

4. Construction Plans

The construction plans for LID features shall be submitted as provided in Chapter 2. They shall conform to the requirements of the Engineering Design Manual and shall also meet the following requirements:

- a. All design professionals shall include in their plans, the statement "Construction of all facilities to be constructed shall be performed per the requirements of the City of Boerne LID Manual.
- b. Complete design of all BMPs shall be included in the construction plans with sections and profiles. These plans shall meet the BMPs and techniques as identified in the LID Manual
- c. Construction plans as necessary shall include but is not limited to design for storm drains, underdrain connections, overflows, bypasses, cistern details including foundations, permeable pavement structural design, and liner connections and details

5. Engineering Report

The engineering reports for LID features shall be submitted as provided in Chapter 2 and shall include the following information:

- a. General information and site description
- b. Narrative and summary for requested incentives
- c. Site planning and environmentally sensitive design methods
- d. Grading plan
- e. Detailed drainage maps for proposed LID BMPs (existing and proposed)
- f. Impervious cover exhibit(s)
- g. LID volume and treatment/removal calculations
- h. Vegetation plan including establishment plan, if necessary
- i. Inspection, maintenance, repair, and retrofit plan
- j. Narrative and summary of multiuse benefits, if necessary
- k. Financial assurance

6. Deed Recordation Affidavit

A deed recordation affidavit shall be required when LID BMPs are proposed with a building permit where the BMPs are not within a separate lot or drainage easement. Once a Stormwater Management Study stormwater plan has been approved for the site, within sixty (60) days the applicant shall submit a deed recordation affidavit referencing the stormwater management study, including a description of LID BMPs and the stormwater plan's operation and maintenance agreement. Building permit approval may be withheld until the affidavit is reviewed and approved by the City of Boerne. Certificate of occupancy may be withheld until proof of recordation of the affidavit is submitted to and accepted by the City of Boerne.

The affidavit may be drafted such that modifications or removal of LID BMPs does not require revoking or vacating the deed recordation affidavit. However, those modifications to the site Stormwater Management Study must be submitted to the City for review and approval. The property shall conform to all applicable development standards of the Unified Development Code.

7. Waiver to LID Requirements

The Planning and Zoning Commission, after considering a report from City staff, may waive the LID requirements after considering the engineering report for the development. The report should be able to demonstrate that incorporating LID features would cause hardship, is ineffective or provides insignificant benefit or produces a negative impact onsite or to adjacent property or right-of-way.

C. IMPERVIOUS COVER REQUIREMENTS

1. Purpose

The growth in and around the City of Boerne and the associated development and construction of buildings, paved surfaces, roads and other improvements including the construction of gutters, culverts, drains and channels increases the pollution of natural waterways from urban runoff of rainwater or other non-point specific sources. This Chapter is adopted to provide environmental protection within the City's extraterritorial jurisdiction (ETJ) and protect the natural and ecological resources that are essential elements of the City's health and community character by reducing negative impacts from the following concerns:

- a. Paved surfaces, automobiles, buildings, and other improvements produce increases in air temperatures whereas plants and vegetation have the opposite effect through transpiration and the creation of shade.
- b. Impervious surfaces created by development generate greater water runoff causing problems from contamination, erosion, and flooding. Preserving and improving the natural environment and maintaining a working ecological balance are of increasing concern.
- c. Landscape elements can contribute to the processes of air purification, oxygen regeneration, water absorption, water purification, and the abatement of both noise and heat as well as the preservation of the community's aesthetic qualities.
- d. The use of such landscape elements and minimization of impervious covers serves as a benefit to the health, welfare and general well-being of the community and, therefore, the proper use of such landscape and impervious cover elements are required.

2. Authority

The provisions of this Chapter are adopted pursuant to the Texas Local Government Code Chapters 211 and 212; §26.177 of the Texas Water Code, the Texas Health and Safety Code, the rules and regulations of the Texas Commission on Environmental Quality, the United States Environmental Protection Agency and the City of Boerne Home Rule Charter.

3. Applicability

All development in the City of Boerne ETJ shall comply with the impervious cover limitations set forth in this Article.

4. Compliance

Compliance with the requirements of this Article will be achieved in the City of Boerne ETJ through the Impervious Cover review and approval process during the subdivision plat review process.

5. Impervious cover limitation

These impervious cover standards are adopted to minimize negative flooding effects from storm water runoff and to control, minimize and abate water pollution resulting from urban runoff of rainwater or other non-point specific sources, pursuant to §26.177 of the Texas Water Code. These impervious cover limitations apply to all properties within the jurisdiction of the City of Boerne.

6. Calculating percent impervious cover

The “percent impervious cover” shall be calculated as the total area of all impervious surfaces within the perimeter of a subdivision, divided by the total area within the perimeter of the subdivision.

7. Impervious Cover in Water Supply Drainage Areas

In order to reduce the potential pollutant and contaminant load which may ultimately be carried by drainage into the City water supply, the maximum percentage of the area which may be covered by impervious surfaces within any subdivision in any drainage basin above a City water supply reservoir shall be limited. The limits of the water supply drainage basin shall be determined according to USGS maps and confirmed in the plat by a survey of the proposed subdivision site. In a subdivision which is to be developed in more than one land use, the impervious surfaces in streets and alleys shall be counted and assigned as divided equally between the lot areas on both sides of the street or alley according to the frontage of the lot areas in each contrasting land use.

Context – Development Pattern	Maximum Percent Impervious Cover
Residential, < 1 dwelling unit/acre (gross)	10%
Residential, 1-2 dwelling units/acre (gross)	30%
Residential, >2 dwelling units/acre (gross)	50%
Nonresidential	65%

8. Impervious cover outside of water supply drainage areas

- a. Site Development: Overall impervious cover for a residential subdivision shall be no more than 50%.
- b. Impervious Cover Ratios for Nonresidential Lots in the City Limits:
- c. The following maximum percent of impervious cover shall apply in accordance with the base zoning designation of the property, to the following:
 - i. Neighborhood Commercial (C1) – 75%
 - ii. Transitional Commercial (C2) – 80%
 - iii. Community Commercial (C3) – 85%
 - iv. Regional Commercial (C4) – 85%
 - v. Neighborhood Office (O1) – 75%
 - vi. Office Park (O2) – 80%
 - vii. Industrial Office (O3) – 85%
 - viii. Craft Commercial (CR) – 85%
 - ix. Storage and Transportation (I1) – 85%
 - x. Light Industrial (I2) – 70%
 - xi. General Industrial (I3) – 70%
 - xii. Civic and Institutional (CIV) – 70%
 - xiii. Interim Holding (HOL) – 10

9. Impervious Cover ratio (maximum percent) for Residential Lots in the City Limits:

- a. The following maximum percent of impervious cover shall apply in accordance with the base zoning designation of the property, to the following
 - i. Agricultural and Rural Residential (RA)- 10%
 - ii. Manor Residential (RM) – 25%
 - iii. Estate Residential (RE) – 40%
 - iv. Low Density Residential (R1-L) – 40%
 - v. Medium Density Residential (R1-M) – 50%
 - vi. Neighborhood Residential (R2-N) – 50%
 - vii. Moderate Density Residential (R2-M) – 80%
 - viii. Attached Residential (R3-A) – 85%
 - ix. Duplex Residential (R3-D) – 50%
 - x. Bungalow Courts (R4-B) – 70%
 - xi. Low Density Multi-family Residential (R4-L) – 85%
 - xii. Urban Multi-family Residential (R4-U) – 85%
 - xiii. Manufactured Home Communities (RMHC) – 55%
- b. Impervious Cover Ratio (maximum percent) for Lots in the ETJ:
- c. The maximum percent of impervious cover in the ETJ shall be based on general use category, as follows:
 - i. Industrial Uses: 70%
 - ii. Commercial Uses: 70%
 - iii. Single-Family Residential:
 - (a) Total impervious cover for a single-family residential subdivision in the extraterritorial jurisdiction of the City shall not exceed 40%.
 - (b) Impervious cover for an individual single-family residential lot in the extraterritorial jurisdiction of the City shall not exceed 25%.
- d. Multi-family (more than 2 dwelling units per lot, including townhomes, row houses, quadplexes, condominiums and apartments): 70%

10. Impervious cover credits

- a. Credit for Parkland: Any land on the property that has been approved for parkland dedication shall be counted in its entirety as pervious land when calculating percent impervious cover.
- b. Arterials and major collectors within the subdivision required by the City of Boerne thoroughfare plan shall not be counted as impervious cover, when determining impervious cover ratios for a property.

11. Waiver of impervious cover limitations

- a. The City Manager must approve all Low Impact Development Measures if a waiver is requested.
- b. Maximum Increase to Impervious Cover Limit

The City Manager may increase the amount of impervious cover permitted by up to seven percent (7%) if accepted Low Impact Development (LID) measures are used on the property, in accordance with this Section.

- c. Low Impact Development measures that may be considered for a waiver to the maximum allowed impervious cover include:
 - i. rainwater harvesting;
 - ii. bio-retention facilities placed around the perimeter of parking lots;
 - iii. wet ponds
- d. Partial credit may be granted by the City Manager for certain LID measures.
- e. No combination of waivers may allow impervious cover to exceed the maximum seven percent increase established herein.
- f. Requirements for a Waiver of Impervious Cover Limitations:
 - i. Accepted Low Impact Development designs must be utilized, following the guidelines and standards adopted by the Boerne Low Impact Development Technical Design Guidance Manual.
 - ii. The applicant is responsible for providing sufficient design information for the appropriate department to examine and verify the improvement.

8.3 TREE PRESERVATION

A. PURPOSE

The purpose of the tree preservation requirements of the City is to:

1. Enhance the quality of life and the present and future health, safety and welfare of all citizens;
2. Minimize the negative impact of land development on environmental quality, namely nati habitat, ambient temperatures, air quality and soil stability;
3. Preserve and protect the sense of place associated with the Texas Hill Country, including viewsheds;
4. Promote a healthy urban forest within the City and its extraterritorial jurisdiction and ensure proper planting and care of trees;
5. Establish requirements for tree preservation, tree removal and associated mitigation;
6. Facilitate preservation and protection of existing trees, roots and soil conditions during design and construction and prohibit the indiscriminate clearing of property
7. Establish requirements to reduce the impacts of insects and disease on the urban forest with a focus on reducing the spread of oak wilt.

B. APPLICABILITY

1. No tree shall be removed unless such removal meets all the provisions of this or any other applicable ordinance adopted by the City Council of the City of Boerne, Texas.
2. This Ordinance shall regulate all activities that result or may result in the removal of tree(s) in the City limits of Boerne Texas. Said activities include any of the following conducted on property to which the section applies:
 - a. All residentially zoned property for which a subdivision is accepted by the City after the effective date of this ordinance.
 - b. Industrial, commercial, office, multi-family, institutional development and schools, including all new construction and any additions greater than 2500 square feet.
 - c. Construction of a new parking lot or expansion of an existing parking lot.
 - d. Any grading, filling or clearing of land.
 - e. Chemical or biological treatment of tree(s) that may result in the death or destruction of any tree(s) as defined.
 - f. Trenching or excavating that may damage or destroy Legacy as defined.
 - g. All governmental development shall comply with the tree preservation plan review procedure regardless of the zoning district in which they are located.
 - h. Detached and attached dwelling lots platted after the effective date of this ordinance.

C. EXCEPTIONS

The following shall be exempt from the requirements of this Section:

1. Buildings or structures which were constructed prior to the adoption of this ordinance and subsequently damaged by fire, explosion, flood, tornado, riot, act of the public enemy, or accident of any kind, provided a building Permit is issued for restoration within 12 months after the damage occurs and additional square footage is not proposed.
2. Dangerous, diseased, dead or dying trees as determined by a tree survey and a letter from an ISA certified Texas Arborist.
3. Trees causing physical damage to existing structures, drainageways, utility systems or facilities in the public right of way.
4. Protected trees damaged or destroyed by floods, fire, wind or other natural causes;
5. The following exempted tree species; Hackberry, Sugarberry, Chinese Tallow, Eastern Red Cedar, Common Ashe Juniper < 10" DBH, Chinaberry, Mesquite, Huisache and Ligustrum.
6. Trees or areas of tree canopy preventing the opening of reasonable and necessary vehicular traffic lanes in a street or alley.
7. Trees or areas of tree canopy located in the clear vision area, as defined in the street improvement standards, section 7.5 intersection visibility.

D. MINIMUM TREE PRESERVATION REQUIREMENTS

1. No protected tree shall be removed from any real property within the City of Boerne without following the provisions as stated below.
2. Preservation requirements that are set as percentage values shall be percentage of the trees, not percentage of the sum of all diameter inches.
3. The following shall apply to Protected trees:
 - a. Commercial and Multi-family – A minimum of 40% of Standard and Legacy trees, exclusive of Heritage trees, shall be preserved on a lot.
 - b. Subdivision Development of Single-family and other residentially zoned areas – A minimum of 35% of Standard and Legacy trees, exclusive of clearing and installation for infrastructure (roads, utilities, etc.) and lot lines is allowed.
 - c. Commercial, Industrial and Multi-family – 100% of Heritage trees shall be preserved. Heritage trees within clearing and installation for infrastructure (roads, utilities, etc.) shall not be removed without mitigation.
 - d. Single-family and other residentially zoned areas – 100% of Heritage trees on platted lots, shall be preserved. Heritage trees within clearing and installation for infrastructure (roads, utilities, etc.) shall not be removed without mitigation.
 - e. Steep slopes – Protected trees shall not be removed from a Steep Slope area.
 - f. Tree preservation in the Drainageway Protection Zones and the Water Supply Protection Zone

No trees shall be removed without following the procedures set forth for Drainageway and Water Supply Protection Zones. The minimum percentage of trees to be preserved shall be by type, according to the zone in which the trees are located, as follows:

- i. Drainageway Protection Zone 1
 - (a) Standard Trees – 100% shall be preserved
 - (b) Legacy trees – 100% shall be preserved
 - (c) Heritage trees – 100% shall be preserved
- ii. Drainageway Protection Zone 2 and the Water Supply Protection Zone
 - (a) Standard trees – 50% shall be preserved
 - (b) Legacy trees – 80% shall be preserved
 - (c) Heritage trees – 100% shall be preserved

E. MITIGATION FOR TREES REMOVED

1. When the specific preservation rate described in Section 11.3.D (Minimum tree preservation requirements) is not met the inches (TC) required for mitigation will be determined using the approved tree survey or tree preservation plan. Legacy trees shown to be removed (beginning from largest to smallest (TC)) will be added to the preserved tree total until the preservation percentage is reached. The number of trees needed to meet the preservation requirement will be included in the mitigation calculation.
2. Protected trees which are removed shall be mitigated using any combination of the following:
 - a. Preservation of existing trees ≥ 6 inches in DBH above minimum preservation requirements;
 - b. Relocation of the removed tree onsite, mitigation is required for relocated trees if mortality occurs within 2-years of the relocation;
 - c. replacement by new Legacy tree species, or alternative native trees approved by the City Manager or designee; and/or
 - d. payment of a fee in lieu of tree replacement.
3. The preservation of healthy Standard and Legacy trees on-site is encouraged and may be used as mitigation to offset the removal of Protected trees. The mitigating trees may be of any Legacy tree species with an aggregate TC in inches of the trees removed (1:1). Mitigating trees should be ≥ 6 inches in DBH and clear of existing or proposed utility easements and overhead electric lines. Existing Heritage trees cannot be used to mitigate for the loss of Heritage trees.
4. Replacement trees are in addition to the minimum landscaping requirements as described in Section 4.6 (residential site design) and section 5.5 (non-residential site design) of this document.
5. Replacement trees may be of any Legacy tree species or alternative approved indigenous tree with an aggregate TC in inches of the trees removed with ratio of (1:1) for Standard trees, (1.5:1) for Legacy trees and (3:1) for Heritage trees.
6. Replacement trees shall be a minimum of two caliper inches measured 6 inches from ground level and a minimum height of 8 feet when planted.
7. When possible, replacement trees shall be planted on the same lot according to an approved TPP. Replacement trees may be planted on another lot if approved by the City Manager or designated representative.
8. Biodiversity requirements for tree replacement
 - a. When replacing trees on site, or at a location approved by the City Manager, no single tree species may account for more than 50% of the total required caliper inches to be replaced.
 - b. When more than 300 inches (TC) of replacement trees are required, a minimum of five (5) different approved tree species shall be used to fulfill the replacement requirements.
9. Fee in lieu of replacement
 - a. If all or a portion of the required replacement trees will not be planted on-site or on a site approved by the City Manager, payment of a fee in lieu of replacement shall be made, which shall be deposited into the City's Tree Restoration Fund. The fee shall be determined as follows in Table X.X:
 - b. As described in Texas Government Code Sec.212.905, a tree mitigation fee is not required for trees ≤ 10 inches in DBH on a property that is an existing one-family or two-family dwelling that is the persons residence.

Table Mitigation methods for tree removal

Tree Classification	Tree Diameter Removed (DBH)	Tree Planting: Aggregate TC in inches of trees removed	Mitigation Fee per inch (TC) of tree removed
Standard	8.0"-11.9"	1:1	\$50
Legacy	12.0"- 23.9"	1.5:1	\$100
Heritage	>24.0"	3:1	\$200

If it is necessary to convert diameter or caliper to TC when purchasing replacement trees, the cost shall be calculated as:

$$TC = \text{diameter (in)} \times 3.1415, \text{ where}$$

TC is total circumference (in)

10. OAK WILT MANAGEMENT

- a. The planting of Texas Red Oak (*Quercus buckleyi*) aka Spanish Oak, Shumard Oak (*Quercus shumardii*), and similar thin bark red oaks is prohibited. These trees are potential sources of inoculum for the Oak Wilt fungus, *Ceratocystis fagacearum*. Fungal spore mats formed on these types of trees are attractive to insect vectors, which results in long range dissemination of the fungus.
- b. Trimming or cutting of any oak species should not occur from the first day of February to the first day of July. Regardless of season, all pruning cuts or other wounds to oak trees, including freshly cut stumps and damaged surface roots should be treated immediately with paint to prevent exposure to contaminated insect vectors.
- c. Contractors or individuals identified pruning any oak(s) without a demonstrated ability to seal all wounds greater than 0.75 inches within 30 minutes of the time of cutting will be required to cease all work until a wound sealant is onsite and utilized on the project.
- d. Contractors or individuals identified pruning any oak without sealing wounds with an acceptable wound dressing within 30 minutes of pruning will be assessed a \$500 fine per occurrence.
- e. Infected red oaks that die in late summer, fall or early winter should be cut down and burned when allowed, buried, or chipped soon after discovery to prevent fungal mats that may form on these trees the following spring.
- f. Upon verification of an oak wilt infected red oak species the City urban forester will provide written notification to the tree owner advising of the proper methods and timing for removal and disposal. Cost associated with tree removal and disposal are the sole responsibility of the tree owner. Any entity that fails to remove and properly dispose of an infected red oak species in accordance with the written notification can be fined up to \$1,000 or as determined by city council.
- g. Potential oak wilt investigations should be performed by a member of the Texas Forest Service, a Texas Oak Wilt Qualified (TOWQ) ISA certified arborist or the City urban forester. For information on oak wilt identification, spread and management reference www.texasoakwilt.org

F. PRESERVATION OF PROTECTED TREES

Standard, Legacy and Heritage trees shall be protected under the following conditions:

1. No clear-cutting is permitted.
2. Tree Protection Zones (TPZ) shall be established for all trees to be preserved during construction. A TPZ is an arborist defined area surrounding the trunk intended to protect roots and soil within the critical root zone and beyond, to ensure future tree health and stability. At a minimum, the TPZ shall have an average radius of one foot for each inch of tree diameter (DBH) measured from the trunk perimeter. Where appropriate, the drip line method may be used to establish the TPZ. The drip line method uses the tree canopy's drip line to define the boundary of the TPZ, where the entire area within the drip line is considered the TPZ. Even when the TPZ is placed at the drip line or at the location defined by the trunk diameter method, large portions of the root system may be lost. The city urban forester shall inspect the trees and the site and may alter the TPZ as needed to provide adequate tree protection.
3. No materials intended for the use in construction or waste materials accumulated due to excavations or demolition shall be placed within the limits of the trees' root protection zone.
4. Neither substances used to clean equipment nor other foreign materials shall be deposited or allowed to flow overland within the root protection zone of a Protected tree. This includes, without limitation, paint, fuel, oil, hydraulic fluids, solvents, asphalt, concrete, mortar or similar materials.
5. No signs, wires or other objects, other than those of a protective nature, shall be attached to any Protected tree. However, lighting of a decorative nature may be attached to a any tree. The lighting shall be attached in a manner so as not to damage the tree.
6. No vehicular and/or construction traffic or parking shall take place within the limits of the root protection zone of a Protected tree other than on an existing paved surface. This restriction does not apply to access within the root protection zone for purposes of clearing underbrush performed with rubber-tired equipment.

7. All trees to be retained as part of an approved Tree Preservation Plan shall be protected during grading and construction. A protective barrier shall be erected around the root protection zone before the beginning of grading and construction, and the barrier shall be maintained until construction is completed. During grading and construction, no excess soil, additional fill, equipment, liquids or construction debris shall be placed inside the protective barrier, and no soil shall be removed from within the barrier. The proposed finished grade of the land within the root protection zone shall not be altered. Welling and retaining methods should be used to protect the area outside the root protection zone. The root protection zone shall remain unpaved. If wells are used to preserve a Protected tree the wells shall have a drain installed or a pump shall be installed to ensure that the well does not hold water.
8. Trees close to construction activities where the trunk or buttress roots may be mechanically damaged those parts shall be protected. Temporary trunk protection should be installed with dimensional lumber around the trunk and secured with straps or wire to bind the planks in place.
9. No paving with asphalt, concrete or other impervious materials shall be placed within the root protection zone of a heritage tree.
10. In situations where a Protected tree is within 50 feet of a construction area, a protective fence, minimum of four feet in height, shall be erected and maintained outside of the root protection zone of each Protected tree or tree group.
11. Offsite trees with root protection zones that extend into a construction site shall have a protective fence, minimum of four feet in height, erected and maintained outside of the root protection zone.

8.4 STEEP SLOPES

A. PURPOSE

The purpose of this ordinance is to regulate the intensity of use in areas of steeply sloping, elevated terrain while promoting future development on a scale that maintains the hill country character and identity by preserving the natural environment and scenic corridors.

B. APPLICABILITY

This ordinance shall be applicable to any subdivision or development located in city limits of the City of Boerne. Land disturbance for the purpose of this ordinance shall mean any activity involving the clearing, cutting, excavation, grading, filling, storing, transporting of land or any other activity which causes land to be exposed.

C. DOCUMENTATION OF CONDITIONS REQUIRED

If any slope of 15% or greater exists on a site, a slope map shall be provided as described in Chapter 2 Procedures.

D. RESTRICTIONS ON DISTURBANCE OF STEEP SLOPES

The maximum percentage of lot area or site area of a development which may be disturbed, graded, and cleared of vegetation during development and construction of the public and private improvements with the exception of incidental grading for structure construction is as follows:

1. Any disturbance to steep slopes, regardless of grade, shall be achieved by terracing the area.
 - a. Terraces shall be designed and constructed with no more than eight (8) vertical feet for every ten (10) horizontal feet of area per terrace.
 - b. Multiple terraces may be constructed in sequence.
 - c. The terraces must be designed by an engineer and certified after construction by the design engineer.
 - d. The terrace must be constructed using vegetated retaining walls to allow for drainage and plant growth.
 - e. The vertical terraces should allow natural growth through and the horizontal sections shall be irrigated and planted with climbing/draping vines or similar types of plants that will grow along the vertical sections. In addition, the horizontal section of the terrace shall be fully landscaped to include planted trees that typically do not achieve a height of thirty (30) feet.
 - f. The terraced area shall not count towards a setback or open space whereas the steep slope, left undisturbed, may count toward the required open space. (*Ord. No. 2010-10, §3, 5-25-2010*)

- g. A creative alternative to Section C (1), (2) and (3) may be approved by the Planning and Zoning Commission if the intent of this section is met.

2. Nonresidential Development

- a. If there exists on a non-residential site a slope with a grade of 20% or greater, no more than 15% of the steep slope area may be disturbed.
- b. If disturbance is necessary for site development, it shall be achieved by terracing as outlined in item (3) below.

3. Residential Development

Any residential development which has slope of 15% or greater shall limit the steep slope disturbance as follows:

- a. If the slope grade is 15% - 25%, then 35% of the steep slope area may be disturbed using terraces.
- b. If the slope grade is 25% or greater, then 15% of the steep slope area may be disturbed using terraces.

8.5 DESIGN CRITERIA FOR OPEN SPACES

A. REQUIREMENTS FOR OPEN SPACES IN THE ETJ

- 1. The requirements of 8.2 Watershed Protection and 8.4 Steep Slopes shall satisfy the open space requirements within the ETJ.
- 2. There are no additional design requirements for open spaces in the ETJ.

B. REQUIREMENTS FOR OPEN SPACES IN THE CITY LIMITS

- 1. In addition to requirements of 8.2 Watershed Protection, 8.3 Tree Preservation and 8.4 Steep Slopes, there are additional criteria for how open spaces are designed within the City Limits.
- 2. Exceptions

Compliance with the Open Space Design Criteria shall not be required if:

- a. The property is less than 5 acres in size; or
 - b. The property is designated as a conservation subdivision. Conservation subdivisions shall follow the design requirements of 6.7: Conservation Subdivisions; and/or
 - c. The applicant pays a fee in lieu of parkland dedication.
- 3. Every property that is not exempt from these requirements shall incorporate at least one of the following Open Space Types into the design of the site.
 - a. Natural Areas
 - i. Natural areas shall incorporate at least one of the following preservation features within the boundary of the designated area:
 - (a) a tree stand that includes specimens from the City's Protected Tree List (Appendix B),
 - (b) a natural water body,
 - (c) prominent topography or the view thereof, or
 - (d) a steep slope area
 - ii. The use of any species on the City's invasive plant list is prohibited in a Natural Area.
 - iii. The size of a Natural Area should be based on the site characteristics and potential continuity of similar natural features in the area, along with the potential to connect to adjacent natural areas.
 - iv. The width of the conservation area shall not be less than 100 feet in any direction, except where connecting to other park land, trail easement, or open space.
 - v. No more than 6% of the designated natural area shall be covered with an impervious surface, including all trails, parking areas and rest areas.

- vi. The natural area shall be contiguous, based upon consistent and substantial linkages of natural systems, including links to areas on adjacent sites. While a site may preserve more than one natural area, no single, contiguous natural area shall be less than 5 acres or 15% of the site, whichever value is greater.
 - vii. The width of the conservation area shall not be less than 100 feet in any direction, except where connecting to other park land, trail easement, or open space.
 - viii. Active open spaces such as parks, landscaped areas, outdoor recreation areas or other amenities shall not count towards the minimum size requirement for a natural area.
- b. Greenways
- i. Greenways shall include at least one of the following features within the boundary of the designated area:
 - (a) Stream
 - (b) Riparian corridor
 - (c) Drainage protection zone
 - (d) Multi-use trail
 - (e) Designated wildlife corridor
 - ii. A Greenway shall be usable for recreation and non-motorized transportation through pedestrian multi-use trails.
 - iii. No more than 10% of the area designated as a greenway shall be covered with an impervious surface, including all trails, parking areas and rest areas.
 - iv. Greenways shall be linear in nature.
 - v. Greenways shall be at least 20 feet wide at all locations.
 - vi. Greenways shall be publicly accessible.
 - vii. Every greenway shall connect at 1 or more points to the thoroughfare and/or trail network of the City.
 - viii. Invasive species shall not be used for landscape improvements within or adjacent to a Greenway.
- c. Community Parks
- i. Community Parks shall be at least 20 acres in size.
 - ii. An on-site portion of a larger community park which extends beyond the boundary of the site can be counted as a community park, provided that:
 - (a) the park in its entirety is at least 20 acres in size and is located in conformity to the Parks Comprehensive Master Plan and the Future Land Use Plan, and
 - (b) the on-site portion is developed to include recreational facilities identified in the Parks Comprehensive Master Plan for Community Parks, such as athletic fields, trails and playgrounds.
 - iii. At least 20% of the land area for a Community Park shall be used for active recreational purposes.
 - iv. Maximum impervious cover for Community Parks is 10%.
 - v. Tree canopy for Community Parks shall cover at least 60% of the park area, as measured by specimen canopy coverage at maturity.
 - vi. Invasive species shall not be used for landscape improvements within or adjacent to a Community Park.
- d. Neighborhood Parks
- i. Neighborhood Parks shall be 2-10 acres in size.
 - ii. An on-site portion of a larger neighborhood park which extends beyond the boundary of the site can be counted as a neighborhood park, provided that:
 - (a) The park in its entirety is 2-10 acres in size and is located in conformity to the Parks Comprehensive Master Plan and the Future Land Use Plan, and
 - (b) The on-site portion is developed to include recreational facilities identified in the Parks Comprehensive Master Plan for Neighborhood Parks, such as playgrounds, gathering areas and trails.

- iii. At least 30 % of the land area for a Neighborhood Park shall be used for active recreational purposes.
 - iv. Maximum impervious cover for Neighborhood Parks is 20%.
 - v. Tree canopy for Neighborhood Parks shall cover at least 50% of the park area, as measured by specimen canopy coverage at maturity.
 - vi. Invasive species shall not be used for landscape improvements within or adjacent to a Neighborhood Park.
- e. Mini Parks
- i. Mini Parks shall be less than 2 acres in size.
 - ii. Due to their size, Mini parks must be fully developed on-site.
 - iii. At least 50% of the land area of a Mini Park shall be used for active recreational purposes.
 - iv. Maximum impervious cover for Mini Parks is 50%.
 - v. Tree canopy for Mini Parks shall cover at least 40% of the land area of the park, as measured by specimen canopy coverage at maturity.
 - vi. Invasive species shall not be used for landscape improvements within or adjacent to a Mini Park.
- f. Landscaped Open Space
- i. To qualify as an open space type, a Landscaped Open Space has to cover at least 25% of the site.
 - ii. Landscaped Open Spaces shall be fully developed on-site.
 - iii. None of the land area shall be used for active recreational purposes.
 - iv. Maximum impervious cover for Landscaped Open Space is 10%.
 - v. Tree canopy for Landscaped Open Space shall cover at least 70% of the land are, as measured by specimen canopy coverage at maturity.
 - vi. Invasive species shall not be used for landscape improvements within or adjacent to Landscaped Open Spaces.
 - vii. If protected trees are removed from a site containing a Landscaped Open Space, on-site mitigation shall be required.

8.6 RAINWATER HARVESTING

A. PURPOSE

Rooftops can generate large volumes of runoff which, when discharged to paved surfaces and landscaped areas, can generate large pollutant loads. Rainwater harvesting systems can capture this runoff before it is discharged, thus preventing pollution while also putting the captured water to beneficial use for both potable and non-potable purposes. The amount of runoff captured will depend on the size of the collection surfaces required to meet the users estimated water demands.

A private, stand alone, rainwater harvesting system can reduce the water demand on the City's public water supply system thereby augmenting the City's water supply. To augment the City's future water supply, builders should be encouraged to install rainwater harvesting systems in all new construction which would lesson future demands on the City's water supply system.

B. DESIGN REFERENCES

1. City of Boerne Cross Connection Control and Backflow Prevention Program, Ordinance 2001-38, or as amended.
2. City of Boerne Edition – San Antonio River Basin Low Impact Development Technical Design Guidance Manual, latest version.
3. The Texas Manual on Rainwater Harvesting, Texas Water Development Board, latest version.

C. DESIGN REQUIREMENTS

1. General
 - a. To ensure proper system installation, this code, and any applicable manufacturer's installation instructions must be followed.

- b. All materials used in installation of piping and plumbing fixtures for rainwater harvesting systems must be approved for potable water and in the plumbing code or listed by an ANSI accredited product certification program.
- c. Engineered systems shall be installed per plans and specifications of the engineer of record.
- d. A property owner is not required to be licensed to harvest, store, distribute, treat, or use harvested rainwater on property owned by the person if the rainwater system, is physically separated from the City public water system.
- e. Rainwater shall only be harvested from impervious elevated roof surfaces. Harvesting shall not occur from the following locations:
 - i. Any vehicular or pedestrian area.
 - ii. Surface water runoff.
 - iii. Bodies of standing water.

2. Tanks/Cisterns

- a. Tanks shall be located outside any required building setbacks.
- b. Minimum required storage volumes shall be determined by the users estimated water demand consistent with the estimated future water supplies based on historic local rainfall records.
- c. Design tanks and piping so stored water will not be accessible to mosquitoes, insects, sunlight, or animals.
- d. For all tanks, install a tank overflow and route it to a logical location in the landscape where it will be put to beneficial use. The overflow capacity must be equal to or greater than the inflow capacity.
- e. Filter inflow from roof to tank to remove organic debris. Filter tank outflow before it enters the potable or non-potable system to prevent clogging.
- f. Consider installing a bypass to allow direct drainage of rooftop runoff when tanks are full. Route bypass water to a beneficial use area
- g. Tanks shall be listed for use with potable water.
- h. Tanks shall be opaque or painted to prohibit algae growth.

3. Treatment

- a. Pre-tank filters such as gutter screens, first flush divertors, roof washers, basket screens or sock filters shall be used to filter water prior to entering the storage tanks.
- b. To improve water quality, treatment methods such as chemicals, ultra-violet light, ozonation, nanofiltration, reverse osmosis may be used. It is responsibility of the property owner to determine appropriate treatment method for each individual use.

4. Piping

- a. There shall be no physical interconnection between any rainwater harvesting system pipe system with that of any City water supply system piping.
- b. Where private rainwater harvesting pipe and private potable water pipe are installed in the same trench, wall cavity or other location, the potable water pipe shall be separated by a minimum distance of twenty-four inches (24") above and away from the rainwater harvesting pipe.
- c. All private rainwater harvesting pipes shall be a minimum of five feet (5') from any buried public utilities (domestic water, sanitary sewer, electric, gas, etc.).

D. SYSTEM MAINTENANCE

Rainwater harvesting systems shall be maintained in functioning order, for the life of the system. It is the property owner's responsibility to maintain the system until the system is abandoned by removing the entire system.

E. CITY WATER SYSTEM AS A BACK-UP SUPPLY

A person who intends to use the City's water supply system as a source for a back-up supply to the rainwater harvesting system, must give written notice of that intention to the City Utility department. The private system shall always be maintained by landowner and shall not be directly connected to the City system. The water from the rain water harvesting system will be considered an Auxiliary Supply to the public water system and must comply with the backflow protection

requirements established in the City of Boerne “Cross Connection Control and Backflow Prevention Program for the City of Boerne Potable Water Distribution System.”

To use the City public water supply as a back-up for a rainwater harvesting system, the minimum volume of rainwater storage shall be 20,000 gallons. Both an air gap and a reduced pressure backflow device must be installed, and City access to backflow preventers must be maintained.

8.7 SOLAR POWER

A. PURPOSE

Solar power offers high-value electric supply, supply diversity, zero emissions, and promotes energy conservation.

B. APPLICABILITY

If a City of Boerne electric customer desires to interconnect or operate in parallel, a distributed generation system, for a property within the City of Boerne electric system, they shall comply with the City of Boerne Distributed Generation Policy, Ordinance 2014-03, as amended.

8.8 ENDANGERED SPECIES HABITAT COMPLIANCE

A. PURPOSE

The purpose of this section is to preserve and protect unique species of wildlife habitat and shall employ appropriate measures to minimize disturbances to wildlife habitat on surrounding properties and properties that will be preserved for conservation or floodplain management purposes.

B. APPLICABILITY

The owner of property subject to this chapter who submits an application to the City of Boerne for development on/of a tract of land greater than ten (10) acres in area shall submit a Habitat Assessment in accordance with the provisions of this section

C. HABITAT ASSESSMENT

The applicant shall submit a report, prepared by a biologist permitted by U.S. Fish and Wildlife (USFWS). Report shall be based upon a site evaluation for potential habitat for endangered or threatened species as described at the Texas Parks and Wildlife (TPWD) Annotated County Lists of Rare Species. If potential habitat for the protected species is found, construction impacts to these areas should be avoided to the greatest extent practicable. Coordination with the U.S. Fish and Wildlife Service is required if federally-listed species or their habitat would be adversely affected by the project.

8.9 LOWER GLENROSE AQUIFER

A. PURPOSE

The purpose of this section is to regulate activities having the potential for polluting the Middle Trinity Aquifer, to protect existing and potential uses of groundwater as well as maintain Texas Surface Water Quality Standards. The specific area of concern is the surface outcrop (or exposure) of the Lower Glen Rose Limestone, a formation which contains a karst aquifer which, by definition, is susceptible to contamination and potentially hydrologically connects surface water to that aquifer throughout much of Kendall County.

B. APPLICABILITY

This rule is applicable in the Lower Glen Rose Protection Zone (LGRPZ) where caves, sinkholes, faults, fractures, or other geologic features create a potential pathway for recharge of surface waters into the Middle Trinity Aquifer. The Engineering Design Manual shall be the reference for the Lower Glen Rose Protection Zone (LGRPZ).

If the project location is within the area identified as Lower Glenrose aquifer area, no subdivision plat, change in zoning, Planned Unit Development (PUD) submission, Planned Development District (PDD) submission, Cluster Development District (CDD), or building permit application shall be submitted unless a geologic assessment is completed by the applicant as provided for this ordinance.

C. DEFINITIONS

1. Lower Glen Rose Protection Zone (LGRPZ) is identified as that area designated where the Lower Glen Rose Limestone formation surface outcrop as defined on official USGS maps and/or City of Boerne maintained maps in addition to the area upgradient of the mapped outcrop for a distance of 1,200 feet.
2. Sensitive Feature: A geologic or manmade geologic feature where a potential for hydraulic interconnectedness between the surface and the Middle Trinity Aquifer and rapid recharge to the subsurface may occur. Identification of sensitive features shall be performed through the use of a pedestrian field survey following the protocol established in the TCEQ Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zones (TCEQ-0585, current version)

D. GEOLOGIC ASSESSMENT (GA)

If any portion of the subject property includes the mapped LGRPZ, the applicant must submit a report prepared by a PG professional geoscientist licensed by the State of Texas describing the site-specific geology and any potential recharge features. The report must identify potential pathways for contaminant movement to the Middle Trinity Aquifer. The geologic assessment report must be signed, sealed, and dated by the geoscientist preparing the report.

1. The Geologic Assessment must include a geologic map, at site-plan scale, illustrating the outcrop of surface geologic units and all geologic and manmade features, specifically identifying by field assessment:
 - a. caves;
 - b. sinkholes;
 - c. faults;
 - d. permeable fractures;
 - e. solution zones;
 - f. surface streams; and
 - g. other potentially sensitive features.
2. The geologic assessment must contain a stratigraphic column showing, at a minimum, formations, members, and thicknesses.
3. The geologic assessment must contain a description and evaluation of all geologic and manmade features, on forms provided by, or approved by, the City Manager. The assessment must determine which of these features are sensitive features. The assessment must include:
 - i. the identification of each geologic or manmade feature, with a cross-reference to the site-plan map coordinates; and
 - ii. the type of geologic or manmade feature including, but not limited to:
 - (a) sinkholes;
 - (b) caves;
 - (c) faults;
 - (d) wells;
 - (e) surface streams; or
 - (f) potentially permeable fractures and solution zones.
4. The geologic assessment must contain a narrative assessment of site-specific geology. The assessment must detail the potential for fluid movement to the Middle Trinity Aquifer and include a discussion of the stratigraphy, structure, and karstic characteristics of the site.
5. The geologic assessment must contain a narrative description of soil units and a soil profile, including thickness and hydrologic characteristics.

E. FEATURE PROTECTION AND BUFFER ZONE

Within the LGRPZ the applicant shall identify potential recharge features within the Geologic Assessment which are considered sensitive.

1. Sensitive Feature Buffer Zone

A minimum 50-foot buffer area will be placed surrounding sensitive features which will be maintained in a natural condition. In addition, and unless otherwise approved by the City Manager, the width of the upgradient buffer area shall be based on measurements from the outer surface perimeter of the feature for a minimum distance of 100 feet.

2. Buffer zones may be required to extend beyond the property line. The City Manager may approve the buffer zone terminating at the property line if the Developer has exhausted all commercially reasonable efforts in the pursuit of the acquisition of off-site easements. Future development, or redevelopment, of the adjoining tract shall continue the buffer.
3. Buffers shall be recorded with the plat and only minimal disturbances (access grates, protection fences, etc.) as approved by City Manager shall occur within the buffer.
4. Developer shall include sensitive feature protection details in the development application.

F. SEALING A SENSITIVE FEATURE

Buffers shall be the primary means of protecting the water quality in the Middle Trinity Aquifer at an identified sensitive feature, however a developer may request to seal a sensitive feature by submitting a sealing plan to the City Manager for approval. Sealing plans shall be consistent with TCEQ guidance document RG-348.

G. PROTECTION OF FEATURES IDENTIFIED DURING CONSTRUCTION

1. Many sensitive features, such as solution cavities and caves, are not identified during the Geological Assessment, but are discovered by excavation during the construction phase of a project. This is especially common during utility trenching. The features encountered at this phase of a project must be protected to ensure that water quality and the stability of the construction and/or utility installation are protected.
2. If any sensitive feature is discovered during construction all activities near the sensitive feature must be suspended immediately. The developer must immediately notify the City Inspector of any sensitive features encountered during construction. This notice must be given before continuing construction. Construction activities near the sensitive feature may not proceed until the City Manager has reviewed and approved the methods proposed to protect the sensitive feature and the Middle Trinity Aquifer from potentially adverse impacts to water quality.
3. To describe, assess, and provide a proposed method of protection for the feature, use TCEQ Form 10256, available from the TCEQ's main web page (Forms and Publications). The attachments for Form 10256 are:
 - a. Protection Plan Prepared by a Professional Geoscientist licensed in the State of Texas including:
 - i. Plan, profile, cross section sketches, and photos for each feature.
 - ii. Geologic Assessment Table (if applicable).
 - iii. Drawings and narrative descriptions of the proposed protection measures.
 - iv. If the discovery is related to a sewage collection system, a Texas Registered Professional Engineer is also required to submit the protection plan.
4. Depending on type of feature discovered, developer shall provide the minimum treatment required as described in Chapter 5, Complying with the Edwards Aquifer Rules, Technical Guidance on Best Management Practices (RG-348), current edition.
5. Small, isolated solution cavities less than or equal to six inches may be completely filled with concrete. All plans submitted to the City shall have a signed and dated seal of a Texas licensed Professional Engineer or Professional Geoscientist. All plans will be reviewed on a case-by-case basis and additional protective measures or additional information may be required.
6. Once a complete plan is accepted it will be reviewed and approved or denied within 14 calendar days. If after 14 calendar days no action has been taken by the City Manager, the plan shall be considered approved and work may proceed.