

Section 1: Title IV (“Land Use”), Chapter 410 (“Subdivision Regulations”), Section 410.700 (“Sinkholes and Karst Features”), of the Municipal Code of the City of Republic, Missouri is hereby amended to read as follows:

410.700 Sinkholes And Karst Features

- A. *General.* Refer to Section 9 of the Stormwater Management and Design Criteria Manual for design criteria involving sinkholes and karst features on a site.
- B. *Policy.* In keeping with the intent of the City Development Regulations the following policy is set forth for development in areas containing sinkholes:
 - 1. Development in sinkhole areas will be based upon the following axioms:
 - a. Avoidance.
 - b. Minimization.
 - c. Mitigation.
 - d. **Proactive repair or remediation.**
 - 2. Construction in sinkholes shall be avoided. Exceptions ~~will~~**may** be made **for either of the following** ~~only~~ in situations:
 - a. ~~Where it can be conclusively demonstrated,~~ **to the satisfaction of the Director of the Community Development Department, or their designee,** that there are no practical alternatives to such construction.
 - b. **When the sinkhole is part of an active Sinkhole Evaluation Permit and meets all criteria outlined.**
 - 3. These situations are mostly likely to arise where:
 - a. An underground cavity has caused a collapsed sinkhole to form, after prior subdivision or building construction approval.
 - b. A sinkhole has been altered or filled either unknowingly or prior to passage of these regulations.
 - c. Maintenance and operation is required for existing roads and utilities.

- d. Location of existing streets or utilities would render access or utility service to a property impractical or cost prohibitive.
 - e. **The highest and best use of a property is rendered impractical by the existence of a sinkhole.**
4. In these types of cases, measures, which will have minimal impact on the sinkhole or receiving water, may be proposed. Plans for minimal alteration can be approved provided it is conclusively demonstrated that the proposed plan is the minimum practical alternative.
 5. In these cases potential impacts of construction on the sinkhole and receiving waters must be studied and assessed and recommendations made for mitigation of potential impacts upon surface flooding and groundwater quality before the plans can be approved. The degree and sophistication of study required will increase in proportion to the potential impacts. A remediation plan will need to be submitted for review by the City. The remediation plan will need to be stamped by a Qualified Professional Geotechnical Engineer licensed in the state of Missouri. **An independent, third-party, may be retained by the City, at the cost of the property owner, in order to review, assess, and provide comments for submitted remediation plans.**
 6. **It is the responsibility of the property owner to address any issues, concerns, or consequences, that derive from any sinkhole occupying their property.**
 7. **For the purposes of this Section any sinkhole included in the sinkhole inventory is presumed to be valid and accurate with respect to its geographic location, including the sinkhole rim.**

C. Definitions. As used in this Section, the following terms shall have these prescribed meanings:

ALTERED SINKHOLE A sinkhole that has been filled, excavated or otherwise disturbed.

COLLAPSED SINKHOLE A subsidence or cave-in of the ground surface caused when soil overburden can no longer be supported by underlying strata due to the presence of subsurface solution cavities.

HEAVY EQUIPMENT Motorized equipment having a gross weight of more than six (6) tons.

LIGHT EQUIPMENT Motorized equipment weighing six (6) tons or less.

~~**QUALIFIED GEOLOGIST** A person who has met or exceeded the minimum geological educational requirement and who can interpret and apply geologic data principles and concepts and who can conduct field or laboratory geologic investigations (per RSMo.) and who by reason of experience and education, has an understanding of local karst geology.~~

QUALIFIED PROFESSIONAL GEOTECHNICAL ENGINEER A person registered to practice engineering, as a Professional Engineer, according to the laws of the State of Missouri and who by reason of technical education and experience has a background in the fundamentals of storm drainage and karst geology.

SINKHOLE A closed depression formed by removal (typically underground) of water, surficial soil, rock, or other material. The existence of a sinkhole shall be indicated by its inclusion in the Sinkhole Inventory or may be determined by a field survey. Actual limits may be determined by a Qualified Professional Geotechnical Engineer with concurrence of the Director of the Community Development Department or their designee. Any depression in the surface of the ground, with or without collapse of adjacent rock that provides a means through which surface water can come into contact with subsurface water.

Sinkhole depressions may be gradual or abrupt; they may or may not have a well defined eye. While most sinkholes can be defined as the area within a "closed contour", some sinkholes such as those located on the sides of hills may not.

All sinkholes provide discreet points of recharge to groundwater.

SINKHOLE BUFFER The area comprised of a thirty (30) foot setback outward from the sinkhole rim.

SINKHOLE CLUSTER AREA An area containing two (2) or more sinkholes located in close proximity, generally interconnected by groundwater conduits.

SINKHOLE EYE Generally, a visible opening, cavity or cave in the bottom of a sinkhole, sometimes referred to as a swallow hole.

SINKHOLE FLOODING AREA The area inundated by runoff from a storm with an annual exceedance probability of one percent (1%) and a duration of twenty-four (24) hours.

SINKHOLE INVENTORY The collective account of all known or suspected sinkholes as recorded by the Greene County, Missouri "sinkhole" layer and maintained by the Greene County, Missouri GIS Department including updates by the City of Republic.

SINKHOLE RIM The perimeter of the sinkhole depression. The sinkhole rim will generally vary in elevation. The location of the sinkhole rim may be determined by a Qualified Professional Geotechnical Engineer with

concurrence of the Director of the Community Development Department or their designee.

SINKHOLE WATERSHED The ground surface area that provides drainage to the sinkhole. This area extends beyond the sinkhole depression and generally crosses property boundaries.

TERMINAL SINKHOLE The lowest sinkhole in a sinkhole cluster to which any surface water overflowing from other sinkholes in the cluster will flow.

UNALTERED SINKHOLE A sinkhole that has never been altered or disturbed.

D. *Permits Required.*

1. ~~Grading~~**Sinkhole Evaluation** ~~Permit~~. A ~~grading~~**Sinkhole Evaluation** ~~Permit~~ must be obtained prior to ~~any alteration of~~**land disturbance, including any grading, filling, excavation or alterations, within any sinkhole or sinkhole buffer.** ~~associated with new subdivision construction in accordance with the City's Subdivision Regulations.~~ Procedures and requirements for ~~grading~~**Sinkhole Evaluation** ~~Permits~~ are set forth **below** in ~~Subsection 410.710F~~.

2. *Other permits.* Other permits from State or Federal agencies may be required, as outlined in Section **410.650** of these Design Criteria, depending upon the size and nature of the proposed activity.

E. ~~General Plan Requirements.~~ General requirements for ~~grading and drainage plans are set forth in the latest version of the Stormwater Management and Design Criteria Manual and section 410.710 of these Design Criteria.~~ *Development Requirements.*

1. *Setbacks and use restrictions.*

a. No new construction of any of the following shall be permitted within **the sinkhole buffer** ~~thirty (30) feet of the sinkhole rim:~~

- (1) Residential, commercial or industrial structures.
- (2) Swimming pools.
- (3) Streets, highways or parking lots.
- (4) Storage yards for materials, vehicles and equipment.
- (5) Sanitary sewer lines.

b. Use of pesticides and fertilizers within **the sinkhole buffer** ~~thirty (30) feet of the sinkhole rim~~ is prohibited.

- c. Use of heavy or light construction equipment in unaltered sinkholes is prohibited.
- d. Construction of underground utilities is prohibited within the sinkhole rim.
- e. **Public R**recreational facilities such as hiking, jogging and bicycling trails, playgrounds, exercise courses and grass playing fields are permitted within the sinkhole area provided they are not located within the eye of the sinkhole.
- f. Golf courses are permitted subject to approval of a Management Plan for use of pesticides and fertilizers.
- g. Clearing and pruning of trees and undergrowth and limited grubbing of roots is permitted.
- h. Landscaping and minor gardening is permitted outside of the sinkhole eye provided erosion and sediment discharge is limited through use of minimum tillage and mulches.
- i. Construction of light incidental landscaping and recreational structures such as gazebos, playground equipment, etc. is permitted except in the sinkhole eye.
- j. **No grading may occur within the sinkhole rim or sinkhole buffer.**

2. *Collapsed sinkholes.*

- a. Collapsed sinkholes may be stabilized and filled using approved techniques. A **GradingSinkhole Evaluation** Permit must be issued prior to performing any construction.
- b. The probable cause of the collapse and potential adverse impacts of filling the collapse shall be investigated and information submitted with the **GradingSinkhole Evaluation** Permit application.

3. *Altered sinkholes.*

- a. Filling or altering of sinkholes without a **GradingSinkhole Evaluation** Permit constitutes a violation of these regulations. In such cases corrective measures must be proposed within the time period specified in the Zoning Regulations for enforcement of such violations. No corrective

or remedial measures shall be undertaken until the proposed remediation plan has been reviewed by the City and a GradingSinkhole Evaluation Permit issued.

- b. No Building Permits will be issued or zoning or subdivision approvals granted, until the remedial measures specified in the GradingSinkhole Evaluation Permit have been completed and approved.

F. Sinkhole Evaluation Permits

1. **Permit Requirements.** Sinkhole Evaluation Permits are required for any work in the sinkhole or sinkhole buffer area involving alteration of the soil cover (vegetative or non-vegetative) or of existing topography with the following exceptions:

- a. Repair or maintenance of an existing road.
- b. Repair or maintenance of existing utilities.
- c. Other items affecting the general safety and wellbeing of the public, as identified by the Community Development Director, or their designee.

2. **Permit Procedure.** The following items are required prior to issuance of a Sinkhole Evaluation Permit:

- a. Signed and completed Sinkhole Evaluation Permit application with guaranty of payment form.
- b. Payment of permit fee. Fee is provided for in the fee schedule found in Section 805.050.
- c. An approved Remediation Report or Plan stamped by a Qualified Professional Geotechnical Engineer which:
 - (1) Outlines plans and methods for addressing stabilization or remediation of one or more sinkholes.
 - (2) Has been approved for construction by the City.
 - (3) May require the review of an independent third-party selected by the City and paid for by the Applicant

(4) Any additional permits required by County, State, or Federal agencies.

3. Approved Remediation Plan Requirements. Any submittal consisting of materials serving the purpose of providing analysis, technical details, plans, or specifications relating to the repair, stabilization, or remediation of any area within a sinkhole or designated sinkhole buffer must bear the seal of a Qualified Professional Geotechnical Engineer. The precise contents of the document may vary and are dependent on the geological circumstances of a given site as well as the scope of the intended work and will be determined by the Director of the Community Development Department or their designee.

4. Remediation and Repair.

a. Oversight.

(1) The City must receive notification of planned construction at least twenty-four hours in advance of said construction through the preferred method of contact as provided on the Sinkhole Evaluation Permit.

(2) All stabilization, repair, or remediation work must be completed as described in the approved Remediation Plan and must be performed under direct observation of the Qualified Professional Geotechnical Engineer of record, or their designee, and any additional parties as outlined in the conditions of the permit.

(3) Any inspection reports or testing results must be submitted to the City.

(4) Any proposed changes to the approved Remediation Plan must be reviewed and approved by the Director of the Community Development Department, or their designee.

b. Future Approvals. The presence of an open or active Sinkhole Evaluation Permit may result in the denial of building permit applications and land use permit applications for the subject property.

- c. Permit Closeout. A Sinkhole Evaluation Permit shall not be closed until the following conditions are met:
- (1) Completion of all site work as specified in the approved remediation plan.
 - (2) Passage of a final inspection by the Director of the Community of Development Department, or their designee. Final inspection will require that the project be in a finished state and free of all equipment, materials and general construction debris while also meeting any additional requirements set forth by the Director of the Community of Development Department, or their designee.
 - (3) Provision of a certification letter from the Qualified Professional Geotechnical Engineer of record, and bearing their stamp, attesting that all stabilization and remediation methods were observed by them, or their designee, and were completed in accordance with the approved plans and city standards.
 - (4) Provision of as-built engineering drawings showing the approved work and any distinct changes that took place during construction.
 - (5) Provision of digital files of any required documents, as well as any additional materials necessary as determined by the Director of the Community Development Department, or their designee.
- d. Outcome. The Director of the Community Development Department, or their designee, will make the final determination as to the activities allowable within the sinkhole rim and sinkhole buffer, once remediated. This determination will take into account several factors including, but not limited to:
- (1) The approved Remediation Plan;
 - (2) Any alterations resulting from conditions encountered in the field;

- (3) Final inspection conducted by the City;
- (4) The letter of certification as provided by the Qualified Professional Geotechnical Engineer of record.