MONTGOMERY COUNTY
TENNESSEE

BUILDING AND CODES DEPARTMENT

Phone
931-648-5718

350 Pageant Lane Suite 309
Clarksville, TN 37040

Fax
931-553-5121

Montgomery County, TN. Karst Feature Policy

1.) General Information

Montgomery County, TN. has significant areas characterized by karst topological formations which significantly influence local hydrologic-geologic conditions, surface drainage and subsurface water movement. Areas of karst topology have a high potential for the formation of sinkholes and caves.

Storm water runoff that flows into sinkholes is transmitted through the ground-water system in a network of interconnected conduits and is finally discharged at resurgent locations. If the storm water runoff flow rate exceeds the capacity that a sinkhole can accept, flooding is probable. If the storm water runoff is polluted, the ground water will become contaminated, creating a serious health and safety issue.

According to the Tennessee Department of Environment and Conservation, any closed depression found in karstic topological regions is a sinkhole. All sinkholes are storm water structures, regulated by the Montgomery County Storm Water Resolution.

2.) Class V Injection Wells

A Class V Injection Well is a well used to drain surface water, primarily storm water runoff, into a subsurface formation.

Injection Wells are generally designed to allow large amounts of runoff to be drained into subsurface formations. The most common design involves installation of a standpipe which allows the runoff to flow down and into subsurface formations. The standpipe is surrounded by graded rock fill and the sinkhole is lined with geotextile material. Properly constructed, the water path is limited to the standpipe, preventing water erosion of the limestone formation and further dissolution of the limestone substrate.

Conversion of a sinkhole to an Injection Well requires a permit issued by the Tennessee Department of Environment and Conservation.

Montgomery County does not advocate or support the creation of Injection Wells due to the potential for pollution introduction to area aquifers and due to ongoing

maintenance and permitting concerns. It is preferred that sinkholes remain undisturbed.

3.) Caves

Caves are formed in karstic areas by the same process that results in sinkholes. A cave provides direct access to subsurface formations, and has the same potential for pollution of groundwater as sinkholes. Caves are storm water structures regulated by the Montgomery County Storm Water Resolution. The same water quality buffer requirements that are applied to sinkholes are also required for caves.

In all cases, plans submitted for review to the Montgomery County Building and Codes Department must show all known or suspected caves and any associated water quality buffer zone.

4.) Sinkhole Options

a.) **Leave the Sinkhole Untouched:** The sinkhole area and existing vegetation would remain undisturbed during and after any area development. In case of an open throat that may create a safety hazard, or if illegal dumping is a problem in the area, the sinkhole may be fenced and posted with warning signs.

Maintenance shall be limited to removing dead or diseased plant material, repairing erosion problems internal to the buffer, clean up after a storm, or removal of invasive plants. Woody vegetation should be removed by hand. Vegetative root systems shall be left intact to maintain the integrity of soil. It is permissible to remove individual trees from water quality buffer zones if there is danger of the tree falling and causing damage to dwellings or other structures. The root wad or stump should be left in place to maintain soil stability.

The following activities are specifically forbidden within the sinkhole and buffer area:

- Filling or dumping
- Using, storing, or applying pesticides, herbicides and fertilizers
- Camp fires, burning of plant waste or trash

No person shall place or cause to be placed any substances or objects, other than storm water runoff, in any sinkhole or sinkhole drainage area in such a way as to allow such substances or objects to be washed into a sinkhole during storm events.

All legal liability for the sinkhole remains with the property owner.

b.) **Remediation (Repair):** While Montgomery County does not advocate or support the remediation of sinkholes due to the possibility of failure at a later date, a landowner may remediate a sinkhole after appropriate geophysical surveys have been conducted. It is preferred that sinkholes remain undisturbed.

Prior to construction, the landowner must submit a report consisting of appropriate geophysical surveys performed by a geotechnical professional or engineer licensed to operate in the State of Tennessee. The geophysical survey must clearly demonstrate that the remediated sinkhole will be stable and will not pose a threat to public health and safety.
The structure remediation plan must be in accordance with accepted TDOT practice and sound engineering principles. If the Montgomery County Building and Codes Department deems it necessary, the plans may be required to be reviewed and evaluated by an independent engineer, selected by the Montgomery County Building and Codes Department, at the landowner's expense.

Maintenance, ownership and legal liability will remain the responsibility of the landowner, unless and until the landowner transfers ownership to another party (i.e.: a homeowners association or individual landowner). Transfer of ownership will also transfer maintenance responsibility and legal liability for the structure.

Each remediated sinkhole on a development will require the submission of a $25,000 bond, which will be held for five (5) years by the Montgomery Country Building and Codes Department. If additional funds are required to perform repairs on the remediated sinkhole, those funds will be drawn from the subdivision maintenance bond.

c.) **Conversion to a Class V Injection Well:** While Montgomery County does not advocate or support the construction of Class V Injection Wells due to the possibility of failure at a later date and due to the high potential for pollution introduction into the aquifer, a landowner may convert a sinkhole to a Class V Injection Well, after appropriate geophysical surveys and using an engineering plan accepted by Montgomery County Building and Codes Department. It is preferred that sinkholes remain undisturbed.

The Injection Well plans must be in accordance with accepted TDOT practice and sound engineering principles. The minimum design standards for flood management will be based on a 100-year, 24-hour design storm, and assume plugged conditions (zero cubic feet per second inflow) for the sinkhole. If the Montgomery County Building and Codes Department deems it necessary, the plans may be required to be reviewed and evaluated by an independent engineer, selected by the Montgomery County Building and Codes Department, at the landowner's expense.

<u>A TDEC Class V Injection Well permit must be obtained by the landowner and a copy of this permit must be submitted to the Montgomery County Building and Codes Department before any alterations to the area surrounding the sinkhole occur.</u>
A map showing the full extent of the sinkhole structure and plans for the construction of the Injection Well must be submitted with the development GDEC plans, and will also be shown on the post construction as-built plans. The area will be protected by a water quality buffer. No structures will be allowed to be built within this buffer zone.

Maintenance, ownership and legal liability will remain the responsibility of the landowner, unless and until the landowner transfers ownership to another party (i.e.: a homeowners association or individual landowner). Transfer of ownership will also transfer maintenance responsibility and legal liability for the structure. The new owner would be required to submit an Injection Well Permit application to TDEC and obtain an Injection Well Operations permit, a copy of which must be provided to the Montgomery County Building and Codes Department.

No person shall place or cause to be placed any substances or objects, other than storm water runoff, in any sinkhole or sinkhole drainage area in such a way as to allow such substances or objects to be washed into a sinkhole throat during storm events.

Each Injection Well will require a $25,000 bond, which will be held for five (5) years by the Montgomery Country Building and Codes Department. If additional funds are required to perform repairs on the Injection Well, funds can and will be drawn from the subdivision maintenance bond.

5.) Montgomery County Liability

The Montgomery County Stormwater Management Resolution and this policy statement shall not create a liability on the part of, or a cause of action against, Montgomery County, TN., or any officer or employee thereof for damages that result from reliance on these regulations or policies, or any administrative decision lawfully made there under.

<u>Montgomery County, TN. Karst Feature Policy</u> (Version Dated 10/6/2014) is approved for use by the Montgomery County, TN Stormwater Program. Changes to this document must be submitted to the Montgomery County, TN Building and Codes Committee for approval.

Effective Date:

Submitted by: _____ Date: _____

John H. Doss
Montgomery County, TN
Storm Water Coordinator

Approved by: _____ Date: _____

Rod Streeter
Montgomery County, TN
Building Commissioner

Approved by: _____ Date: _____

Chairman,
Montgomery County, TN
Building and Codes Committee