



**Montgomery County Government**  
**Building and Codes Department**

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**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. One aspect of karst topology is the formation of subsidence features. Examples of subsidence features would include sinkholes and caves.

Storm water runoff flows into subsidence features and is transmitted directly into ground-water systems by a network of interconnected channels. If the storm water runoff is polluted, the groundwater will become contaminated, creating a serious health and safety issue. In addition, if the storm water runoff flow rate exceeds the capacity that a subsidence feature can accept, flooding is probable. All subsidence features are regulated by the Montgomery County Storm Water Resolution as storm water structures.

**2.) Sinkholes**

According to the Tennessee Department of Environment and Conservation (TDEC), any closed depression found in karst topological regions is a sinkhole unless and until proven otherwise. TDEC considers the sinkhole rim (the maximum extent of the sinkhole structure) to be the area defined by the highest closed contour. Montgomery County water quality buffer requirements and structure extents are discussed in detail in Section 5 of this document.

In all cases, Grading, Drainage and Erosion Control (GDEC) plans and final plats submitted for review to the Montgomery County Building and Codes Department must show all sinkholes and associated water quality buffer zones. In cases where the buffer area associated with a sinkhole structure is difficult to define, the Montgomery County Building and Codes Department will determine the extent of the water quality buffer, based on best professional judgment.

Sinkhole determinations made by the Montgomery County Building and Codes Department can be appealed in one of two ways:

1.1) By direct appeal to the Tennessee Department of Environment and Conservation (TDEC). If TDEC determines that the feature is not a sinkhole, the Montgomery County Building and Codes Department will defer to TDEC's determination.

1.2) The submission of appropriate geotechnical surveys performed by an independent, qualified professional engineer, geophysicist or geologist, licensed to operate in the State of Tennessee with verifiable experience in karst hydrogeology, will be considered sufficient evidence to determine that a depression is not a sinkhole, and thus poses no danger to citizens of the County.

### **3.) Class V Injection Wells**

A Class V Injection Well (also: Class 5 Injection Well or Injection Well) is a subsurface drainage well used to drain surface water, primarily storm water runoff, into a subsurface formation. The extent of a class V injection well is defined by the outer edge of the injection well structure (usually the outer edge of the rock backfill). Injection wells are permitted by TDEC, and are storm water structures regulated by the Montgomery County Storm Water Resolution. Some sinkholes may be classified as Class V Injection Wells by TDEC, depending on specific circumstances relative to that sinkhole.

### **4.) Caves**

Caves are formed in karstic areas by the same material dissolution and collapse process that results in sinkholes. A cave provides direct access to subsurface formations, and has the same potential for the pollution of groundwater as sinkholes. Caves are storm water structures regulated by the Montgomery County Storm Water Resolution, and have an associated water quality buffer.

In all cases, GDEC plans submitted for review to the Montgomery County Building and Codes Department must show all known or suspected caves and the associated water quality buffer zone. In cases where the buffer area associated with a cave is difficult to define, the Montgomery County Building and Codes Department will determine the extent of the water quality buffer, based on best professional judgment.

### **5.) Sinkhole Options**

**5.a) Sinkhole Water Quality Buffers:** In cases where a landowner or developer chooses not to alter the structure of a sinkhole, a 60 foot wide undisturbed buffer around any structure associated with a sinkhole that allows water to be discharged into a subsurface formation. Sinkhole structures allowing subsurface discharge may include, but are not limited to, open throats, cave openings, solution channels, swallets, swallow holes, standpipes or sinks.

No structures or land disturbing activities are allowed within the area surrounding a sinkhole that is delineated by the 100 year flood zone contour line (hachure), determined assuming plugged conditions (zero cubic feet per second outflow from the sinkhole).

Storm water flowing into a sinkhole from a construction or development site must be treated to prevent sediment and/or pollutant introduction into the sinkhole.

Subsurface Sewage Disposal System secondary disposal fields (duplicate area disposal fields) may be allowed within the 100 year flood zone contour line (hachure) based on approval by the Tennessee Department of Environment and Conservation. Subsurface Sewage Disposal System secondary disposal fields that are located within the 100 year flood zone contour line (hachure) must follow all applicable TDEC and federal laws, rules and regulations.

Maintenance, ownership and all 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 include the transfer of maintenance responsibility and legal liability for the structure. The transfer of ownership should include the submission of an approved, signed and notarized Storm Water Maintenance Agreement 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.

In cases where increases in impervious surfaces result in an increased discharge rate to a sinkhole, a TDEC Class V Injection Well permit may be required.

**5.b) Remediation (Repair):** A landowner or developer may remediate a sinkhole, after submitting a remediation plan that is in accordance with accepted engineering standards and practices. If deemed necessary by the Montgomery County Building and Codes Department, the plans may be required to be evaluated by an independent engineer at the developer's or landowner's expense. The location of the remediated sinkhole structure and any associated water quality buffer must be shown on the final plats and on final as-built plans.

A map showing the full extent of the remediated sinkhole structure(s) and a detail drawing must be submitted which details the method that will be used to remediate the sinkhole. The remediated sinkhole structure will be protected by a 60 foot water quality buffer, as measured from the outer edge of the remediated structure limits (see Figure 1). Structures may be located within this buffer zone following the submission of a letter of certification stating that the area is safe for the type of

structure planned. The certification must be stamped and signed by a qualified professional engineer, geophysicist or geologist licensed to operate in the State of Tennessee.

Maintenance, ownership and all 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 location of all remediated sinkholes must be disclosed at the time of sale or transfer of the property. The transfer of ownership will include the submission of an approved, signed and notarized Storm Water Maintenance Agreement to the Montgomery County Building and Codes Department.

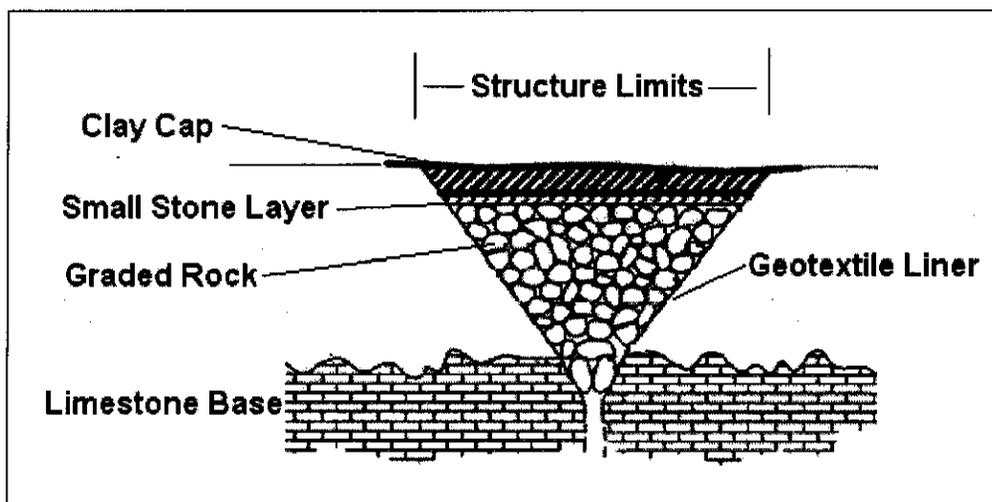


Figure 1: Simplified Diagram of a Remediated Sinkhole (diagram courtesy TDOT)

Each remediated sinkhole will require the submission of a \$25,000 maintenance bond, which will be held for five (5) years by the Montgomery County 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.

**5.c) Conversion to a Class V Injection Well:** A landowner may convert a sinkhole to a Class V Injection Well. The injection well construction plan and methods must be in accordance with accepted engineering standards and practices as determined by an engineer licensed by the State of Tennessee. If deemed necessary by the Montgomery County Building and Codes Department, the plans may be required to be evaluated by an independent engineer at the landowner's expense.

A TDEC Class V Injection Well permit must be obtained by the landowner/developer, 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. 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 60 foot water quality buffer, as measured from the outer edge of the injection well structure limits (usually the outer edge of the rock backfill, see Figure 2). No structures are allowed within this buffer zone.

Runoff directed into the injection well will be pre-treated to reduce the amount of sediments and other pollutants contained in the runoff. The minimum design standards for flood management will be based on a 100-year rain event, assuming plugged conditions (zero cubic feet per second discharge) for the class V injection well. No structures are allowed to be built within the area delineated by the 100 year flood zone contour line (hachure).

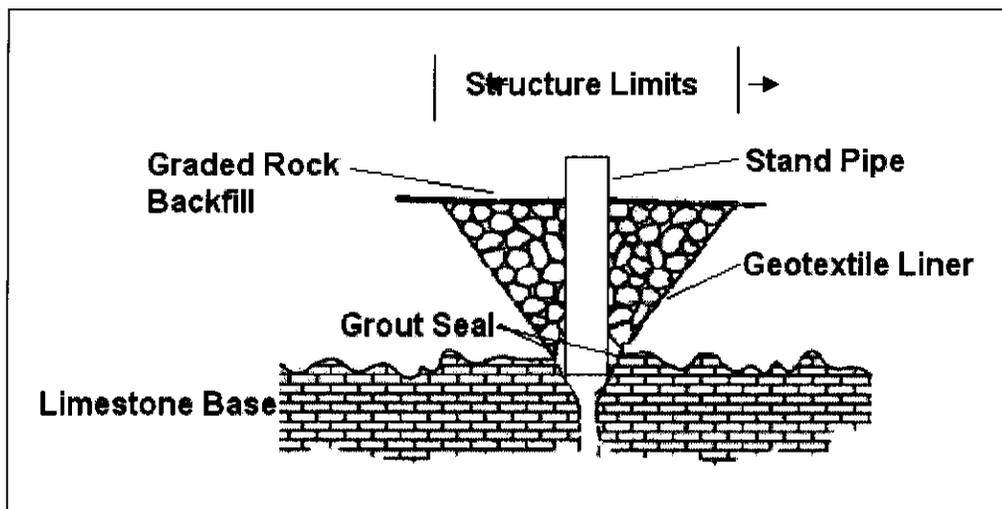


Figure 2: Simplified Diagram of a Class V Injection Well (diagram courtesy TDOT)

Maintenance, ownership and all 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 is 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. The transfer of ownership will include the submission of an approved, signed and notarized Storm Water Maintenance Agreement 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 new injection well will require a \$25,000 maintenance bond, which will be held for five (5) years by the Montgomery County 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.

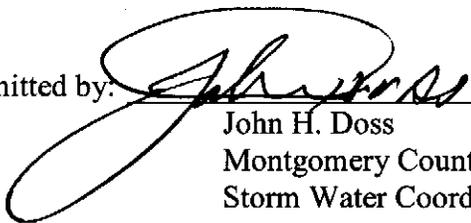
## 6.) Montgomery County Liability

The Montgomery County Storm Water 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 thereunder.

**Montgomery County, TN. Karst Feature Policy (Version Dated 07/06/2010)** is approved for use by the Montgomery County, TN Storm Water Control and Management Program. Changes to this document must be submitted to the Montgomery County, TN Building and Codes Committee for approval.

Effective Date: 07/08/2010

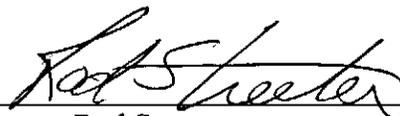
Submitted by:



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Date: 07/07/2010

Approved by:



Rod Streeter  
Montgomery County, TN  
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Date: 07/07/2010

Approved by:



Chairman,  
Montgomery County, TN  
Building and Codes Committee

Date: 07/07/2010