

- (4) Lighting levels for exterior lighting, except for public outdoor recreational facility lighting described in [Subsection 6](#), shall not exceed the following standards:
 - (a) 2.5 foot-candles for parking lots;
 - (b) 5 foot-candles at entrances from local rural/urban road entrances;
 - (c) 10 foot-candles along fronts of buildings, at loading docks, and at entrances from primary highways and rural/urban arterials and collectors;
 - (d) A uniformity ratio of 4:1 shall be provided across all parking lots, travelways, and private/public streets and roads. The project site shall be modeled with all lighting (building, canopy, parking, etc.) in operation.
 - (e) Lighting levels shall not exceed 0.2 foot-candles at any common property line.
 - (f) The first three measurements shall be made at the ground surface. The fourth measurement shall be made on a vertical face with the property line at five feet above the ground.
- (5) Field verification of installation required. Upon completion of lighting installation, the applicant shall provide written certification that the lighting is installed and operates in conformance with the approved photometric plan and the provisions of this ordinance.

7.2.7 Environmental Reviews

- A. Erosion and Sediment Control.** An erosion and sediment control plan for all disturbed areas of a development as depicted on the site development plan shall be submitted for review in accordance with [Code of Clarke County Chapter 148 \(Erosion and Sediment Control Ordinance\)](#) and Code of Virginia requirements. Erosion and sediment control plan approval is a prerequisite to approval of a site development plan.
- B. Stormwater Management.** If State law requires submission and review of a stormwater management plan for a proposed development, a copy of the submission to the State stormwater management program authority shall be filed in conjunction with the site development plan. A copy of an approved permit or approval letter from the State stormwater management program authority shall be provided by the applicant as a condition of final site development plan approval.
- C. Soil Suitability.** A generalized mapping of on-site soils and their engineering characteristics shall be submitted with a site development plan. The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), shall be referred to for commenting on the suitability of soils for intended development, and on any special measures that are recommended for development on a certain soil classification.
- D. Geotechnical Issues – Karst and Sinkholes.** The purpose and intent of this section is to establish review procedures, use limitations, design standards, and performance standards

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applicable to land development activities that encompass or affect sinkholes or other karst features. The intent of this section is to protect the public health, safety and welfare by requiring the development and use of karst areas to proceed in a manner that promotes safe and appropriate construction and storm water management.

1. Site Review and Investigation by Geotechnical Engineer. For all site development plan applications, the applicant shall undertake a geotechnical inspection of the subject area by a qualified Geotechnical Engineer (GE). The GE shall review available geologic and engineering data, aerial photographs, and other information relevant to the site and shall make on-site observations, photographs, and measurements as appropriate. The GE shall prepare a written report of the initial findings along with a recommendation to perform Fracture Trace Analysis, Electrical Resistivity, Cone Sounding, Core Samples, Microgravity, and/or other geophysical or intrusive studies as appropriate to determine if the action requested may have a negative impact. Such report shall be submitted in conjunction with the site development plan and shall include any findings as to whether there may be significant karst features that apply to the site.
 - a. No Evidence of Karst Features. If the GE finds that the site has no evidence of karst features, they shall so indicate in the written report.
 - b. Evidence of Karst Features. In cases where the GE finds evidence that karst features do exist, and which would be impacted by development, electrical resistivity testing, core drilling or microgravity tests, shall be required within a 100 foot radius for all locations on the property where karst features were identified and along any linear trend of at least three or more features. For sinkholes the 100 foot radius shall be measured from the discernable edge. At the conclusion of the tests the applicant shall submit a karst review plan to the Zoning Administrator and follow specific development procedures.
 - c. The presence of karst features on the site that are not impacted. At the discretion of the Zoning Administrator, the karst plan may be simplified if the environmental constraint found to be present on the site is not impacted by the proposed site development.

2. Karst Plan. A karst plan shall be developed for the property identified as having evidence of karst features (i.e., sites upon which sinkholes are fully or partially located and/or which drain to sinkholes). The burden of proof for establishing that there will be no significant impacts shall rest with the applicant. A karst plan shall include the following:
 - a. An engineering audit that identifies and maps karst features and the limitations that such features impose on site development. The audit shall include:
 - (1) The physical location and limits of the area of the sinkhole depression as determined by field survey, the [Soil Survey of Clarke County \(1982\)](#), or the [Map of Selected Hydrogeologic Components or Clarke County, Virginia \(1990\)](#), or other reliable sources as may be approved by the Zoning Administrator;

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- (2) Locations of other karst features (fissures enlarged by dissolution and caves);
 - (3) Topographic contours at maximum intervals of two feet, and spot elevations sufficient to determine low points and discernable edges; and
 - (4) Setback distances of 25 feet and 100 feet from the discernable edge of each feature.
 - b. For structures proposed between 25 and 100 feet of the discernable edge of sinkholes or other karst features, engineering that ensures structural stability.
3. Requirements and Restrictions. The following provisions shall apply to developments containing sinkholes and karst features:
- a. As identified in [Subsection 2](#) above, no construction or land disturbance shall occur within a minimum buffer distance of 25 feet from the discernable edge of a sinkhole or other karst feature. Vegetation in the buffer area shall not be altered from predevelopment conditions. While vegetation should not be removed so as to disturb the soil, invasive species identified by the Virginia Department of Conservation and Recreation or dead plant material may be removed with the approval of the Zoning Administrator. Fertilizers, herbicides, and pesticides shall not be applied within the buffer area.
 - b. No construction shall take place between 25 and 100 feet of the discernable edge of a sinkhole or other karst feature unless a geological and geophysical survey (as described in [Subsection 2](#)) indicates that such construction or earth disturbance is appropriate.
 - c. Sinkholes or karst features identified during construction shall be mitigated as described in the [Virginia Department of Transportation’s Location and Design Division Instructional and Informational Memorandum 228 \(IIM-LD- 228\)](#), or other applicable standard as recommended by a GE.
 - d. Stormwater management facilities shall comply with State stormwater management regulations for Karst Terrain.
 - e. Underground utilities located within 100 feet of karst features shall be laid out so that they do not intersect those features. Along all such underground utilities, a dike of clay or other suitable material shall be constructed across the trench of the transmission lines and pipelines at intervals of 20 feet or less, or as directed by a GE.
 - f. For any tests requiring boreholes, such as air track drilling, the boreholes must be grouted upon completion. Grouting should be done with a mixture of 50% bentonite and 50% portland cement.
 - g. If air track drilling is used to determine the depth of overburden and continuity of bedrock, then these operations must be monitored full time by a GE to confirm the findings of the driller.
 - h. Geotechnical studies shall be conducted at each proposed structure site before issuance of a building permit to determine the existence of karst features. If karst features are found, remediation shall be done to protect the health, safety, and welfare of occupants of the structure.

- i. Storage tanks shall have impervious secondary containment. Underground fuel storage tanks shall have interstitial monitoring of tanks and piping systems.
- j. Where applicable, the following Consumer Disclosure Statement that provides information on what review occurred and what was discovered shall be included in the Deed of Dedication:

This property is located in an area identified as having karst features. Karst features are created by groundwater dissolving sedimentary rock such as limestone. Features include sinkholes, fissures enlarged by dissolution, and caves. Geologic tests were conducted and one or more of these features were identified on this property. Karst features are unstable and collapse may occur. Measures have been taken to ensure structural stability in this area; however, karst areas are dynamic and geologic changes may cause future structural instability. Fertilizers, herbicides, and pesticides shall not be applied within designated buffer areas.

- k. Measures to permanently protect karst features shall be identified on the site plan. These measures may include fencing and/or signage.

E. Use of Explosives. If explosives are to be used in conjunction with the development of a site, the following note shall be included on the site development plan:

Explosives used in conjunction with the development of this property shall be done in accord with a Blasting Plan per Code of Clarke County Chapter 86 (Explosives) approved by the Board of Septic and Well Appeals.

If explosives are not to be used, the following note shall be included on the site development plan:

No explosives will be used in conjunction with the development of this property.

7.2.8 Plan Approval and Construction

A. Construction and Performance Guarantees.

- 1. No site improvement activities may occur unless the final site development plan has been approved and all required performance guarantees have been posted in accordance with [Section 8 \(Performance and Maintenance Guarantees\)](#).
- 2. All improvements required by this Section shall be installed at the cost of the developer, except where cost sharing or reimbursement agreements between the County and the applicant are appropriate. Such cost sharing or reimbursement agreements shall be recognized by formal written approval prior to site development plan approval.