

**DRAFT- FOR CONSIDERATION AT THE MAY 15, 2008  
MEETING OF THE HIGHLANDS COUNCIL**

**Subpart f. Carbonate Rock (Karst) Topography**

The term karst describes a distinctive topography that indicates dissolution of underlying carbonate rocks (such as limestone and dolomite) by surface water or ground water over time. This dissolution process causes surface depressions and the development of such features as sinkholes, sinking streams, enlarged bedrock fractures, caves, and underground streams. Sinking streams range in size from intermittent streams to perennial rivers. They may sink through a segment of the stream bed or through a discrete opening such as a fracture or cave entrance, and then reappear further downstream. Sinkholes function as funnels, directing surface water runoff into karst aquifers with little or no attenuation of any transported contaminants. Stormwater basins, septic system leaching fields, sewers, agricultural runoff, lawn runoff, underground pipelines, and soil disturbance may also contribute contaminants directly to ground water through karst features. Soils in sinkhole bottoms may be thin or non-existent. In addition to ground water concerns, communities in karst areas must contend with safety concerns as sinkholes can have damaging effects to large manmade objects.

Beyond the potential deleterious affects of karst areas with respect to ground water and public safety, karst features provide natural, scenic, and recreational resource values. In situations where carbonate rock is overlain by permeable materials, such as glacial sands and gravels, high yielding aquifers may be present. These prolific aquifers have significance as water supplies and are extremely vulnerable to contamination. Karst areas often offer unique topographic features and opportunities for outdoor recreation. They typically occupy valley bottoms, producing dramatic contrasts in relief and valuable scenic vistas, especially when viewed from the higher elevations of ridges. Carbonate rock areas also offer unique habitats that contribute to the Region’s biodiversity such as the calcareous wetland fens of the upper Wallkill River valley and the limestone forests of the Johnsonburg Swamp Preserve in Frelinghuysen.

The Highlands Region has several large areas with carbonate rock formations, usually located in river valleys such as the Musconetcong, South Branch of the Raritan and Lamington. Karst features exist in some – but not all – of these areas.

<b>GOAL 1K</b>	<b>PROTECTION OF GROUND WATER QUALITY AND PUBLIC SAFETY REGARDING KARST FEATURES IN THE HIGHLANDS</b>
<b>Policy 1K1</b>	To map areas of the Highlands Region that are underlain by carbonate rocks to define a Carbonate Rock Area.
<b>Policy 1K2</b>	To identify and delineate through local development review and Highlands Project Review land areas that drain surface water into the Carbonate Rock Area, as changes in the quantity, quality and rate of discharge of surface water runoff from upslope lands can impair ground water resources in the Carbonate Rock Area.
<b>Policy 1K3</b>	To establish and maintain inventories of karst features and subwatersheds that drain directly to Carbonate Rock Areas in the Highlands Region.
<b>Policy 1K4</b>	To ensure through Plan Conformance that municipalities in, or within subwatersheds draining directly to, the Carbonate Rock Area protect public health and safety and the quality of ground waters from inappropriate land uses and pollutant discharges.
<b>Objective 1K4a</b>	Identification of critical requirements for development review ordinances to be adopted by municipalities, and for county development review procedures regarding roads and stormwater systems at a minimum, with technical guidance.

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- Objective 1K4b** Applications for site plan or subdivision approval will include a multi-phased geotechnical site investigation (e.g., test borings, test pits, etc.) to locate any potential karst features and potential hazards to public health and safety, structures and ground water quality.
- Objective 1K4c** Local development reviews and Highlands Project Reviews and requirements shall ensure that all potential hazards to public health and safety, structures and ground water quality, including but not limited to concentrated surface water or ground water flows that dissolve carbonate rock, are fully addressed and mitigated in the construction plans and subsequent approval process, with the maximum emphasis on nonstructural measures, including, but not limited to, avoidance of modifications to the karst features.
- Objective 1K4d** Public works projects, including but not limited to water supply, sewerage, stormwater and transportation facilities, shall be constructed and maintained such that the potential for damage from karst features and the contamination of ground water are avoided.
- Objective 1K4e** Highlands Project Reviews and requirements and local development reviews (where applicable) shall prohibit new land uses and facilities that constitute unacceptable risks of discharge due to karst topography where karst features have been identified, including but not limited to:
- Underground storage tanks
  - Solid waste landfills
  - Hazardous waste storage and disposal
  - Hazardous materials storage and handling
- Objective 1K4f** High priority is given, and state agency coordination will be undertaken, with respect to management and remedial action regarding high risk land uses and facilities where karst features have been identified including, but not limited to:
- Known contaminated sites
  - Failing septic systems
  - Existing underground storage tanks