



The Haberman Hampton Tract is underlain by carbonate rock, which provides the Musconetcong River with clean (non-polluted), cold (thermally-controlled), and abundant (quantity) water on a year-round basis. The site contains characteristic and typical karst features, and has 83 documented karst features including 20 sinkholes. These enhanced solutioning patterns trend northeast-southwest, matching mapped bedding plane trends, as well as the flow direction of the Musconetcong River. The development of the Hampton Haberman Tract will impact all three areas that provide the river with the basis for its NJDEP Category One and Federal Wild and Scenic River designation, reducing the river's value to the public-at-large as a water resource.

### PERMEABILITY

Direct drainage to the subsurface rather than flowing overland is reflected on the Haberman Hampton site, as observed from the disappearing stream bed on the southwestern area of the property.

Natural springs, which are a surface manifestation of underground streams likely flowing along bedding planes of Allentown Formation dolomite, appear all along the banks of the Musconetcong River on the northern perimeter of the property.

### CONTAMINANT TRANSPORT

A karst aquifer is extremely susceptible to contamination as there is little to no filtration of the subsurface water and any contamination can spread rapidly in the aquifer.

Because the groundwater and surface waters are directly connected and the flow is rapid in karst, there is a greater chance of surface water and sediment infiltration, which in turn, can spread pollutants (like nitrogen, phosphorus, metals, septic tank effluent, etc.) from the Haberman Hampton Tract into the Musconetcong River.

### DISCHARGE

For the Musconetcong River, the enhanced below grade storage capacity in carbonate bedrock provides a year-round cold water supply to the river, even during drought conditions.

Any large-scale treated sewage disposal to the subsurface will introduce wastewater to the groundwater. The increased temperature of the wastewater discharge may have a thermal impact on the baseline water temperatures (e.g. warming waters) conveyed via springs to the Musconetcong River.

## THE MUSCONETCONG RIVER IS A “WILD & SCENIC RIVER” AS DESIGNATED BY U.S. CONGRESS.

- **Unique karst conditions of this site have left it vulnerable to loopholes in the regulations. For example, underground streams are NOT regulated by the NJDEP Flood Hazard Area Control Act and Freshwater Wetlands Act, which provide riparian zones and transition areas to treat the quality of water that runs into surface ponds, lakes, streams and rivers. This gap in the rules circumvents the protection for high-quality waters like the Musconetcong River.**
- **It is highly probable that a high-density development, such as that proposed, will have a permanent and negative effect on this source of base-flow. This will have a calculable, measurable, and permanent effect on the Musconetcong River, and its water quality and value to the region as a scenic and recreational amenity to residents of the State of New Jersey.**

# KARST

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**(n.)** topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum.

- Features of karst landscapes include sinkholes, caves, large springs, dry valleys, and sinking/disappearing streams.
- Sinkhole collapse, drainage problems, and groundwater contamination are engineering and environmental concerns associated with development on karst terrains.
- Water movement in karst terrain is especially unpredictable because of the many paths groundwater takes through the maze of fractures and solution openings in the rock.
- Groundwater moves very rapidly in karst regions, so pollutants can be spread long distances in a short period of time.

The proposed Haberman Hampton project consists of constructing 142 single family homes, 146 multi-family attached units, and 45 multifamily attached affordable units, as well as 6,000 square feet of commercial space over 47 acres. The applicant has requested a site specific amendment to the Upper Delaware Water Quality Management Plan, which will establish a new on-site sewer service area with a proposed discharge-to-groundwater treatment plant for residential and commercial use. The projected wastewater flow to be received by the new subsurface sewage disposal facility is 86,175 gallons per day.

**20 SINKHOLES**  
**83 KARST FEATURES**  
**77 ACRES**

**ON THE HABERMAN HAMPTON TRACT**

## CONCEPTUAL MODEL: CONNECTIVITY OF HYDROGEOLOGY AT HABERMAN HAMPTON TO THE MUSCONETCONG RIVER

BLOCK 23, LOT 1 | BOROUGH OF HAMPTON, HUNTERDON COUNTY, NEW JERSEY

