**Maryland DOT**
**Research Project: SP208B4N**
**Date: July 2004**

RESEARCH SUMMARY

# Sinkhole Hazard Mapping - Phase II

## Problem

The Frederick Valley of Maryland is a tightly folded overturned syncline that exposes easily soluble carbonate rocks that can potentially result in sinkholes.

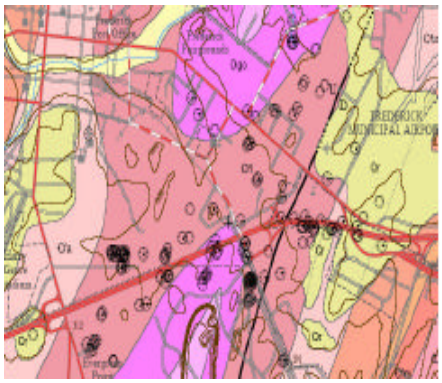
## Objectives

The objective of this study was to identify and develop a relative scale of karst (sinkhole) susceptibility to assist the Department of Transportation, land use planners, developers and the public in recognizing areas of high karst susceptibility.

The primary method of investigation was conventional field geologic mapping for the Frederick, Walkersville and Catoctin Furnace areas.

## Description

One thousand and eight hundred and sixteen karst features were identified and located with a global positioning system in the Frederick Valley of Frederick County. Active sinkholes make up approximately 34 percent of all identified karst features. Depressions are the most abundant karst features identified, and are most frequent in the Rocky Springs Station Member of the Frederick Formation and the Triassic Leesburg Formation; however, these units have few active sinkholes. Rock composition (lithology), fracturing, and ancestral drainage patterns are principal geologic factors contributing to sinkhole activity. A karst susceptibility index is proposed (SI), based on the ratio of the number of active sinkholes to total karst features per square mile.



The Ceresville, Woodsboro and Fountain Rock members of the Grove Formation and the Lime Kiln Member of the Frederick Formation have very high karst susceptibility. When un- lined drainage, storm water management areas or quarries are placed in proximity to these units, soil cover collapses are likely to occur. A slightly lesser karst

RESEARCH SUMMARY

## Description *(Continued)*
## Sinkhole Hazard Mapping – Phase II

susceptibility is recognized for the Rocky Springs Station Member of the Frederick Formation. The Triassic Leesburg Formation, and the Monocacy and Adamstown Members of the Frederick Formation have comparatively low karst susceptibility.

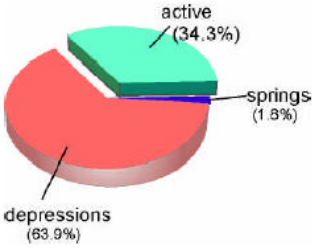



Figure 26. – Pie diagram illustrating the relative percentage of the three types of karst features identified in this study from more than 1,800 karst features of the Frederick Valley.

## Conclusions

Geologic factors play an important part in the distribution of karst features in the Frederick Valley. A redefined, precise stratigraphy helps delineate the stratigraphic intervals most susceptible to karstification. The Lime Kiln Member of the Frederick Formation, and the Fountain Rock, Ceresville, and Woodsboro members of the Grove Formation are intervals of especially high active sinkhole formation. An elevated risk of sinkhole development is likely where altered surface stream drainage, unlined road drainage, storm-water management areas, active quarrying, and soil mantle removal are in proximity to these stratigraphic units.

## Report Information

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