

### INTRODUCTION

Have you ever encountered engineering problems in areas of soluble bedrock? Does your project involve laying foundations in areas of chalk, gypsum or calcareous geology? If so, you will be aware of the possibility of encountering solution features, sinkholes, fractures or other voiding. Without a comprehensive site evaluation you could be risking serious foundation collapse or subsidence on your site.

Fugro can provide you with an integrated geophysical survey technique to evaluate fully the physical characteristics of your site. Our geophysical techniques are non-intrusive, quick to use and can cover large areas in one survey. Any anomalous areas can be verified with Cone Penetration Testing (CPT) and sampling to provide a comprehensive survey giving you confidence in your proposed development design.

#### Electromagnetic Inductive Conductivity



Cone Penetration Testing Truck

### ADVANTAGES

- Geophysical methods are non intrusive. Therefore there are no drill cuttings or spoil disposal problems
- Ease of calibration with other Fugro investigation techniques
- Cost effective and fast
- Geophysical equipment is compact and can be utilised by just one professional
- Variety of complementary geophysical techniques available
- Verification of voiding with CPTs and sampling



Above: Photo of subsidence due to gypsum dissolution. Ripon. N. Yorks 1997

### COMBINED TECHNIQUES

#### ● Electromagnetic Inductive Conductivity

This non-intrusive technique measures changes in the electrical properties of the subsurface e.g. the presence of buried structures or geological features. It is particularly sensitive to hydrogeological and lithological variations. Equipment used is either the EM34-3 Terrain Conductivity meter or the Geonics EM31. Measurements are typically conducted on a 2.5m x 2.5m grid and results presented as contour plots. (See contour plot on back page).

#### ● Microgravity

This method measures variations in the earth's gravitational field and is often used in conjunction with other geophysical techniques. The compact equipment allows measurements to be taken inside buildings.

#### ● Cone Penetration Testing

This intrusive method measures in-situ friction of soil and soft bedrock and indicates soil type and strength. The hydraulic penetrometer equipment is usually mounted in a 20 ton heavy truck, although smaller apparatus is available in areas of restricted access.

#### ● Soil Sampling and Laboratory Testing

When required soil samples can be taken at locations of interest and tested at Fugro's NAMAS accredited laboratory in Hemel Hempstead.

