

# Fugro Engineering Services Limited

## ELECTROMAGNETIC INDUCTIVE CONDUCTIVITY

This geophysical technique measures variations in the apparent conductivity of the subsurface by means of measuring changes in an electromagnetic field which is generated by the instrument itself.

There are several electromagnetic (EM) conductivity meters in use which are designed to penetrate to various depths within the subsurface. The most common of these are the Geonics EM31 (pictured below) and the Geonics EM34-3 Conductivity Meters. All instruments have a common basic design consisting of a transmitter and a receiver loop and a meter calibrated in terms of apparent conductivity in milliSiemens/metre.

An alternating electromagnetic field is generated by the transmitter coil, which induces eddy currents in the subsurface. These will be modified by the presence of subsurface conductors, and in turn will produce a secondary electromagnetic field which is detected by the receiver loop. Values of apparent conductivity can then be read directly from the meter or stored digitally in a datalogger.



### APPLICATIONS

- Mapping of lithological variations
- Location of geological faults, fissures, solution cavities etc.
- Detection of buried foundations and obstructions
- Location of abandoned mineworkings and shafts
- Mapping of landfill boundaries and polluted or hazardous zones
- Assessment of soil corrosivity for pipeline route studies

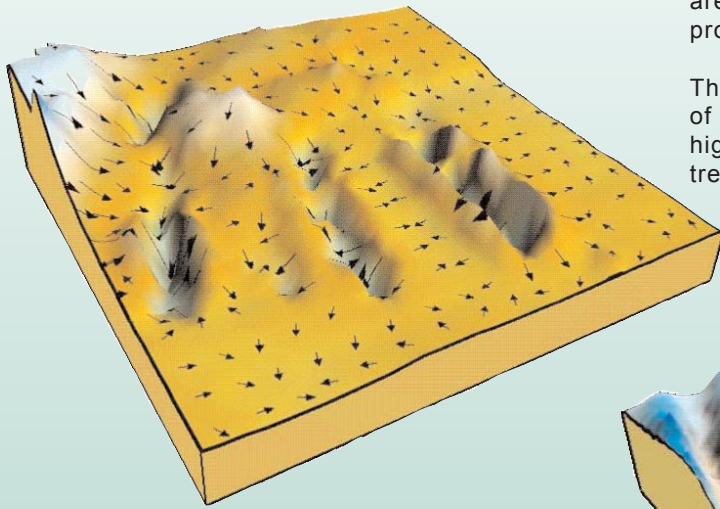
### ADVANTAGES

- Cost effective mapping tool
- Non intrusive technique
- Large areas can be surveyed in one day
- Penetration to depths in excess of 100m is possible
- Applicable to a large number of engineering, geological, environmental and archaeological investigations

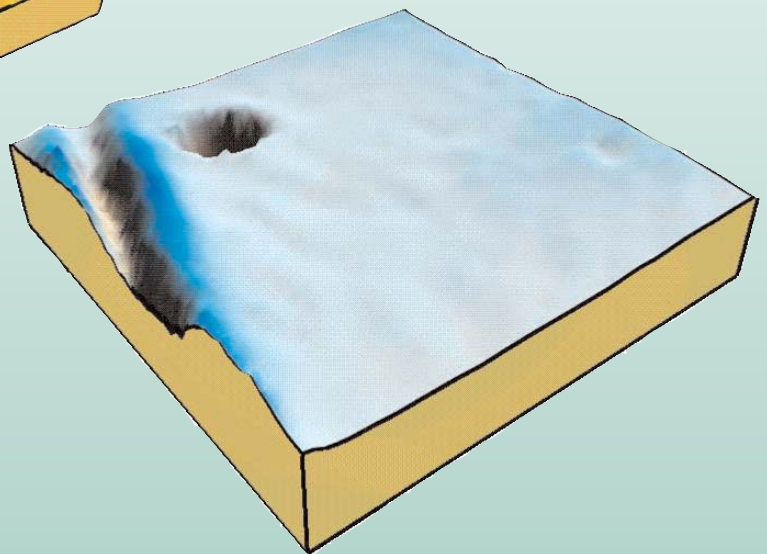
**The Fugro Group is an international organisation with around seven thousand staff in over fifty countries. Our major disciplines are Geotechnics, Environmental Services and Survey.**

Electromagnetic surveys are conducted along survey lines or on a grid basis to highlight anomalous surface areas. Results may be presented as a contour plot or profile of apparent conductivity against distance.

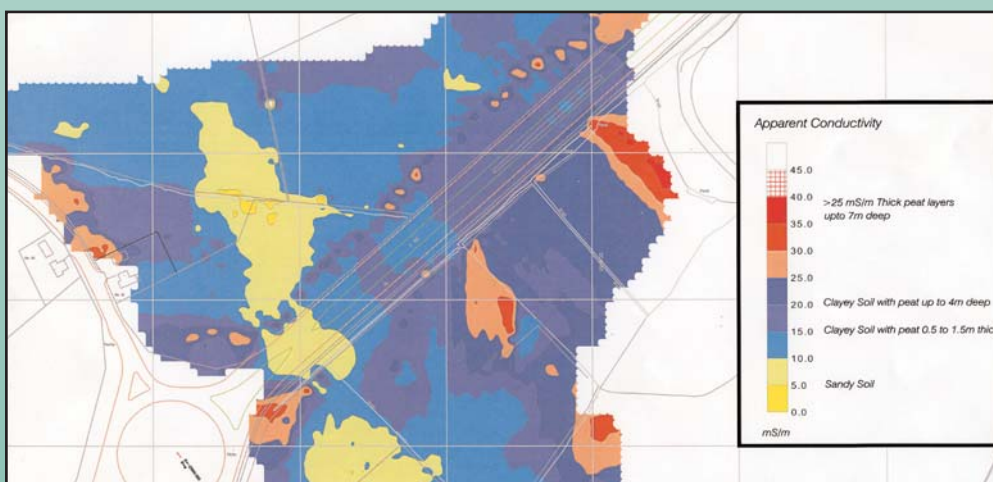
The example (left) shows the apparent conductivity plot of data collected over a suspected land fill. The plot highlights a number of linear features relating to landfill trenching.



The example (right) illustrates the use of EM-31 as a tool for locating ancient buried mineshafts. The prominent circular 'depression' relates to the presence of a mineshaft whereas the linear feature relates to a buried service.



The Electromagnetic method is also a useful tool for shallow and deep stratigraphic mapping. The EM 31 provides information to depths of 5-6m and is useful for shallow bedrock and drift/overburden mapping. The EM 34 provides deeper coverage (up to 60m) for bedrock profiling. The example below illustrates the usefulness of the EM 31 in mapping shallow stratigraphy.



Electromagnetic surveying is often used in conjunction with other geophysical methods to give the most detailed view of the subsurface possible.

**OTHER GEOPHYSICAL TECHNIQUES AVAILABLE :**

- Vertical Magnetic Gradient
- Microgravity
- Resistivity Depth Profiling and Imaging
- Ground Probing Radar
- Seismic Refraction and Reflection
- Cross-hole & Down-hole Seismic
- Borehole Geophysics

Details of services and specifications may change without notice.

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**Fugro Engineering Services Limited**

Fugro House  
Hithercroft Road  
Wallingford  
Oxfordshire OX10 9RB  
Tel: +44 870 4021 400  
Fax: +44 870 4021 499  
Email: wallingford@fes.co.uk

Armstrong House, Unit 43  
Number One Industrial Estate  
Medomsley Road, Consett  
Co. Durham DH8 6TW  
Tel: +44 1207 581120  
Fax: +44 1207 581609  
Email: consett@fes.co.uk

