

To assist with hydrogeological studies, Fugro can offer a combination of geophysical techniques, namely:-

- Electromagnetic Inductive Ground Conductivity (EM)
- Electrical Resistivity

The **electromagnetic (EM)** technique is used as a general mapping tool to detect variations in the apparent conductivity associated with changes in the nature of the subsurface material. Areas of relatively higher apparent conductivity are most likely to be associated with water saturated granular deposits.

The **electrical resistivity** method is employed to map shallow lithology and soil variations. It will also assist in the detection of water bearing strata. Changes in the apparent electrical resistivity with depth are measured and the information obtained builds up a geo-electric model across the site. Thus variations in the electrical properties of the water bearing strata are obtained.

Electromagnetic Inductive Ground Conductivity (EM)

An alternating voltage is produced at ground surface, via a magnetic dipole transmitter unit operating at a specific frequency. This induces circular eddy current loops in the earth, which give rise to a primary electromagnetic field. A secondary electromagnetic field will be induced in the subsurface associated with the primary field.

A magnetic di-pole receiver unit at the surface detects the resultant electromagnetic field that is the vector sum of both the primary and secondary electromagnetic fields.

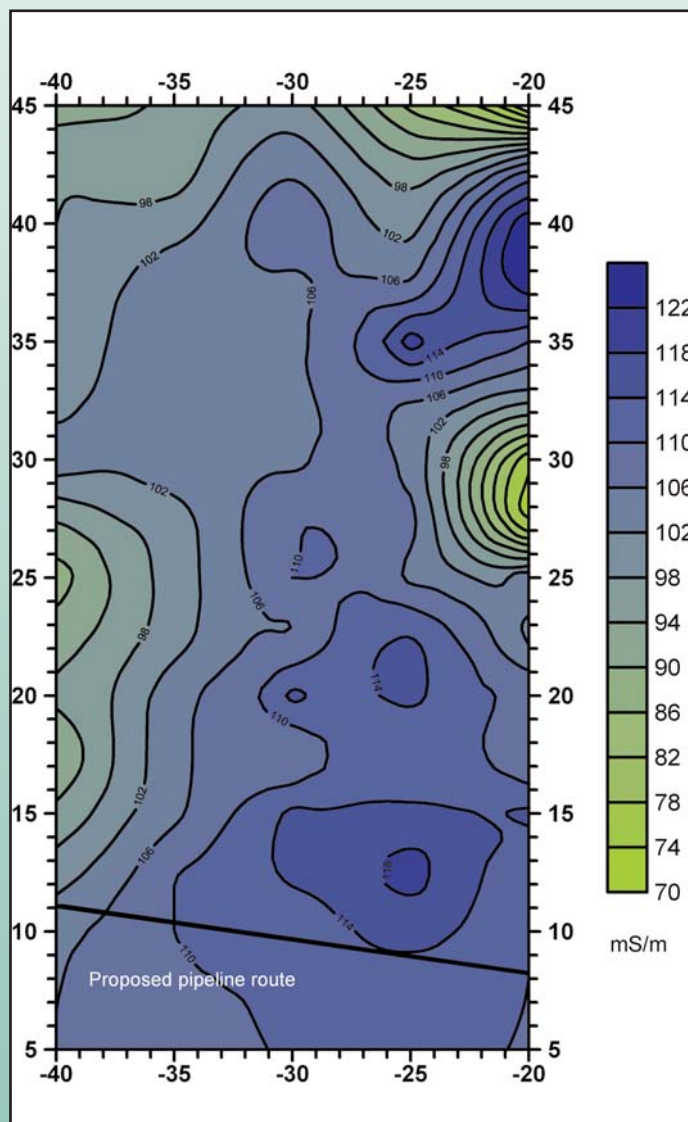


Fig.1 Apparent Conductivity

Changes in the electrical properties of the subsurface mass, e.g. geological and structural variation generally give rise to a contrast in the ground electrical conductivity that would be detected by the electromagnetic metres. Figure 1 shows the spatial extent of a buried river channel (later confirmed by drilling).

Electrical Resistivity

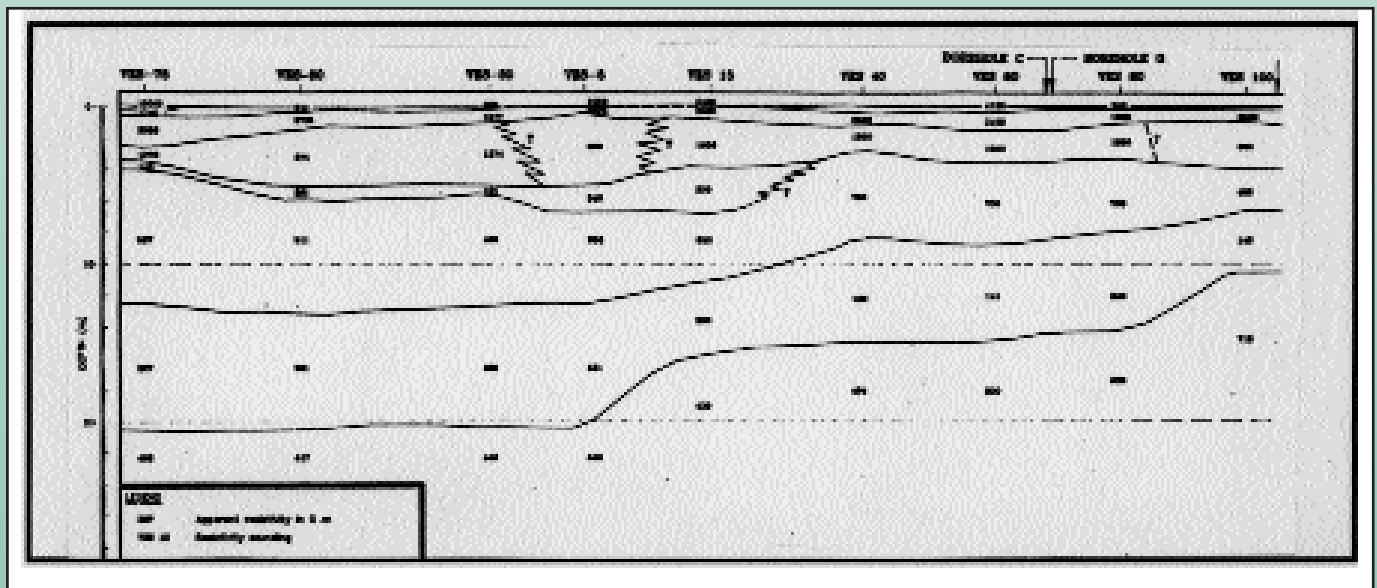
An electrical current, either DC or very low frequency AC, is introduced into the ground by means of two outer metal stakes or electrodes. Variations caused by geological or hydrogeological conditions affect the subsurface current flow and alter the electric potential patterns associated with them. These patterns are measured by a second inner pair of electrodes in line with the first.

Using the resistivity technique both lateral and vertical variations in apparent resistivity can be detected by adopting either Resistivity depth probing or Resistivity profiling modes of operation.

Geophysical Limitations

It must be emphasised that geophysical methods can only identify areas are anomalous to the site norm. The interpretation of the cause of such anomalies is inevitably based on assumptions about the historic use of the site. To identify the nature of the geophysical anomalies positively and to calibrate the geophysical models, intrusive investigation will be necessary. However, the geophysical data enable the intrusive investigation to be planned in the most effective manner possible.

Fig.2 Resistivity plot



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.

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