

Fugro Engineering Services Limited

GROUND PROBING RADAR



Ground Probing Radar (or GPR) is a technique that is used to indicate changes in the structure or electrical properties of the shallow subsurface by means of transmitting and receiving pulses of high frequency electromagnetic radiation. The antenna transmitting the pulses is moved slowly across the surface, and the radiation reflected from various interfaces within the subsurface is detected by a receiving antenna. Many received pulses are collated to produce a continuous radar reflection with time.



APPLICATIONS

- Mapping of shallow lithological variations
- Location of buried pipes, services and tanks
- Structural investigations of bridges and walls etc.
- Location of shallow voids beneath roads and slabs
- Detection of buried foundations and obstructions on brown field sites
- Determining slab thickness and rebar distribution
- Archaeological investigations
- High Speed Pavement Radar and Railway capabilities (refer to separate information sheets).

ADVANTAGES

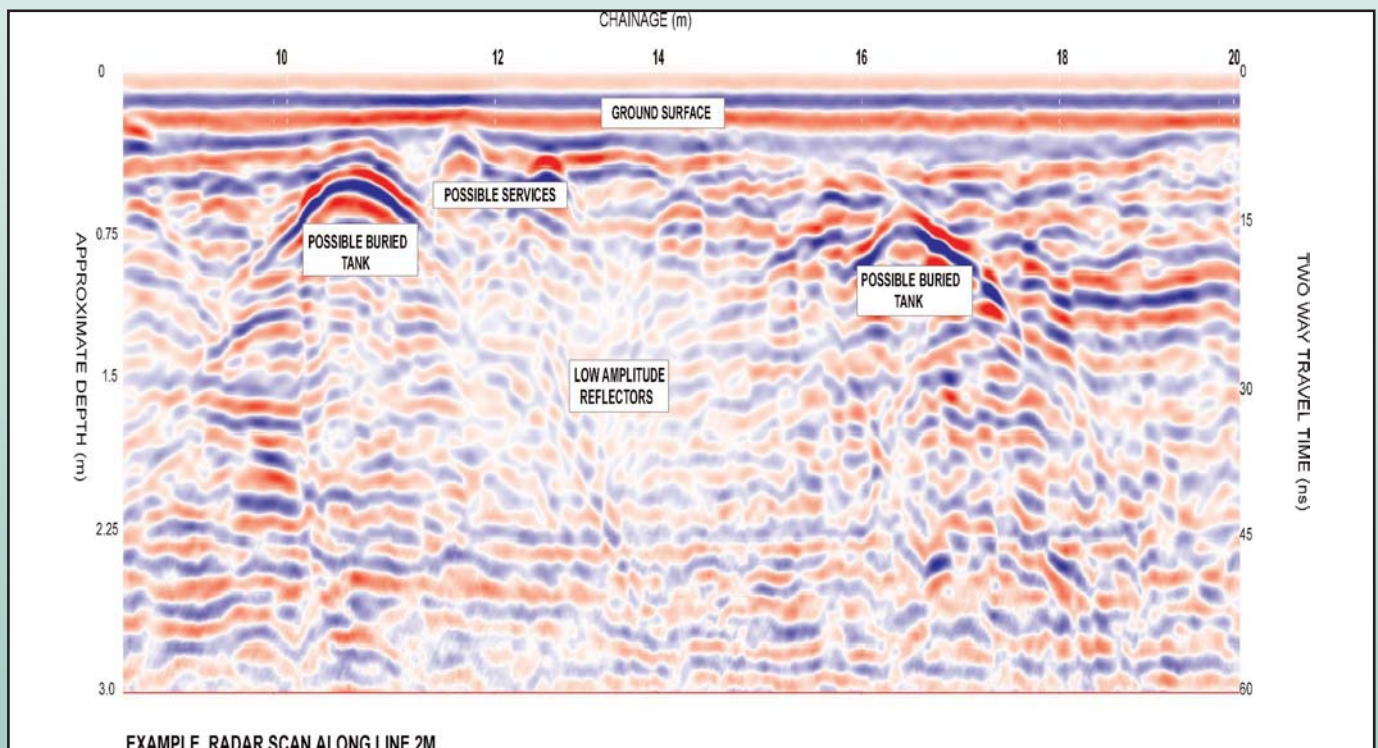
- Quick method of imaging shallow subsurface anomalies
- Applicable to many engineering, environmental and archaeological investigations
- Cost effective mapping tool
- Non intrusive technique
- Complements other geophysical techniques
- Determines approximate depth of buried structures
- Up to three linear kilometres can be surveyed in one day

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.

The velocity of propagation of the radar pulse within the subsurface, and hence the depth penetration, is dependent on the electrical properties of the ground and is primarily influenced by moisture content. By estimating the average velocity of the radar pulse, a depth section can be produced showing the various interfaces at which energy is reflected. A variety of transmitting antennae can be used to penetrate to a range of depths beneath surface level.

Radar sweep lines can either be surveyed on a grid basis to provide complete ground coverage, or oriented perpendicular to known structures such as service pipelines in order to determine their position accurately. Plots are printed out as data is collected to allow real-time interpretation of results.

The radar data above is an example taken from an old petrol station in Birmingham. At the top of the plot is a dominant and continuous reflector, which represents the ground surface. Between chainages 10m to 11m and 16m to 17, there are zones of high amplitude reflections forming a broad hyperbolic outline at an approximate depth of 0.4m to 0.5m. These have been interpreted to be most likely associated with buried tanks. Beneath chainage 12.5m there is a narrow zone of high amplitude reflections with a general hyperbolic outline. This has been interpreted as a buried service.



Ground Probing Radar is often used in conjunction with other geophysical methods to give the most detailed view of the subsurface possible.

OTHER GEOPHYSICAL TECHNIQUES AVAILABLE :

- Electromagnetic Inducted Conductivity
- Vertical Magnetic Gradient
- Microgravity
- Resistivity Depth Profiling and Imaging
- Seismic Refraction & Reflection
- Cross-hole & Downhole Seismic
- Borehole Geophysics

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