

ELECTRICAL RESISTIVITY TOMOGRAPHY



GBGMAPS is a joint venture company between McMullen Nolan and GBG Australia. Employing engineers, geophysicists and surveyors of considerable experience we are specialists in applying non-destructive investigative and geophysical techniques for a wide range of environmental and engineering applications.

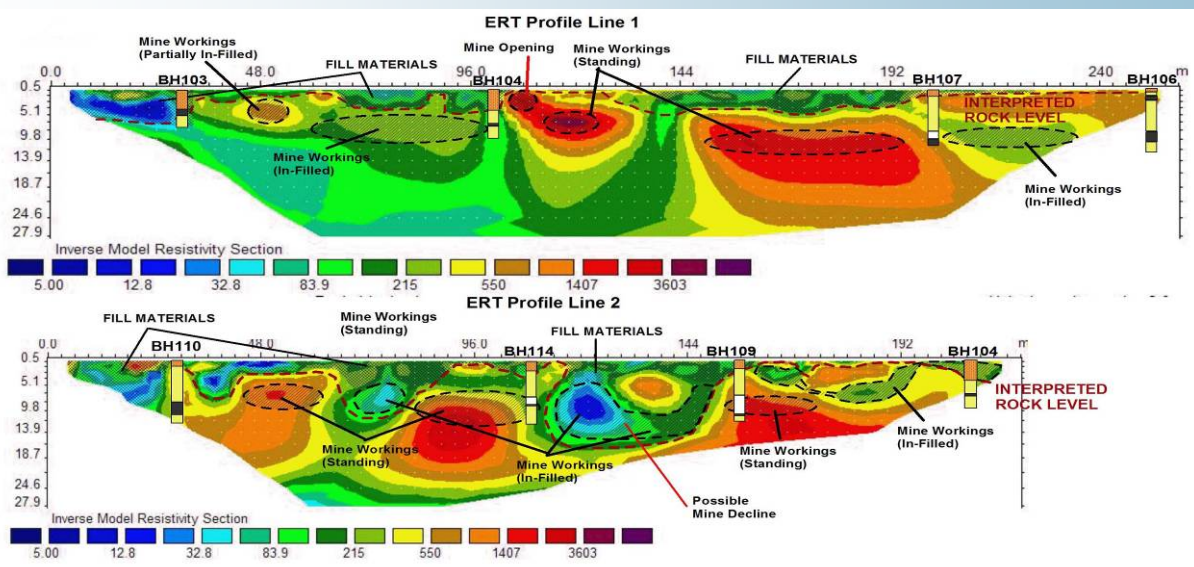
One such geophysical technique we regularly undertake is electrical resistivity tomography. ERT is a geophysical technique that images variations in the electrical resistivity of the subsurface material. The technique involves the injection of electrical current into the subsurface via a series of ground planted electrodes, and the subsequent measurement of the potential difference at the surface. It is an effective technique in many environmental, geotechnical and engineering investigations.

ERT has rapid data collection, with typically over 500 m of continuous line data collected in a day; has a wide variation in investigation depths, depending on the size and type of target being located; and has a minimal impact on the environment whilst providing high resolution images of the subsurface.

Whether it is discerning between fresh and salt water aquifers, locating old mine workings or defining geological shear zones, resistivity methods are useful for a wide range of applications. Below are some examples from ERT investigations previously undertaken by GBGMAPS.

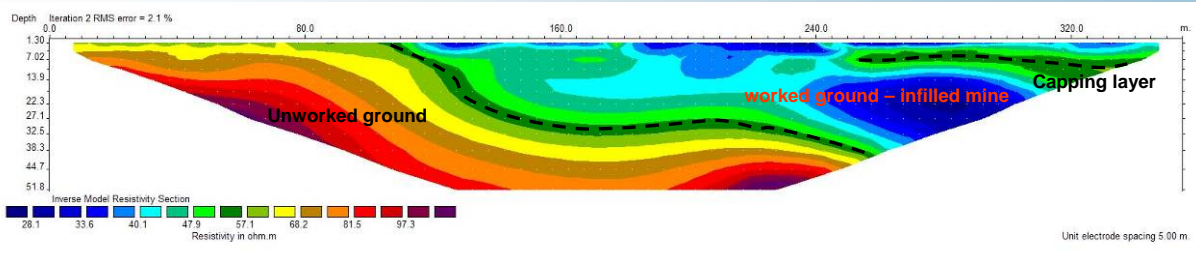
Mapping of underground mine workings – The resistivity profiles shown below were recorded over old underground mine workings in southern New South Wales. The purpose of the survey was to assess the distribution and depths of mine workings.

The presence of several previously unknown mine workings from approximately 3m to 9m depths are visible in the resistivity profile. Both standing mine cavities and in-filled mine workings can be distinguished with ranges of resistivities relating to various types of fill material. The profiles have been correlated with a number of bore holes.



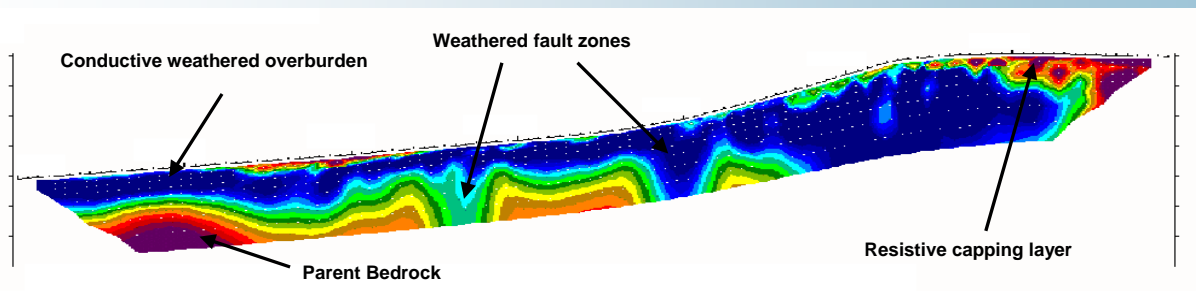
Mapping of filled open cast coal mine workings – The resistivity profile below was recorded in a region in Cumbria United Kingdom which was known to have been part of an open cast mine in the 1970's and was subsequently filled and returned to farming land. The purpose of the survey was to map the extent and depths of the mine pits to help establish the bearing capacity of the ground before the proposed construction of a wind farm.

The edge of the original mine pit is visible in blue to green. The response over the mine pits is relatively low resistivity and is consistent with ground formed of variably but reasonably well compacted fill materials of varying particle size, primarily spoil with a relatively high water content. The unworked ground is visible in yellow to red and is characterised by relatively high resistivity readings and is consistent with a natural mudstone formation. A capping layer on the right of the image is visible in green and may represent a well compacted clay layer.



Mapping of weathered fault zones and lineaments in bedrock – The resistivity profile below was recorded along a proposed road cutting in northern Queensland. The purpose of the survey was to assess the rippability and to plan the drainage of ground water. The profile has been elevation corrected.

The weathered overburden material is visible in blue and is non-resistive due to increased fracturing and ground water content. A near surface layer of resistive capping is visible in red/orange/violet. The resistive bedrock is clearly visible in red/orange at the base of the profile. Two weathered fault zones are visible centrally eroded into the bedrock; these are preferential zones for ground water flow and are low strength zones.



Applications of ERT:

- Contaminant plume mapping
- Landfill site investigations
- Groundwater exploration and quality
- Cavities and void detection
- Geological mapping
- Earthing testing
- Archaeological investigations
- Mineral exploration
- Geotechnical studies

Previous investigations using ERT:

- Resistivity imaging to locate rock floaters Bod-dington Gold Mine Expansion Project, WA—Aker Kvaerner Clough Murray Roberts (2008).
- Forres Flood Alleviation Scheme, Geophysical Survey Mapping of Superficial deposits to assess Distribution of Gravel Layers, Scotland UK—Haskoning UK (2008).
- Ground Investigation of Proposed Wind Farm Site, Cumbria UK—BVG Associates (2007).
- Geophysical investigation over mine workings for proposed residential development, Lithgow NSW—Geotechnique Pty Ltd (2005).