

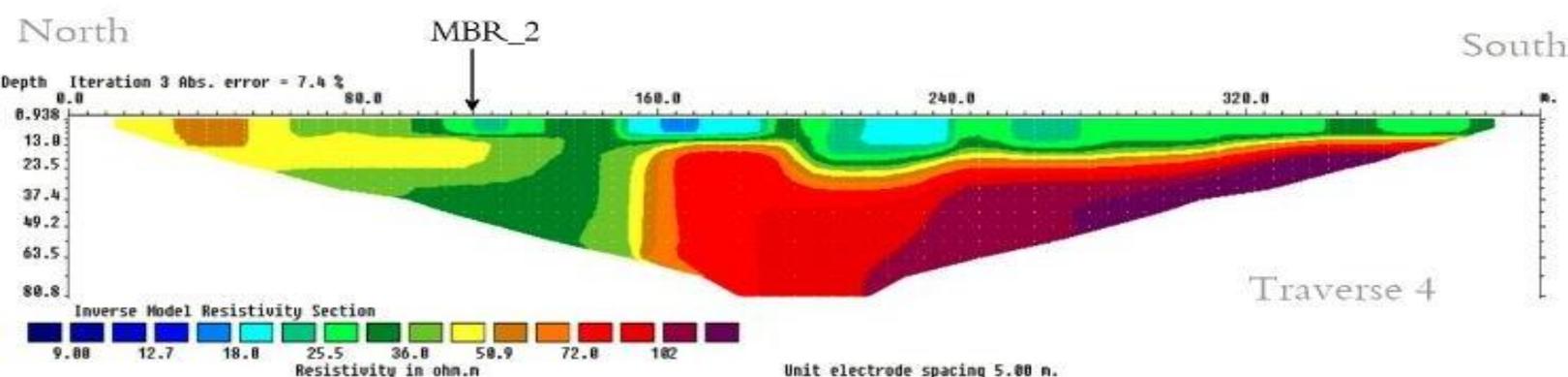
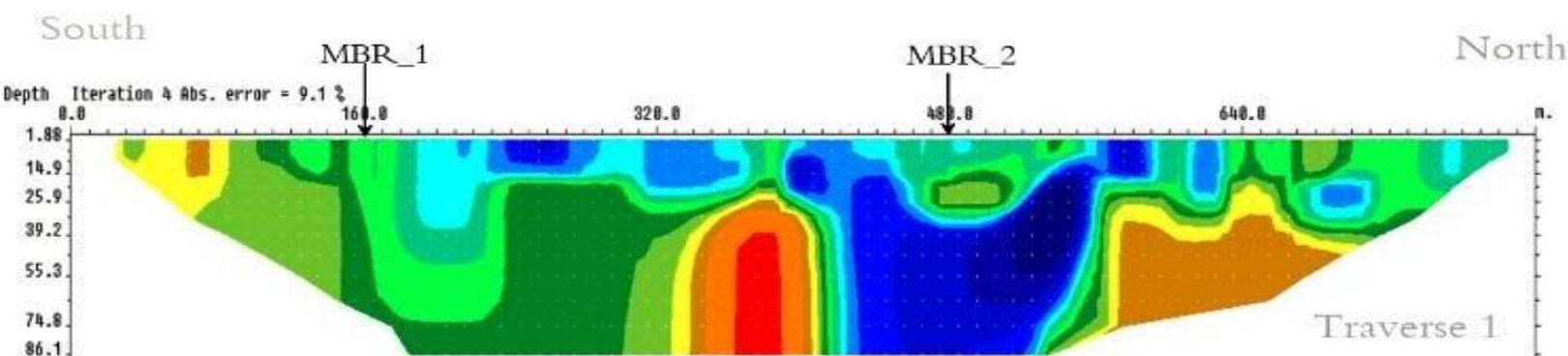


MSF Environmental Health Toolkit

An introductory document to geophysical surveying technique

Tool kit component 1.4

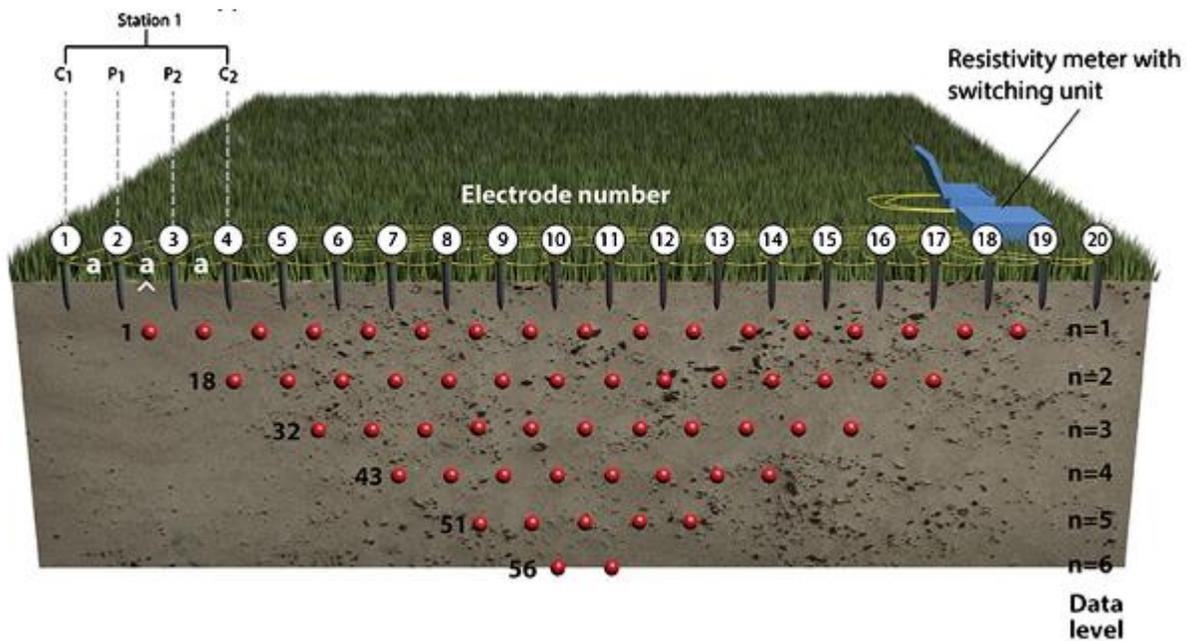
MSF Mission Zimbabwe



ERT (Electrical Resistivity Tomography) Survey

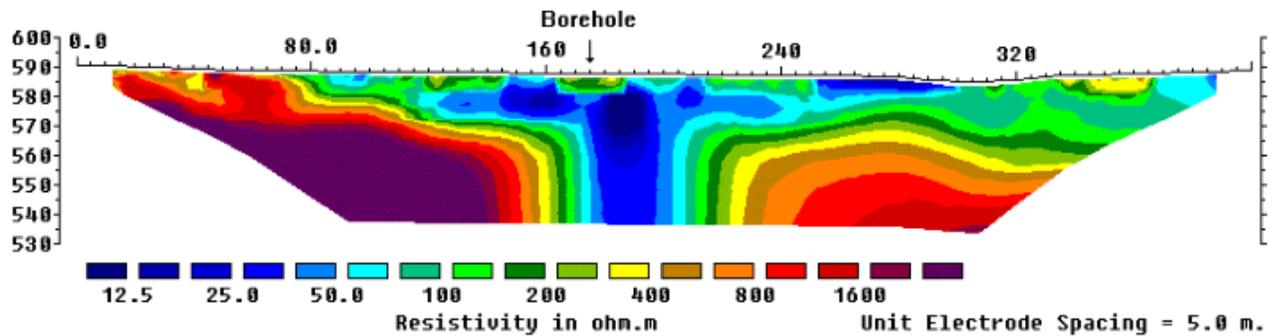
The ERT surveying is a geophysical technique, useful for characterizing the sub-surface geological formations in terms of their electrical properties. Variations in electrical resistivity (or conductivity) typically correlate with variations in lithology, water saturation, fluid conductivity, salinity, porosity and permeability. This information can be used to map various sub surface characteristics including the presence of the possible fractured zones and ground water.

The acquisition of resistivity data involves the injection of current into the ground via a pair of regularly spaced electrodes (called current electrodes) and then the resulting potential field is measured by a corresponding pair of regularly spaced electrodes (called potential electrodes), connected to a central control unit. The depth of investigation depends on the electrode separation and geometry of the array. With greater electrode separations, bulk resistivity measurements from greater depths can be acquired.



Schematic diagram: A multi-electrode system, and a possible sequence of measurements to create a 2-D pseudo section.

The final true resistivity subsurface models are presented as color contour sections revealing spatial variation in subsurface resistivity. Geological materials have characteristic resistivity values that enable identification of boundaries between distinct lithologies on resistivity cross-sections as shown below:



Success stories of the use of 2D-ERT equipment at MSF Projects

The 2D ERT surveying technique is used within MSF project to locate presence of ground water. During the recent interventions at Harare, Zimbabwe, the technique showed promising results in identifying the fractures zones and high yielding aquifers at greater depths. To compare, an average borehole yield in Harare is approx. 2000liters/hour, which is sited using conventional siting methods. MSF Zimbabwe deployed 2D ERT surveying to site new boreholes. This resulted in high yielding boreholes, some providing water up to 30,000 liters/hour.

MSF plans to use this equipment for its further interventions within the southern African region and beyond to site productive boreholes and to identify other issues i.e. salt intrusions within fresh water etc.