

# Geotechnical Geophysics



CLEAR SUBSURFACE IMAGES



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This project was carrying out geophysical surveys to map the extent and depth of lava flows in the central Auckland area to aid in the planning of a new Expressway/ highway. These surveys method meant environmental disturbance was kept to a minimum.

This case study highlights the resistivity imaging results and interpretations.

Resistivity imaging maps the thickness and lateral extent of the basalt flows. A 2D resistivity imaging survey maps both horizontal and depth changes in the electrical resistance of the rock, whereas resistivity soundings provide only depth information at a single point. The resistance of a rock to electric current is dependent on a number of factors. Typically the resistivity contrast between basalt and the sediments underneath is on the order of 10:1 to 100:1, with basalt being more resistive. This large contrast means it is straightforward to interpret electrical image sections. High resistivity areas indicate basalt, and low resistivity areas indicate sediment.

The project scope was seventeen resistivity images both parallel to the flow edge and in some cases at right angles to it. This gives both the thickness and lateral extent of the flow. In most cases basalt thickness was between 5m and 10m reaching a maximum of 17m.

The near surface nature of the basalt and the resistive contrast between it and the underlying sediments facilitates excellent data and very accurate interpretations.

These images demonstrate the striking effectiveness of the resistivity imaging method applied to imaging thickness and lateral extent of igneous geology. This method is similarly effective when applied to other geological materials as well.

