

Application Note

Groundwater Geophysics



The challenges of field work

CLEAR SUBSURFACE IMAGES



New Zealand

3061b Gt North Rd
New Lynn Auckland NZ
Phone NZ : +64-9-826-0700
Fax: +64-9-826-0900

Australia

Unit 17 , 3 Hamley Rd
Mt Kuring Gai NSW 2800
Australia 1800-359-905

E-mail: info@ss-i.biz

Web [http://](http://www.subsurfaceimaging.net)

www.subsurfaceimaging.net

This project was locating groundwater supplies in rural areas of Cambodia.

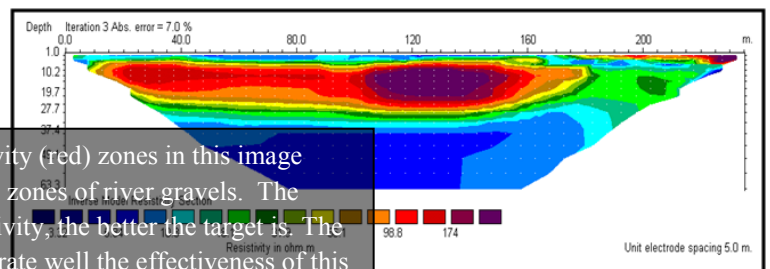
The targets of the survey were bands of clean gravels and sandy gravels and in some cases a zone of fractured rock above competent bedrock. The sediments/ rock resistivity ranges from 1-1000 ohm-m, with clays and silts being 1 – 50 ohm-m, sands and sandy gravels 50 – 120 ohm-m, gravels 120 – 800 ohm-m, basalts and basement rocks 250 – 1000 ohm-m.

The project uses the resistivity imaging method. This effectively replaces one sounding with up to 48 soundings along a 240m long line. The depth penetration was 65m for the pole-dipole array and 150m for the pole-pole array. Resistivity imaging produces depth sections that are blurred versions of the actual electrical structure of the subsurface. The blurring effect is more severe with depth.



Typically for the pole-pole array the number of quadrapoles (electrode sets) was 1060, and for the pole-dipole 860 quadrapoles, with each quadrapole equivalent to one data point in the final resistivity image.

unit.



The high resistivity (red) zones in this image clearly delineate zones of river gravels. The higher the resistivity, the better the target is. The images demonstrate well the effectiveness of this application of resistivity imaging.

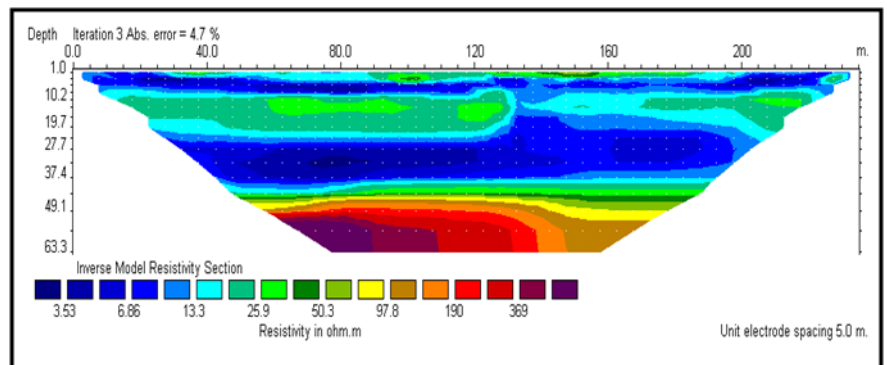
Application Note p2

The maximum electrode spacing used was between 750 and 1000m and this met the project requirement. The scope was 28 Cambodian towns, with a data scope of 65 resistivity data lines.

The results show that:

- 1) Depth changes and structure with offsets of a few metres are detectable.
- 2) The lateral resolution is about 10 meters. This does degrade at greater depth. The method may not resolve very thin layers especially if they are deep.
- 3) It is not possible to distinguish between closely spaced layers of clean gravels, and these will usually be seen as one geological unit.

This image shows laterally extensive gravels and sandy gravels below 50 m. These data are typical for the region and illustrate good drilling targets.



- There was good correlation between geology and the ERI.
- It was possible to map the alluvial boundary and structures.
- A large area could be efficiently and cost effectively covered in a short time by using electrode configurations which concentrate in the zone of interest.
- Surface resistivity imaging is a fast and cost effective alternative to extensive drilling.



New Zealand

3061b Gt North Rd

New Lynn Auckland NZ

Phone NZ: +64-9-826-0700

Fax: +64-9-826-0900

Australia

Unit 17, 3 Hamley Rd

Mt Kuring Gai NSW 2800

Australia 1800-359-905

Training Counterpart staff in Cambodia

