

## Welbeck Landfill

Normanton, WAKEFIELD - UK

### Measurement of landfill parameters to enable effective waste management

The Welbeck landfill site is a domestic waste and light industrial landfill site. It comprises of a substantial landfill area which has been divided into cells. It is founded on graded colliery spoil with discrete perched water tables running throughout the area. It is also bounded by the river Calder and Aire and Calder Navigational Canals.

It is necessary to contain and manage contaminants and leachates derived from new waste mass. In order to undertake this challenge, the foundation is overlaid with an impermeable membrane. It is important that excessive differential movements are monitored and controlled to prevent membrane rupture occurring that would release contaminants into the surrounding environment.

The monitoring scheme was designed to be automatically logged, remotely read via a wireless communication link and powered by solar energy. Vertical movements within the foundation are monitored using arrays of un-vented, vibrating wire settlement cells with their reference reservoirs located outside the landfill footprint.

Lateral profiles are obtained using strings of in-place vibrating wire inclinometers installed into boreholes at the edge of the containment area, these installations have been designed so that they may be retrieved and re-used at a later date.

Ground water parameters are measured using vibrating wire piezometers installed within the perched water tables of the colliery spoil. In addition existing de-airable piezometers have been included within the monitoring scheme to supplement the results.



**Top left:** Installation of settlement cells within foundation trench.

**Top right:** Reservoir enclosure for each settlement cell.

**Bottom:** Welbeck instrumented cell.

<b>DESIGNER :</b>	SLR CONSULTANTS
<b>CONTRACTOR/CONSULTANT :</b>	MOTT MACDONALD/BENTLEY
<b>PROJECT DURATION :</b>	JULY 2005 – SEPTEMBER 2005
<b>SCOPE OF WORKS :</b>	
Installation and commissioning of :	
<ul style="list-style-type: none"> <li>• 10 nos. hydraulic/vibrating wire settlement cells.</li> <li>• 18 nos. vibrating wire in-place inclinometer sensors.</li> <li>• 4 nos. vibrating wire piezometers.</li> </ul>	
Inclusion into the monitoring scheme of 4 nos. existing de-airable vibrating wire piezometer. Design, installation and commissioning of a fully automated, solar powered logging system, interrogated via GSM wireless communications.	