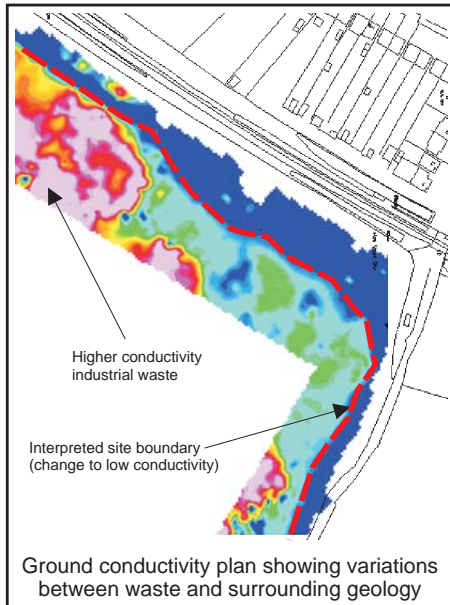


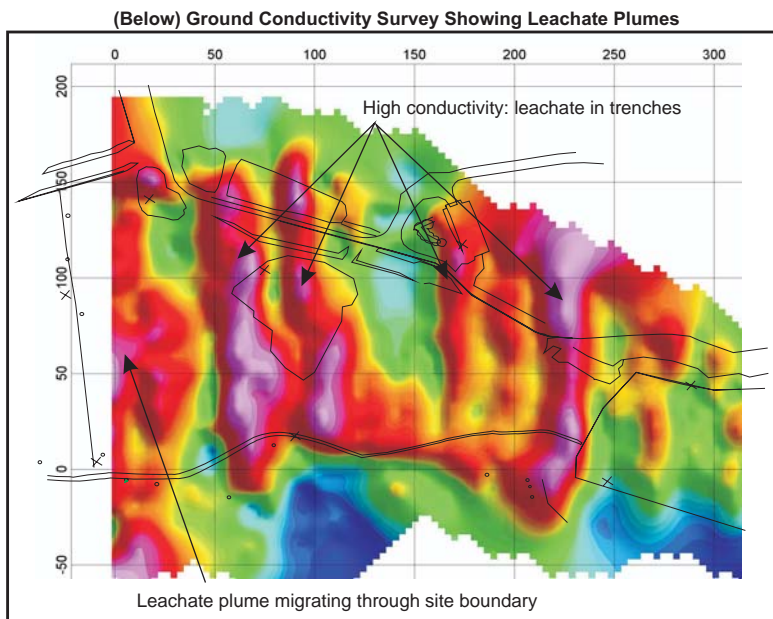
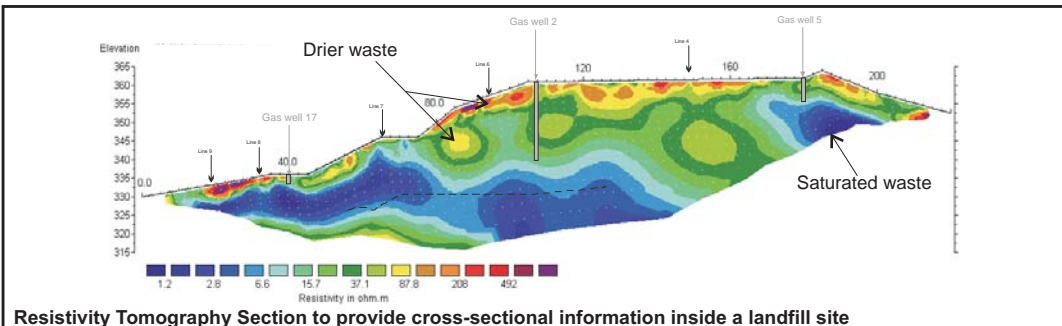
The problem of characterising both active and closed landfills and waste sites is an increasing one in the light of increasing environmental legislation and poor historical records. A TerraDat geophysical survey can be rapidly carried out for a fraction of the cost of obtaining low-resolution information through invasive means, without disturbing the ground.



- Mapping leachate level within landfills
- Locating landfill boundaries
- Characterising variations in waste composition
- Mapping “dry” and “wet” zones for leachate control
- Investigating cap integrity
- Geological characterisation for new cell design
- Leachate plume mapping
- Locating voids or poorly compacted zones
- Landfill HDPE Liner testing
- Locating underground springs

(Left): The plan shows the how conductivity mapping can be used to rapidly locate the boundaries of a closed landfill where records are missing.

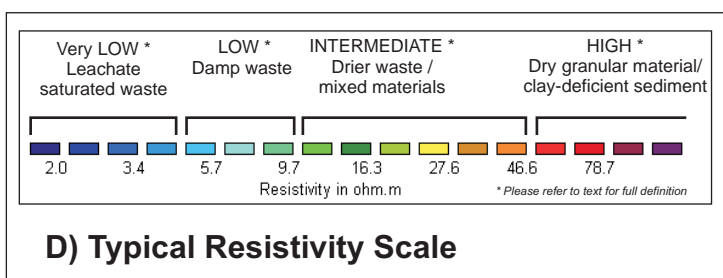
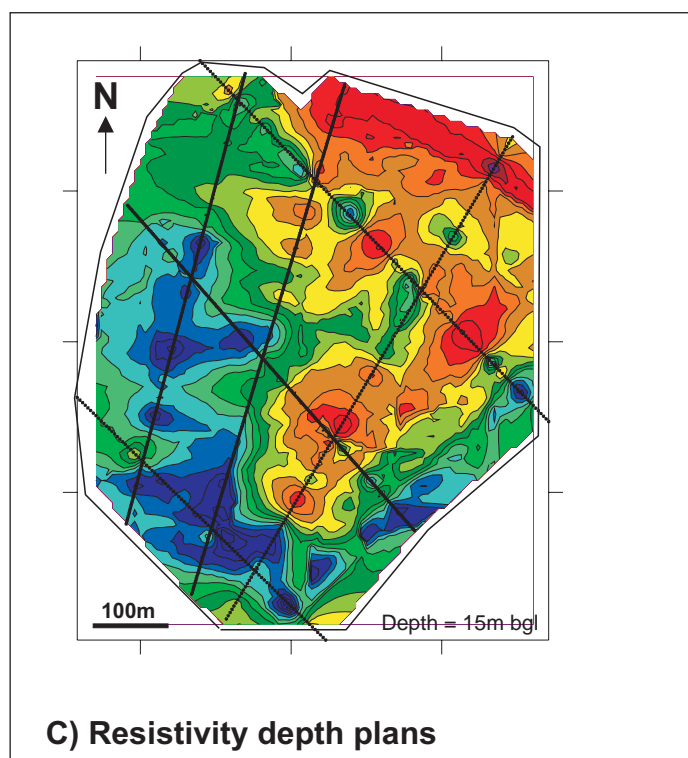
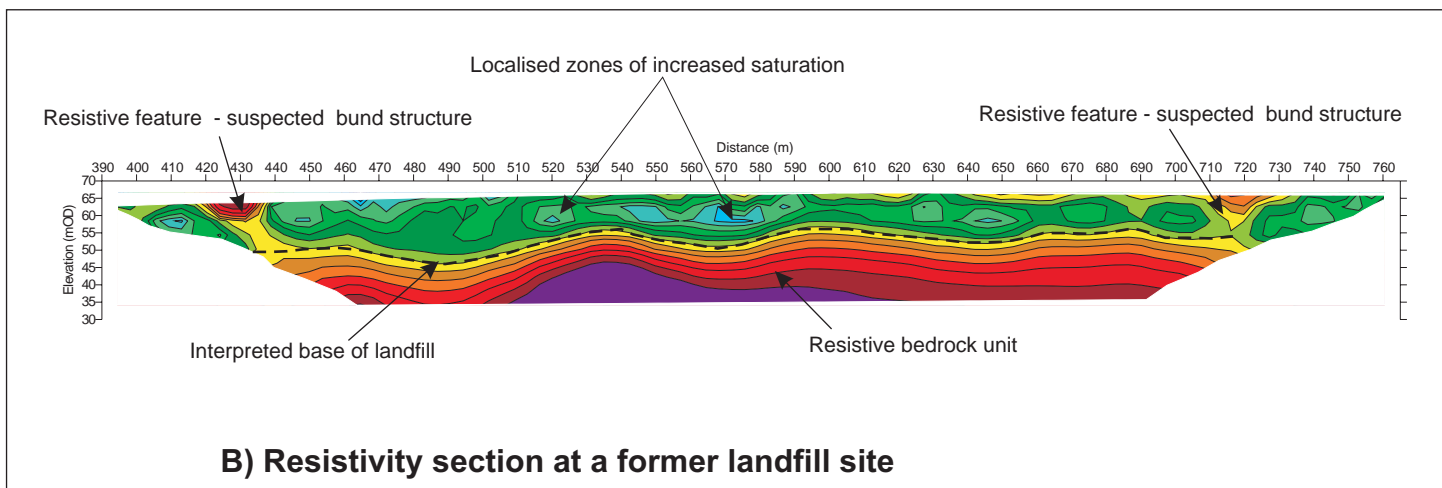
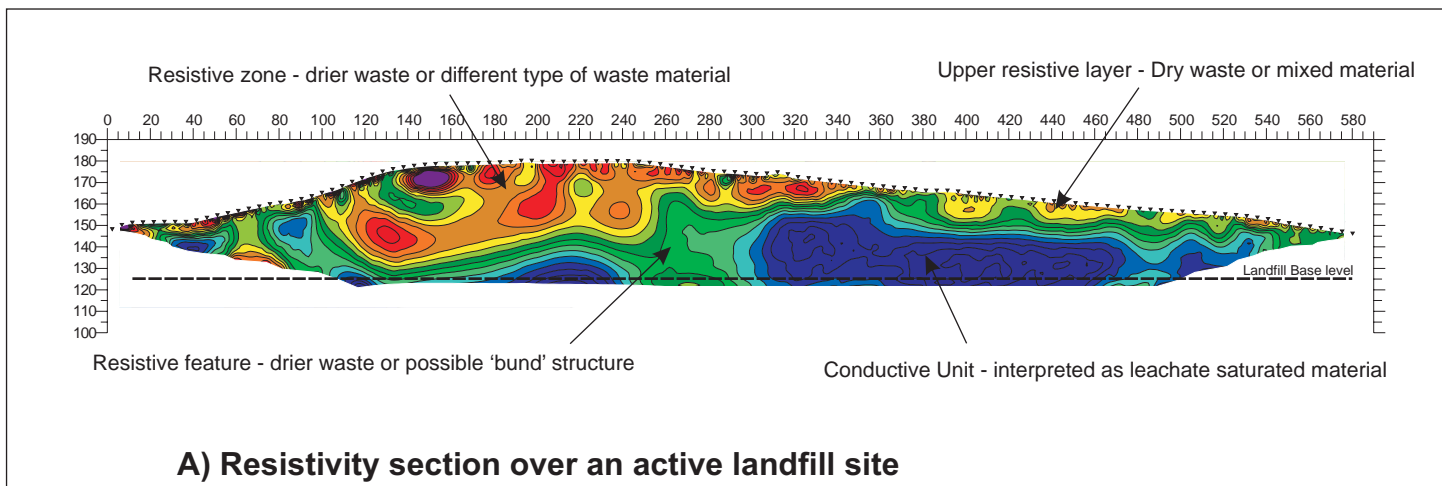
(Below): The section below is from a resistivity tomography survey and shows variations within a landfill cell including wet and dry waste, the landfill base and bedrock characteristics. Up to 1.5km of line can be acquired in one day.



(Left): Characterising the internal composition of a landfill is an important factor when considering the contamination potential and future of either an active or abandoned site. With non-existent or incomplete records, placing random boreholes and probes can be costly and ineffective. Knowledge about lateral changes in the properties of a landfill can identify features such as tip boundaries, different phases of tipping, saturated and dry ground, leachate plumes, and areas of groundwater ingress.

The purple lineations represent conductivity highs in trenches that were excavated into the underlying clay and filled with industrial waste. Subsequent groundwater ingress caused leachate accumulations that concentrated in the trenches.

Further processing of the EM data showed the leachate plumes to be migrating towards the site boundary thus providing optimal locations for pumping wells.



The resistivity technique utilizes the contrast in electrical properties between the dry (resistive) and leachate-saturated waste (conductive) material. The interpretation of the resistivity sections is based on both the published electrical properties of typical sub-surface materials and correlation with on-site information or observations. Generally leachate-saturated waste material is usually characterised by low resistivity values, approximately 0-10 ohm.m (D). However, depending on the type of the waste material and the nature of leachate saturation/chemistry, the saturated waste can exhibit a different resistivity range.

To assist with the spatial interpretation of the survey area, the resistivity data may be transposed into a plan format (C) by interpolating between survey lines at selected depth ranges (below ground level) to illustrate the lateral variability.

TerraDat undertook one of the largest 3-D resistivity surveys of a landfill site in the summer of 2004. The site was a capped landfill and data were acquired along evenly spaced parallel lines using an Iris Syscal 72 instrument together with RTK GPS elevation control.

2D and 3D inversions of the data were carried out using RES2DINV and RES3DINV and presented using various software packages including slicer/dicer, LSS and Surfer.

The lateral and vertical extends of leachate saturated waste were effectively defined using this cost-effective non-invasive approach enabling the landfill operator to estimate leachate quantities and design a recirculation / pumping programme to manage the site more effectively.

