



*Geophex Ltd*

## GEM-2

The GEM-2 is a handheld, digital, programmable, broadband electromagnetic sensor. Combining cutting-edge technology with simplicity of use, the GEM-2 is the finest electromagnetic geophysical sensor for geological, environmental, and geotechnical surveys. The GEM-2 package consists of the sensor boom (ski), that contains all the sensing elements: an electronics console with a removable battery that's plugs into the ski, a handheld data logger as the user interface and display, and a shoulder strap.



### GEM-2 - Technical Specifications

#### Programmable Operation

Bandwidth:	300 Hz to 96 kHz
Frequency Domain:	Single frequency or Multiple frequencies
Sampling rate Selectable:	30 Hz or 25Hz
Ski:	Fiberglass foam 2 kg, L 183cm, W 12.5cm Coil configuration: coplanar
Maximum TX moment:	3 Amp m <sup>2</sup> at 330 Hz
Rechargeable battery:	12VDC
Output:	Inphase and Quadrature in ppm at each frequency Apparent conductivity and Magnetic susceptibility Powerline amplitude

Realtime GPS input for navigation  
 Remote operation options  
 User Interface and data Logger: Trimble Nomad 900B  
 Communication: Bluetooth or RS232



### The GEM -2 is suitable for investigations in

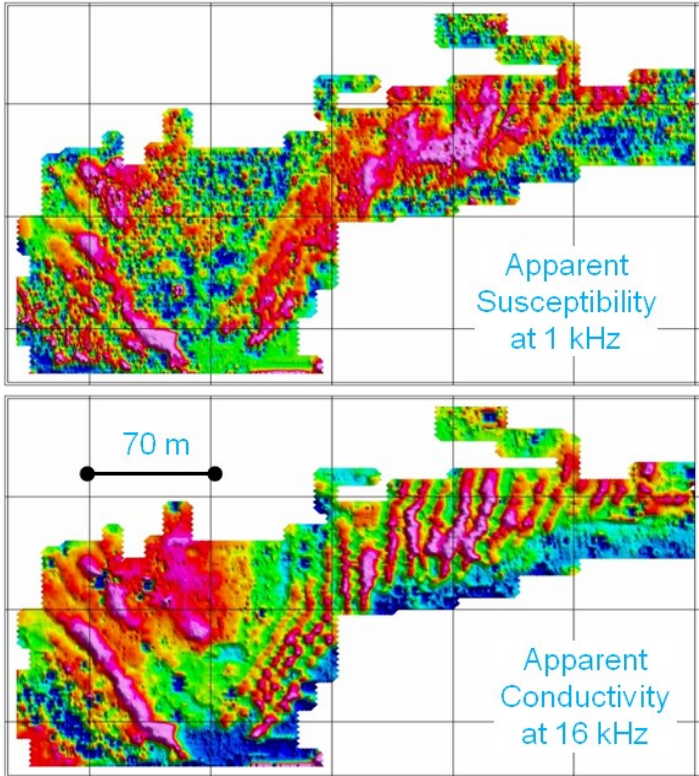
- Shallow geology
- Groundwater
- Geotechnical Engineering
- Soil Science
- Archaeology
- Environmental Contaminations
- Underground facilities
- Continuous EMI Spectrum
- Forensic Science

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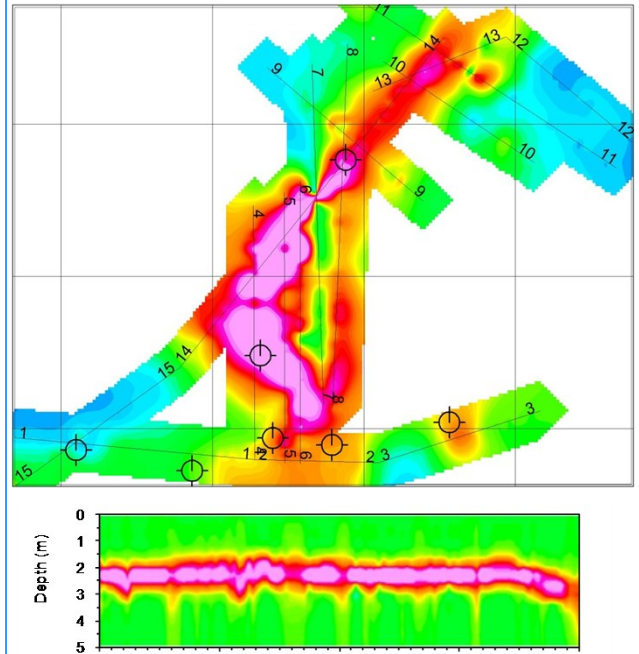
605 Mercury Street, Raleigh, North Carolina 27603 USA  
 Phone (919) 839-8515  
 Website [www.geophex.com](http://www.geophex.com)  
 email [sales@geophex.com](mailto:sales@geophex.com)

## GEM-2 Survey Data Examples

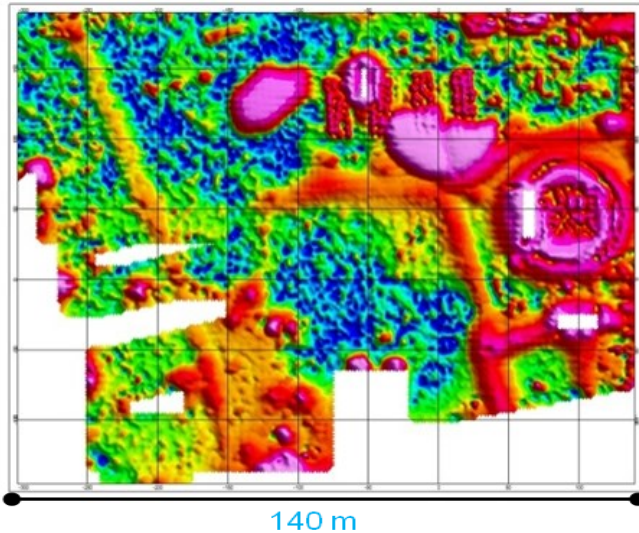
**Forgotten Landfill:** While historical photographs showed burial activities at this site, there were no records showing the areal extent of the buried waste. GEM-2 was used to map all burial trenches and to prioritize locations for remediation.



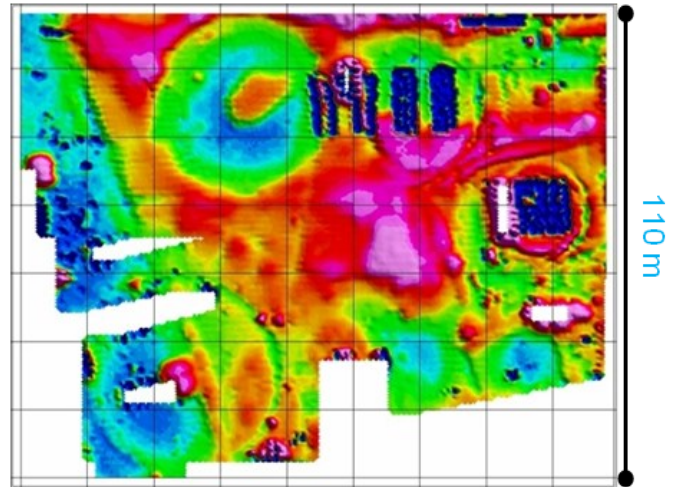
**Brine Contamination at an Oil Field:** The U. S. Geological Survey (USGS) conducted a GEM-2 survey to characterize shallow brine contamination at an oil field in Oklahoma. Data were collected at five frequencies from 330 Hz to 47,010 Hz. The figures below show the apparent conductivity map at 14 kHz, which defines the brine concentration in 3D.



A conductivity-depth section defines the brine concentration at depths of 2–3 m, which was later confirmed by drilling.



Apparent Susceptibility at 1 kHz



Apparent Conductivity at 7 kHz

**Environmental Site Characterization:** A GEM-2 survey was performed for the site characterization of a former industrial plant in Binghamton, NY. The objective was to identify and delineate subsurface features associated with past site operation. The data, shown above, located buried foundations, utility pipes, fill areas, concrete pads, contaminants, and other buried objects associated with the former plant.