

## GBG Australia

### Some of our previous work

Non Destructive investigation using GPR for concrete tunnel lining of a conveyor tunnel, Mount Arthur Mine, singleton—Material Technology GHD (2009)

Resistivity and GPR profiling of the overburden and resource size of a Sapphire Mine in Inverell—Poolbrook Saphires (2009)

Resistivity imaging to locate rock floaters Boddington Gold Mine Expansion Project, WA—Aker Kvaerner Clough Murray Roberts (2008).

GPR survey of Warkworth Sand overburden at Warkworth Coal Mine—Rio Tinto Coal Australia (2007)

Assessment of Ground Penetrating Radar as an Investigation Method for Locating Buried Mine Shafts as part of the Charters Towers Shaft Repair Program—Queensland Government Natural Resources Mines & Water (2006)

Geophysical investigation over mine workings for proposed residential development, Lithgow NSW—Geotechnique Pty Ltd (2005).

## Sydney

18 Fennell Street.  
North Parramatta 2151 NSW  
Telephone: 02 9890 2122  
Fax: 02 9890 2922

### Contact

Simon Williams  
simon@gbgoz.com.au

## Perth

2nd Floor, 2 Hardy Street.  
South Perth 6151 WA  
Telephone: 08 6436 1599  
Fax: 08 6436 1500

### Contact

Rob Hunn  
rob.hunn@gbgmaps.com.au

### Website

<http://www.gbgoz.com.au>

## *Non-destructive methods for* **EXPLORATION GEOPHYSICS**



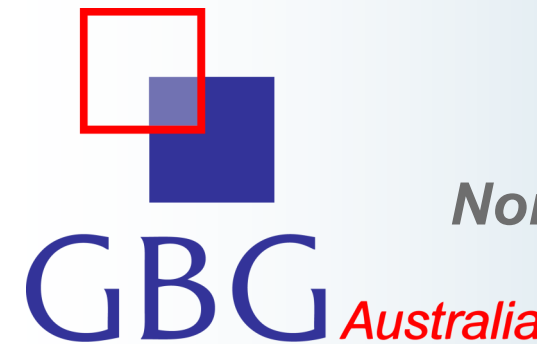
### Uses for Geophysics in Exploration and Mining:

- Mineral exploration
- Delineation of the extent of mineral deposits
- Structural and geotechnical investigations of existing mine structures
- Remediation of disused mine sites.

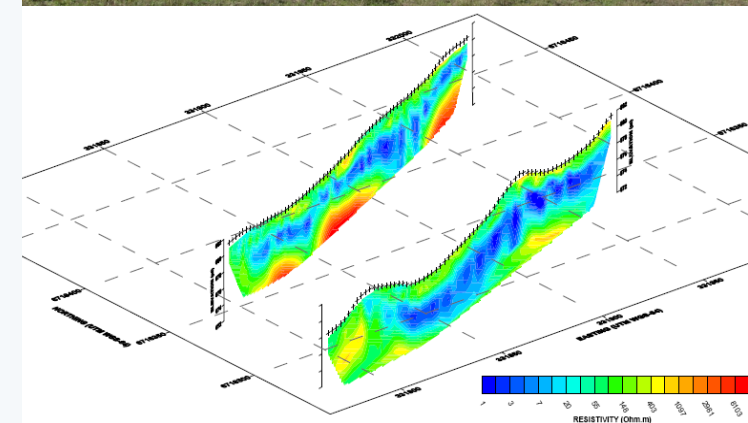
### GBG Staff are skilled in the following Geophysical Techniques:

- Electrical Resistivity Tomography (ERT)
- Ground Penetrating Radar (GPR)
- Ground Based Time Domain Electromagnetics (TEM)
- Frequency Domain Electromagnetic (FEM)
- Magnetics
- Gravity
- Induced Potential (IP)
- Self Potential (SP)
- Reflection and Refraction Seismics
- Multichannel Analysis of Surface Waves (MASW)

**For further information on our services, please visit our web-site:**  
**[www.gbgoz.com.au](http://www.gbgoz.com.au)**



## *Non Destructive Techniques for* **EXPLORATION GEOPHYSICS**



### GBG Australia

GBG Australia is a specialist in applying geophysical techniques for the assessment of subsurface structures and deposits. We offer our clients innovative methods of defining structural and condition information whilst minimising both costs and disturbances to the site.

### Company Profile

GBG Australia is a subsidiary of the GBG Group, a multi-national company specialising in the application of geophysical and advanced applied physics for precision investigations of geotechnical, environmental sites and engineered structures in UK and Europe since 1982. GBG has had a presence in Australia since 1993 originally through a joint venture with CMPS&F and GHD before becoming a stand alone company in 2003, operating in three main areas of business: geotechnical and environmental investigations; non destructive investigation of structures and contracting of equipment and staff for data collection, processing and interpretation of data.

GBG Australia is an independent provider of non destructive and shallow geophysical investigation services with applications ranging from the location of a single pre-stressing strand in a concrete slab to mine scale exploration geophysics. With clients ranging from Local to Federal Government, and from developers and engineering companies to private individuals, we can provide tailored solutions to your particular subsurface investigation requirements.



# Applications for Exploration Geophysics

GBG Australia is a specialist in applying non-destructive investigative techniques to Exploration and Mining as well as environmental and engineering applications. Employing engineers and geophysicists of considerable experience, GBG provides advanced subsurface solutions using a variety of geophysical techniques.

GBG Australia has expertise and experience in many aspects of resource exploration and mining. We have the resources and knowledge to assist in locating mineral resources, delineating the extent of mineral deposits, structural and geotechnical investigations of existing mine structures and remediation of disused mine sites. A number of examples of exploration and mining projects are given below.



## Mineral Exploration

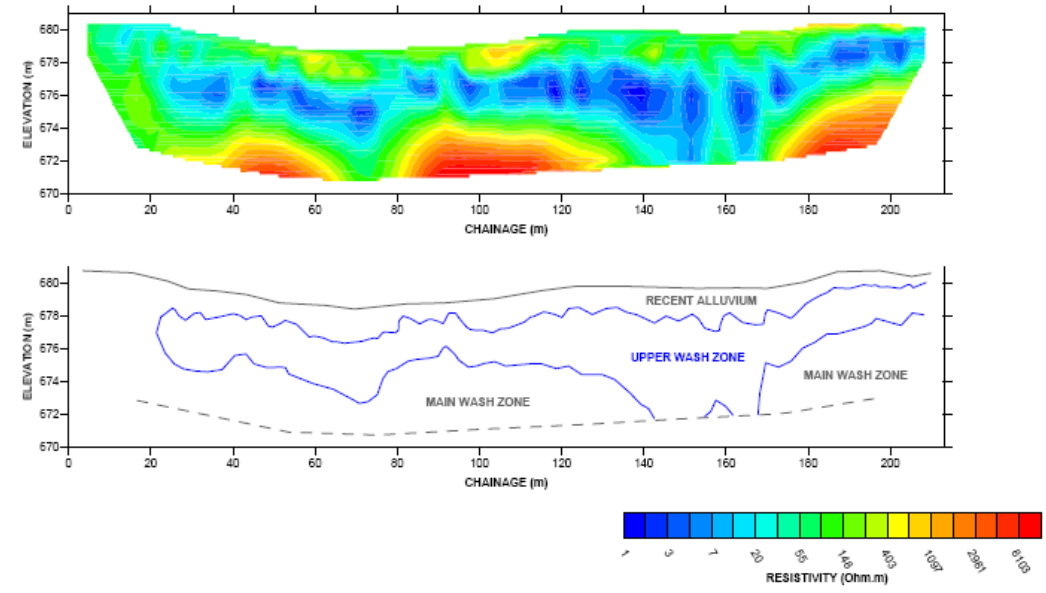
GBG Australia has the expertise to undertake any ground based geophysical method to detect the location of an ore body. Techniques include: magnetometer, IP, SP, TEM, Gravity, GPR and Seismic surveys. If a site is believed to contain an ore body, our trained geophysicists have experience in delineating it's location, size, orientation and extent.

## Resource Delineation and Over Burden Volume

A sapphire mine in northwest New South Wales was surveyed to determine the extent of the lode bearing zone and the thickness of overburden above the economic layers. By mapping out the size and extent of the alluvial deposit the mine was able to be expanded and the life and profit of the mine can be greatly increased.

The mine was surveyed using Ground Penetrating Radar (GPR) and Electrical Resistivity Tomography (ERT). The GPR was able to delineate the layering of the geological layers. This allowed the thickness and volume of the overburden to be calculated. By attaching the GPR antennae to a vehicle a large amount of distance was able to be surveyed in a short amount of time.

The ERT was used to determine the size and extent of the mineral deposit. The sapphires are found as placer deposits in the upper wash zone. This zone has a much lower resistivity than the alluvial material above and the lower wash zone. The results of the ERT allowed the volume of the ore body to be calculated and the extents were able to be determined. This allowed for more advanced mine planning, reduced the need for the expense of drilling and made the mine more economically viable.

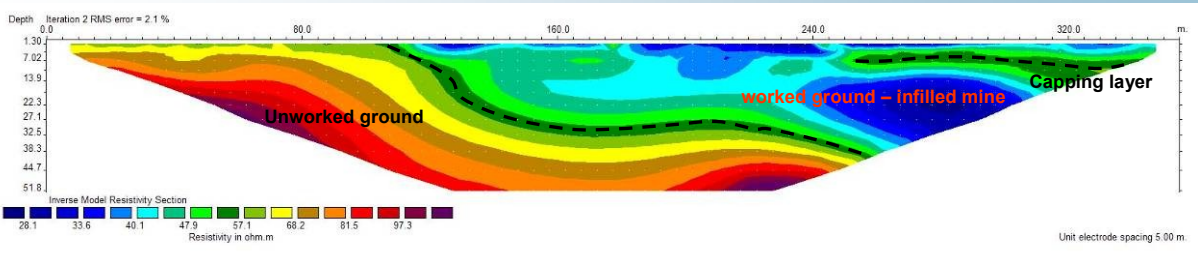


## Mapping of filled open cast coal mine workings



The resistivity profile below was recorded in a region in Cumbria United Kingdom which was known to have been part of an open cast mine in the 1970's and was subsequently filled and returned to farming land. The purpose of the survey was to map the extent and depths of the mine pits to help establish the bearing capacity of the ground before the proposed construction of a wind farm.

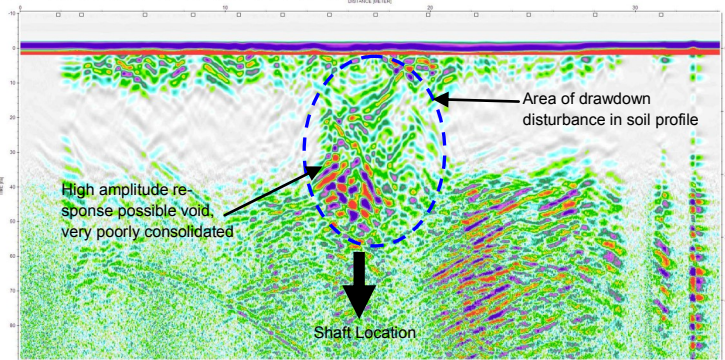
The edge of the original mine pit is visible in blue to green. The response over the mine pits is relatively low resistivity and is consistent with ground formed of variably but reasonably well compacted fill materials of varying particle size, primarily spoil with a relatively high water content. The unworked ground is visible in yellow to red and is characterised by relatively high resistivity readings and is consistent with a natural mudstone formation. A capping layer on the right of the image is visible in green and may represent a well compacted clay layer.



## Mapping of underground mine workings

The resistivity and GPR profiles shown here were recorded over old underground mine workings in New South Wales and Queensland. The purpose of the surveys was to assess the distribution and depths of mine workings.

The presence of several previously unknown mine workings from approximately 3m to 9m depths are visible in the resistivity profile. Both standing mine cavities and in-filled mine workings can be distinguished with ranges of resistivities relating to various types of fill material. The profiles have been correlated with a number of bore holes.



The GPR data shows the disturbance of the soil above an abandoned min shaft.

