Geophysics for Land Development
Whatever your area of interest GBGMAPS can provide advanced subsurface and structural geophysical solutions to add value to your product.

- **Mining and infrastructure**
- **Marine**
- **Structural and Non-destructive Testing**
- **Environmental and groundwater**
- **Archaeological**

Through a process of consultation and pre-project planning GBGMAPS can tailor a geophysical solution to provide enhanced structural or subsurface information adding value to almost any geotechnical, engineering or remediation project.

The application of appropriate geophysical methods carried out by trained and experienced personnel makes GBGMAPS a leader in subsurface geophysical solutions.

GBGMAPS, formed in 2008, is a joint venture between GBG Australia and The McMullen Nolan Group bringing together advanced subsurface investigation with industry leading survey and spatial services.
GBGMAPS offer a full range of geophysical services tailored to land development projects. The acquisition of geophysical data has been shown to reduce site uncertainty thereby reducing risk and possible cost associated with remediation works. Developed to improve upon traditional geotechnical site assessment, GBGMAPS can provide;

**Subsurface Profiling**
- Depth to bedrock
- Determination of bedrock parameters (e.g. indicative strength / rippability)
- Identification of karst features
- Soil profiling
- Seismic velocities for determination of layer stiffness, elastic moduli and compaction

**Environmental**
- Mapping of soil contaminants (including chemical contaminants and saline soils)
- Mapping of landfill extents
- Unexploded ordnance (UXO) detection
- Gravesite / archaeological surveys

**Service Location**
- Locating and defining existing services
- Locating underground storage tanks (UST’s)
GBGMAPS can undertake Greenfield and Brownfield site investigations for land development sites, using a range of geophysical methods as well as standard CPT or DCP tests.

Depth to bedrock can be assessed through the use of seismic refraction or Ground Penetrating radar methods depending on site conditions. Seismic refraction can also be utilised to measure in situ parameters such as seismic p-wave velocity, which can be correlated to material strength for rippability assessment or pile design. GPR has been shown to be useful in identifying karst features which are a common problem, particularly along the Western Australian coast.

Multichannel analysis of surface waves (MASW) is a relatively new technique that uses the dispersive nature of surface waves to obtain seismic shear wave velocity. This technique can be used for discrimination of differing sediment layers or for determination of seismic shear wave velocity used in the calculation of dynamic modulus values.

Correlation between seismic p-wave velocity and rippability
(Caterpillar Handbook of Ripping 12th Ed.)

GPR profiling to detect Karst features
GBGMAPS use a number of geophysical techniques for determination of subsurface structures. These include:

- Seismic Refraction
- Multichannel Analysis of Surface Waves (MASW)
- Electrical Resistivity Imaging (ERI)
- Ground Penetrating Radar (GPR)
- Vertical Electrical Sounding
- Microgravity
GBGMAPS offer a suite of investigative techniques to locate underground utilities. We correlate our GPR and cable/pipe locator results with any known information and accessible service pits enabling detection of all service types including metal, ceramic/concrete and PVC.

The knowledge of the location of utilities can avoid unnecessary, costly and dangerous disruptions to planned works. Utility provided information such as (Dial before you dig) is used but can be erroneous, geophysical techniques can quickly and easily identify the precise location of buried services.

Areas previously occupied by facilities such as petrol stations often feature abandoned buried infrastructure, most notably underground storage tanks. GBGMAPS can use a combination of methods to identify and delineate underground storage tanks associated with existing or removed infrastructure.
Environmental investigation over potential land developments often consists of spot testing and occasional soil sampling. The use of geophysical methods in conjunction with these traditional environmental methods can add value to a potential development by improving ground confidence while reducing risk.

A combination of geophysical techniques can be used by GBGMAPS to map the extent and intensity of contamination plumes and salinity as well as locating and mapping subsurface features such as landfill or unexploded ordnance. Generally, contaminated areas will produce a different geophysical response to the surrounding area.

This allows for effective remediation strategies to be considered. GBGMAPS can also locate and map water table, groundwater pollution. Identification of possible gravesite or archaeologically significant features including aboriginal heritage sites is often required for clearance and approval of land for development.

In addition to typical contaminant and landfill investigation GBGMAPS have extensive experience in locating unmarked graves and mapping of potential archaeologically significant sites using non-invasive methods.

Delineation of landfill