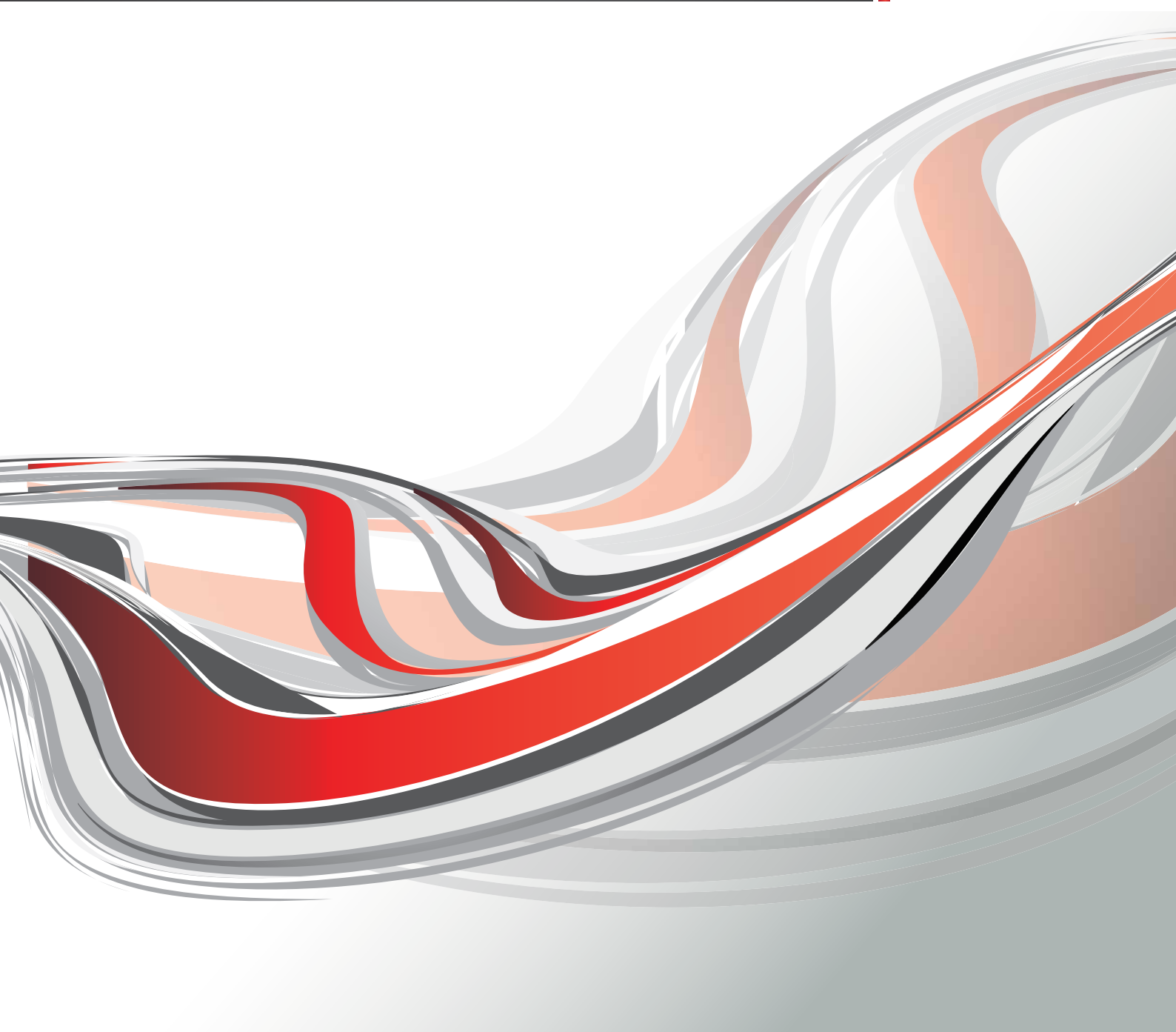


Marine Geophysics



About Us

GBGMAPS, formed in 2008, is a joint venture between GBG Australia and McMullen Nolan Group. The partnership brings GBG's advanced sub-surface investigation techniques together with McMullen Nolan Group's industry leading survey and spatial information services.

Through a process of consultation and pre-project planning, GBGMAPS can tailor a geophysical solution to provide enhanced structural or sub-surface information to add value to almost any geotechnical, engineering or remediation project including:

- **Mining and infrastructure**
- **Marine**
- **Structural and non-destructive testing**
- **Environmental and groundwater**
- **Archaeological**

The application of appropriate geophysical methods carried out by qualified and experienced personnel makes GBGMAPS a leader in sub-surface geophysical solutions.



Marine Geophysics

GBGMAPS offer a full range of marine geophysical services to the geotechnical and engineering sector. Our tailored investigations can assist in the definition and solution of geotechnical problems in port and harbour, transition zone, and in river and lake environments. Such investigations have been shown to reduce site uncertainty by enhancing seafloor and sub-bottom data while also reducing expenditure associated with costly jack-up barges.

Developed to improve upon traditional geotechnical site assessment, GBGMAPS provides the following geophysical and marine surveying services;

Sub-Bottom Profiling

- **Depth to bedrock**
- **Determination of geotechnical parameters (e.g. indicative strength/rippability, elastic moduli)**
- **Sediment thickness and mapping for dredgeability**

Seafloor Survey

- **Bathymetry (single and multi beam)**
- **Seafloor imaging (Side scan sonar)**

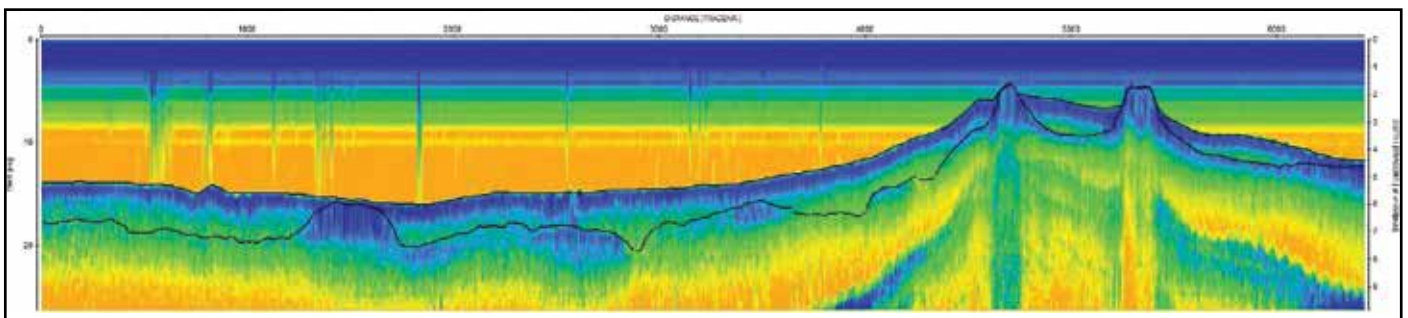
Magnetic survey

- **Locating buried debris (e.g. anchors and unexploded ordnance)**
- **Marine archaeological survey (shipwrecks)**
- **Delineation of ore bodies or other magnetically susceptible geological units**

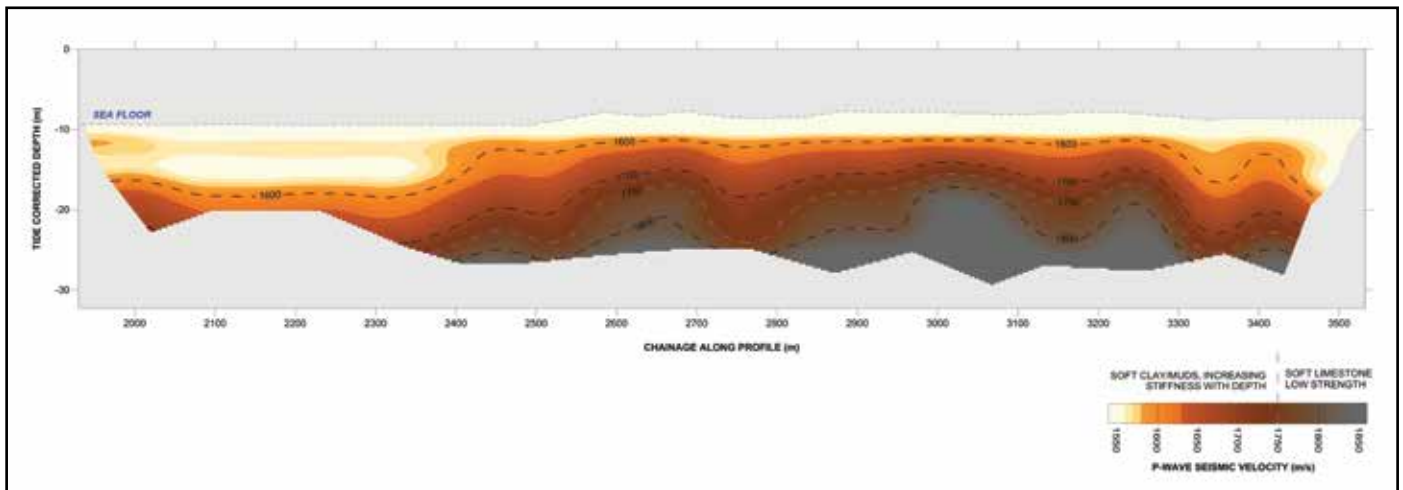


Sub-bottom Profiling

GBGMAPS offer a full suite of geophysical sub-bottom profiling for a range of applications. We specialise in carrying out investigations at shallow water depths, utilising survey vessels with minimal draft, enabling data collection very near to the shore. Our equipment is portable and modular, enabling quick and efficient setup on locally sourced vessels, saving on costly mobilisation of dedicated survey vessels.



Continuous Seismic Profiling (CSP) interpreted section

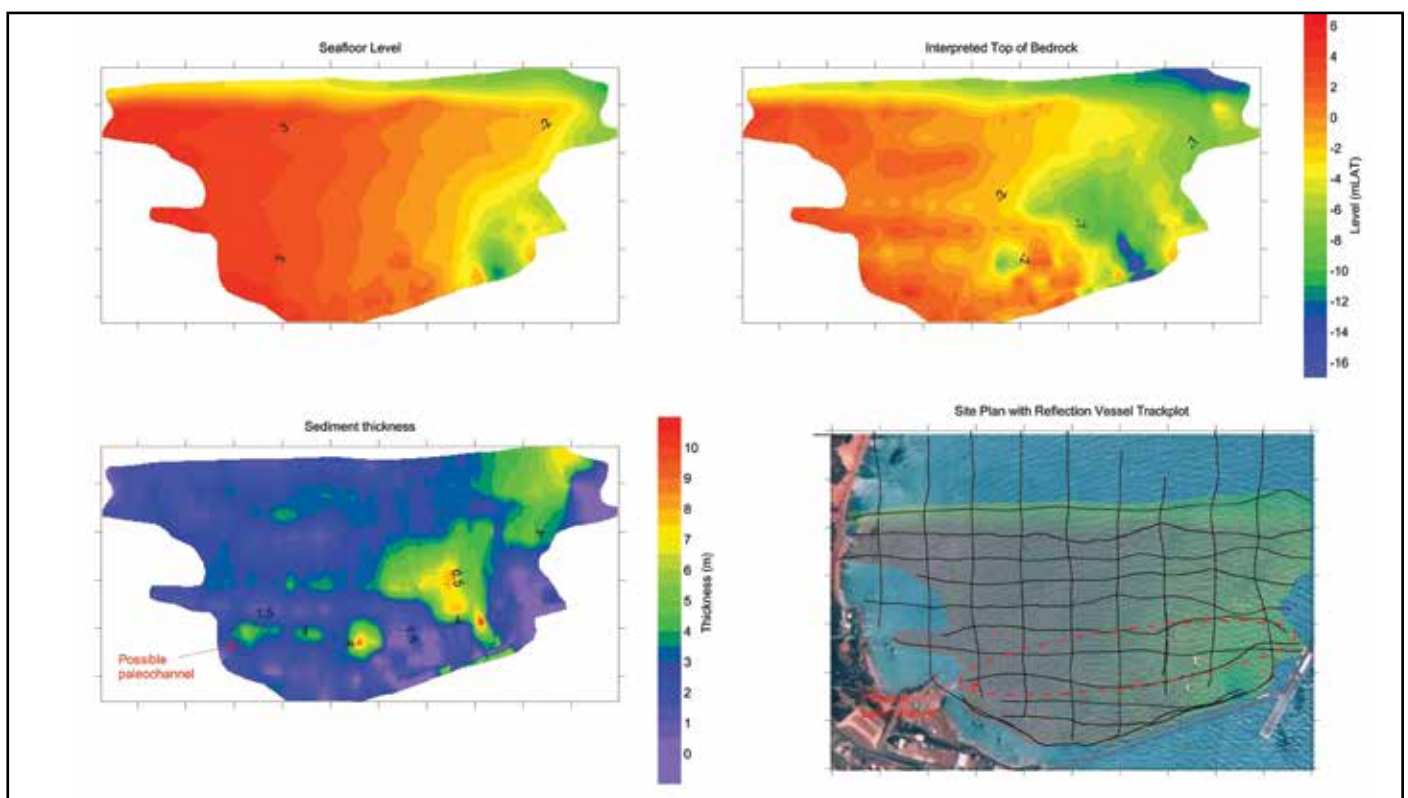


Marine Seismic Refraction interpreted section

Sub-bottom profiling provides invaluable information for the geotechnical design of port infrastructure, channel dredging and HDD river and lake crossings. Past investigations have included mapping the depth to bedrock, imaging fracture/fault zones within the bedrock, measuring sediment thickness and internal sediment layering, as well as calculating useful geotechnical parameters such as rock rippability and sediment dredgeability.

Geophysical sub-bottom profiling techniques provided by GBGMAPS include:

- **Continuous seismic profiling**
- **Marine seismic refraction (towed or static)**
- **Marine resistivity**
- **Marine multi-channel analysis of surface waves**



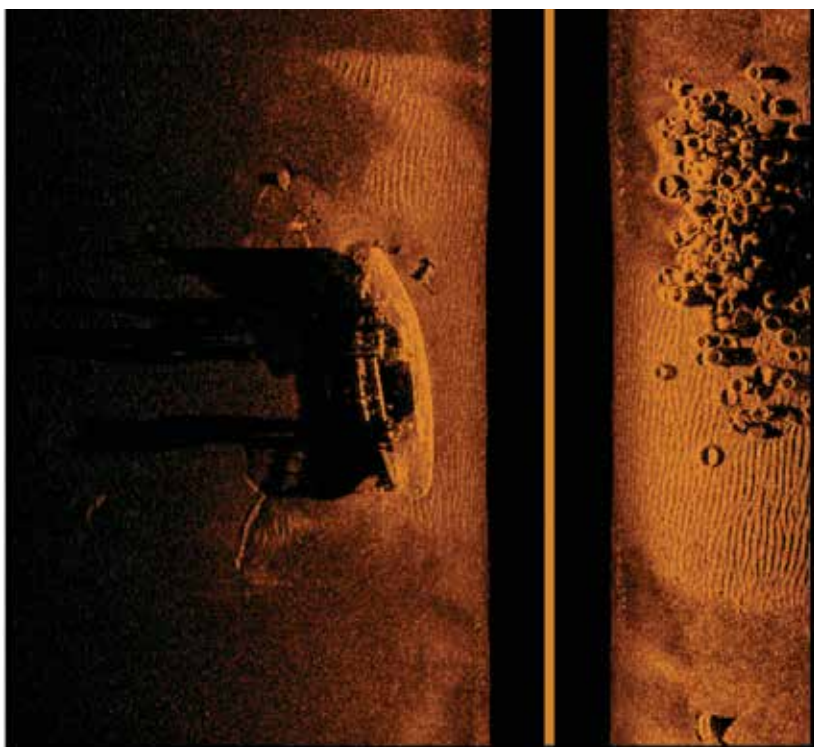
Marine seismic refraction data utilised to determine sediment thickness and bedrock depth

Seafloor Survey

The basis for all marine investigation is a sound understanding of seafloor conditions. GBGMAPS provides full marine bathymetric surveys utilising single beam or multi-beam systems as well as detailed seafloor scanning using side scan sonar.

Utilising industry standard equipment and software, along with experienced hydrographic surveyors from joint-parent company McMullen Nolan Group, GBGMAPS are able to provide full bathymetric surveys including foreshore and coastal land surveys for shallow marine projects. Typical applications of seafloor surveys include:

- **Mapping for shipping hazards i.e. reefs and bombores**
- **Location of archaeological significant features (ship wrecks)**
- **Location of dumped rubbish i.e. car bodies, tyres**
- **Seafloor monitoring of sediment build up**
- **Environmental studies for habitat mapping**

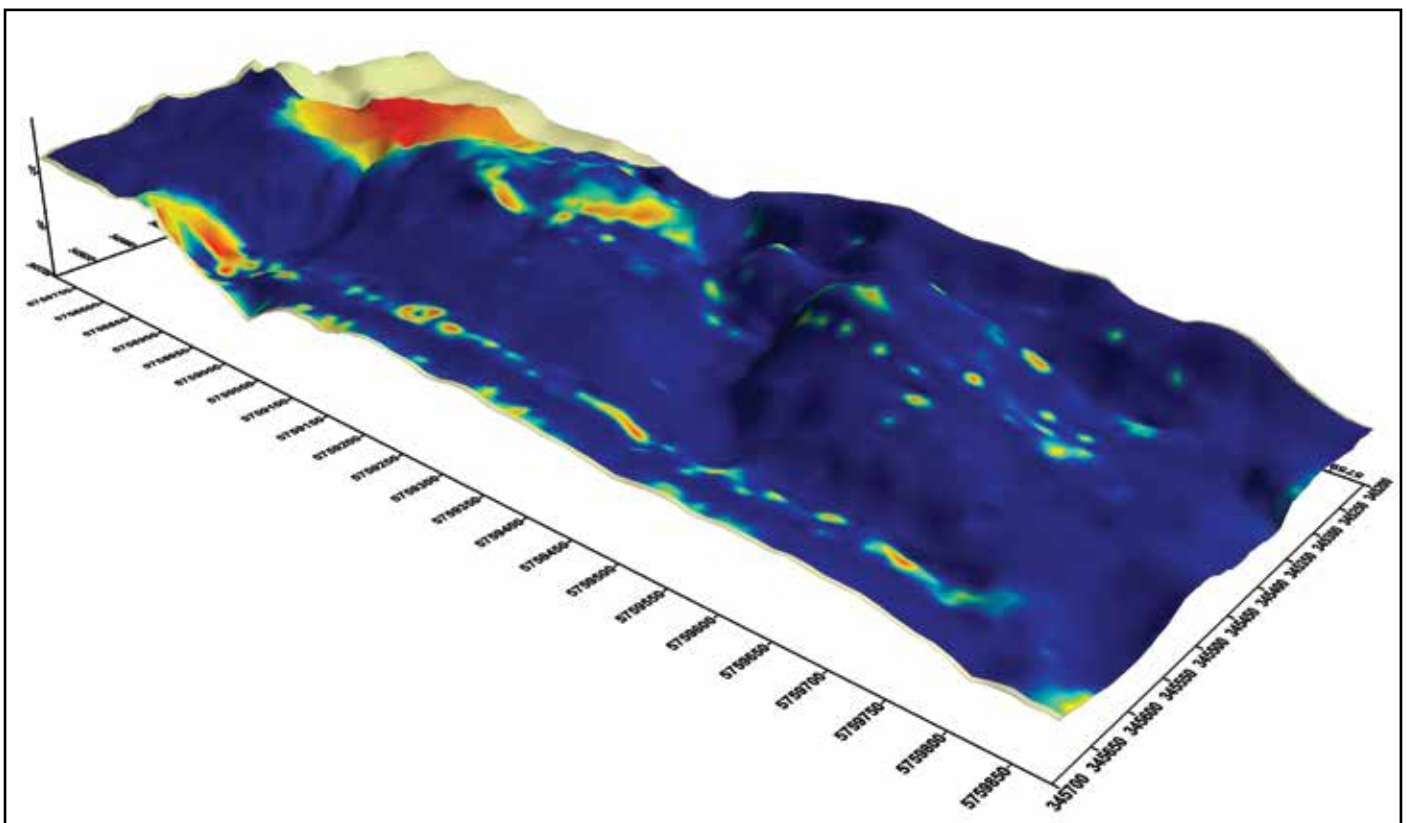


Seafloor imaging using Side Scan Sonar. Left of image shows a wrecked vessel and discarded tyres are visible on the right of image.

Magnetic Surveying

Utilising high precision magnetometers linked to high accuracy DGPS receivers, GBGMAPS can provide detailed marine magnetic surveys. Such surveys are the quickest and most efficient for a number of environmental applications including the location of buried metallic debris such as anchors, unexploded ordnance and scrap metal, marine archaeological surveys and the location of buried pipes.

Marine magnetometer systems can also be used for geological investigations such as the delineation of certain ore bodies or other magnetically susceptible geological units.



Marine magnetic survey used to locate a missing anchor.



Advanced Sub-surface Investigations

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