

UTILISING GEOPHYSICS IN FORENSIC INVESTIGATIONS

Governments are spending large amounts of resources and money in the restoration of peace, harmony and capability building in smaller, less developed countries, usually following post conflict. With this, time management becomes vitally important. Alpha Geoscience's Forensic Team can assist in reducing the large amounts of resources that are wasted during Forensic Investigations, by identifying key areas for investigators to exhume.

FORENSIC CAPABILITIES

Geophysical technology has been successfully utilised to assist Police and Law Enforcement Investigation Teams in Forensic searches and criminal investigations around the world, and Alpha has been instrumental in bringing this technology to Australia.

The technology is also ideal for other non-destructive applications including archaeology, civil engineering, detection of unexploded ordnance, and locating avalanche victims.

The technology is able to detect objects buried in the ground and determine ground structural voids. Large areas of ground can be searched quickly and non-destructively, minimising the impact on the environment. This technology can greatly improve the efficiency of a search operation by reducing the amount of unnecessary excavation, and consequence repair, hence reducing costs and time on site. Accurate positioning of these surveys is conducted utilizing DGPS and incorporating that into the mapping system.

The following are a number of areas where Alpha Geoscience can assist you in your forensic investigations.

Caches and Hides

Several geophysical methods and mapping techniques can be utilized in the search for caches and hides that could contain weapons, explosives (commercial and homemade), drugs, etc.

The geophysical method is not only useful for locating items of interest but for identifying potentially booby trapped items or areas, before being exposed to investigators. This would allow for the Bomb Response Units to successfully render safe the booby traps without compromising safety. This is extremely useful when investigating high risk areas including;

- OMC Premises
- Clandestine Labs
- Drug Plantations
- Known homemade explosive users

This technology is ideal for the surveying of areas where caches are likely to be used. It is well known within Military Intelligence, that certain Pacific Islands contain underground caches and tunnel systems left from WWII, that contain booby trapped ordnance and equipment. These areas can be safely surveyed from the surface without putting personnel in danger.

Grave Sites

Geophysics equipment available today can be instrumental in assisting Police Forensic Investigators in identifying burial locations, whether a single site or a mass burial area. Such investigations avoid unnecessary disruption and excavation, and subsequent excavations. Work can be then planned more efficiently, greatly reducing the time, effort and cost involved. This technology could be utilized for murder investigations and in areas where civil conflict has occurred. The Ground Penetrating Radar method has successfully been used to locate mass graves in the former Yugoslavia, where militants conducted mass killings and genocide.

In cases where it is suspected that metallic objects are associated with the graves, other techniques such as Total Field Magnetics or Ground Conductivity can be used. The Seismic method requires a relatively high level of logistics and would usually only be used if there was a chance of other methods failing in the area.

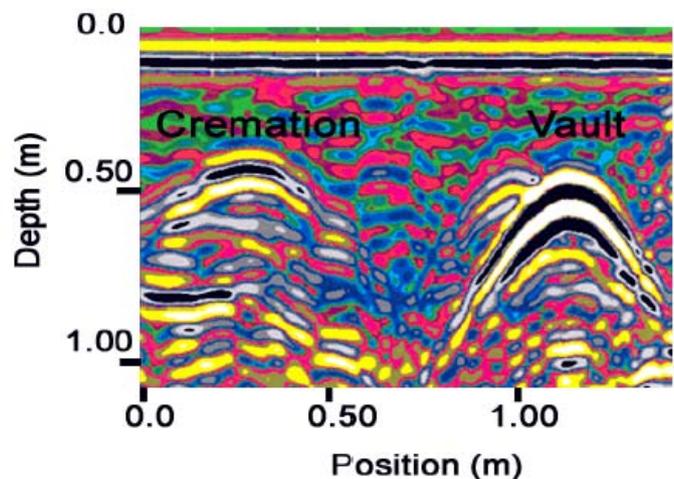


Figure 1: Ground Penetrating Radar used to identify grave sites. (J.T Hefner et al 2001)

Subsurface Voids

Several geophysical technologies can be useful for locating voids in the ground where an item or person may have been, or voids in a structure where items may be hidden. Depending on the specific conditions such as host medium and expected void size, several geophysical techniques can be utilised.

Clandestine Burials

This technology provides for a safe and efficient process of locating potential Clandestine burials which usually contain hazardous chemicals, drugs, explosives, specialist equipment, etc., the recovery of which is important for the evidence and conviction process.

General Crime Scene

Surveying the area could identify an item of evidence that may have been missed or accidentally been pushed into the soft surface like sand, etc.

COMPANY

Alpha Geoscience is an Australian company Established in 1997, specialising in global geophysical investigations. Over the years Alpha Geoscience has built a strong team of Project Managers, Geophysicists and Field Crew, combining their knowledge to produce highly sophisticated survey results in the following areas:

- **Environmental Services** Including the mapping of buried structures, site assessments and the detection of chemical pollutants.
- **Ordnance Services** The location of buried unexploded ordnance (UXO), site assessments and sample surveys to determine extent of pollution. Alpha Geoscience is a member of the Australian Government Defence UXO Panel.
- **Engineering Services** Assisting civil mining and construction engineers with sub surface investigations, especially where intrusive investigation is difficult and costly to undertake.
- **Forensic Geophysics** The location of buried gravesites and other buried objects for the police and other crime agencies.
- **Mining and Exploration** Assist mining and exploration companies with near surface investigations.
- **Training** Provides training courses in high-resolution magnetics, electro-magnetics, seismic refraction and ground-penetrating radar for clients who wish to undertake surveys themselves.
- **Project Management** Is an intricate part of all projects and Alpha Geoscience has expertise and experience in setting up, running and reporting on both major and minor projects worldwide.
- **Research and Development** Alpha Geoscience has been involved in running a number of research and development projects including the development of a multi-sensor geophysical instrumentation package for the horizon control of a coal-mining machine.

QUALIFICATIONS & EXPERIENCE

Alpha Geoscience, is an Authorised contractor for the Australian Defence Force and can provide staff with a high level of security clearance.

The company has been involved in a number of forensic investigations in various areas of Australia and have provided specialist advice in locating buried objects. We have experience in operations throughout Australia, North America, Europe and South East Asia.

Recently the company was engaged to locate potential clandestine drug burials in a forensic investigation, west of Sydney. The geophysical method used was Ground Penetrating Radar. Alpha Geoscience was able to scan an area under a building, which other ways would have to be totally excavated. A full excavation would have compromised the stability of the building and greatly reduced the search area available.

The Forensic Geophysicist was able to process the data immediately on-site and make recommendations for further forensic investigations. With the geophysical information on hand, the investigators were able to maximise the use of the time allocated on the site and the disturbance for the owners of the property was minimised.

All results were handed over on-site and video evidence was provided by the Forensic Geophysicist.

STAFFING

Principal Geophysicist Mr. Timothy Pippett has been involved in geophysical investigations all over the world in the past three decades. In the last years his main focus has been in the area of relatively shallow, high-precision surveys. He is recognised in the industry as a high-integrity geophysical resource and holds memberships of all major geophysical societies around the world.

Mr. Jamie Speer holds a Bachelor in Science acquired at Macquarie University in Sydney. He has gained a wide knowledge and experience of all geophysical methods used by Alpha Geoscience. He has extensive field experience in the use of geophysical tools for forensic and UXO applications.

AVAILABILITY

Alpha Geoscience is based in Sydney, Australia and is capable of mobilising to any part of the world at very short notice.

Alpha Geoscience has access to a large supply of geophysical instrumentation, and if needed, makes it possible to mobilise in less than 24 hours.

METHODS & EQUIPMENT

Alpha Geoscience holds capabilities in almost every geophysical discipline. In order to conduct investigations under different geophysical conditions, Alpha Geoscience offers a number of surveying methods, primarily based on the Ground Penetrating Radar (GPR) and Ground Conductivity Systems. Other methods include Magnetics, Time-Domain Electro-Magnetics, Seismic and Gravimetric.

FORENSIC SURVEYS

Each survey is tailored to the precise requirements of the investigation and practicalities of the site, and starts with a discussion with investigators to determine the most favourable approach to conducting the search. The typical forensic survey service would include:

- Attendance on-site using appropriate survey methods
- Real time ground marking enabling on-site decisions regarding further investigations
- On-site advice and interpretation
- If required, a detailed report with plans, which may be used in evidence
- The flexibility of the survey equipment allows searches to be carried out across the ground and against other surfaces such as walls, bridges, support pillars, etc.
- Each survey tailored to the precise requirements of the investigator and the practicalities of the site.

Each survey is different due to various reasons including item being searched for, local geology, etc. Alpha Geoscience would discuss the exact requirements of each survey.

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