HUNTER GEOPHYSICS

Specialists in unmarked grave detection
and archaeological prospection

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PROPOSAL FOR AN EXPLORATORY GEOPHYSICAL SURVEY
SEEKING UNMARKED GRAVES AT THE

XYZ CEMETERY

TOWN, STATE

Prepared for Mr X Yzabc of the XYZ Cemetery Trust
by David Hunter on the 7 September, 2015

Above aerial imagery of the XYZ Cemetery courtesy Google.

FIVE TIPS FOR CEMETERY SURVEYS

1. Insist on a 25cm line spacing.

Child/infant and cremation urn burials may be missed if using a 50cm (or greater) line spacing.

2. Question what equipment is being used.

There are a number of geophysical methods that can be used to detect unmarked graves. The most common is ground-penetrating radar (GPR).

Here are just a few things to watch for regarding ground-penetrating radar:

- In most cases, the antenna frequency should be between 250MHz and 500MHz.
- Make sure the antenna is shielded to avoid the possibility of interference.
- Is the consultant creating "depth-slices" (which are more reliable) or are they only looking at "radargrams"?

3. Ask to see reports of previous surveys performed by the geophysicist.

- Are the reports clear and precise?
- Do the reports include a map of the cemetery, showing the location of each unmarked grave?
- Will you be able to locate each burial or will you need to hire a surveyor at extra cost?
- Will you receive a printed copy of any reports or an electronic version only?
- Our past reports are available online at www.huntergeophysics.com/archive/

4. Read the terms of the agreement/contract.

- Can you easily read and understand the terms of service? Is the contract written large enough to be read easily?
- Does the consultant have the right to provide the results of the survey to the local media without your consent?
- Who pays for delays in the case of bad weather?

5. Consider having the discovered graves marked on the ground.

- It's one thing to have the results of the survey in a written report in a filing cabinet, but you will find it easier if the graves are marked-out on the ground, especially when planning new burials.
- Hunter Geophysics can mark out any graves we discover using timber stakes, making it easier to avoid unmarked graves.
- A separate quotation will be provided for this service upon completion of the geophysical survey.
- While on-site, we can also establish new burial rows if needed.

Government reporting is mandatory in Victoria

The results of any search for unmarked graves must be reported to Heritage Victoria in accordance with the Heritage Act (1995).

Hunter Geophysics always carries out and submits the mandatory reporting as required by legislation.

Some of our competitors do not.

Carrying out the mandatory reporting as expected by Heritage Victoria is a time-consuming process and failure to do so may result in an significantly cheaper quote.

Failure to submit a report to Heritage Victoria may incur fines, plus the cost of having the report written.

Ensure the findings of your survey are reported.

If you are considering scraping off the ground surface instead of geophysics, ensure that you have Heritage Victoria and Department of Health approval to do so.

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Above: map of the XYZ Cemetery showing proposed survey areas in light green.

Executive summary

A geophysical survey is required for the detection of possible unmarked graves at the XYZ Cemetery. Hunter Geophysics proposes a ground-penetrating radar survey in order to detect any unmarked graves that may be present.

The survey will cover the areas shown in green in the map on page 4 with the exception of areas surrounding surface obstacles such as trees, headstones, paths and fences (as these can produce interference in geophysical data).

The total cost for the currently-proposed geophysical survey is $14,700 (including GST).

Site conditions

The following observations are based on information provided by the client as well as Geoscience Australia data. The site is situated on the Quarternary newer volcanic basalt plains. Hunter Geophysics have performed ground-penetrating radar surveys at cemeteries with similar geology in the past, and found the geology and soil to have no negative impact on the efficacy of the technique. It is reasonable to expect similar results at the XYZ Cemetery.

Preparation of the site by the client as per our specifications (as detailed on pages 9-10) will enable the use of a cost-effective, cart-based ground-penetrating radar system. Therefore, Hunter Geophysics recommends the use of ground-penetrating radar at the XYZ Cemetery.

Right: the Melbourne Australia 1:250,000 geological map[1], with the approximate location of the XYZ Cemetery marked with a red circle.

Proposed survey details

All ground-penetrating radar data will be collected using a cart-based, wheel-encoder system, using a central transmitting frequency of 250MHz. Topographic data will be collected using a real-time kinematic global navigation satellite system (RTK GNSS) receiver or robotic total station where possible for correction of collected geophysical data.

The survey areas shown in light green in the map on page 4 will be covered using a standard ‘survey grid’, consisting of parallel lines 25 centimetres apart and a reading interval of 5 centimetres.

These survey parameters are known to provide the most reliable survey methodology for the detection of unmarked skeletal graves and buried cremation urns[2]. The survey traverse interval is of particular importance: **the use of a traverse interval greater than 25 centimetres is not recommended** as such can prevent the detection of small burials, such as those of children, infants or cremation urns.

Proposed working schedule

A maximum of four days have been allocated to perform all on-site work.

Following the completion of on-site work, approximately six consecutive weeks will be required to undertake data processing and interpretation.

A final report will be sent to the client via mail upon the completion of data processing and interpretation.

Costs and schedule for payments

The total cost for the proposed works is $14,700 (including a total of $1,336.36 GST). A break-down of required payments (including GST) is tabulated below:

Milestone	Total payment amount	GST
Contract award	$5,880	$534.55
Completion of on-site work	$5,880	$534.55
Delivery of survey report	$2,940	$267.26

Payments may be made via electronic bank transfer or cheque. The initial payment is to be made no sooner than three calendar weeks prior to the first day of on-site survey work, with the second payment due within seven calendar days of the completion of on-site work. The final payment will be due within fourteen days of the delivery of the survey report.

Hunter Geophysics reserves the right to charge interest and costs associated with the collection of late payments, as well as for any costs that may have been incurred due to late payment. Hunter Geophysics reserves the right to cancel the project should the first payment not be made, and also reserves the right to delay the delivery of the final survey report until the second payment is made.

Survey personnel

David Hunter, Director

David established Hunter Geophysics in 2009 and has eleven years of excavation, geodetic survey and geophysical survey experience. He has specialised primarily in the geophysical detection of unmarked human graves.

David will act as project coordinator and will carry out data collection, interpretation and report writing. At least one member of our experienced team, listed below, will assist David on-site.

Additional staff

Shannon Hunter
Shannon will be responsible for the collection of geophysical data, site surveying, logistical management, administrative tasks, first aid, human resources management and (where appropriate) media and public relations.

Zara Dennis
Zara will be responsible for the collection of geophysical data and site surveying. Zara will also be involved with the processing of collected geophysical data.

List of deliverables

Under the proposed survey described herein, Hunter Geophysics will:

1. Undertake a ground-penetrating radar survey as detailed within this proposal,
2. Deliver a report to the client detailing the findings of the project, and
3. Where required by legislation, Hunter Geophysics will liaise with and provide copies of all collected data and reports to relevant government bodies.

Terms of service

For the purposes of the terms listed on this and the following two pages, 'Hunter Geophysics' refers to Hunter Geophysics and all of its sub-contractors.

Cancellations and refunds

The client may opt to postpone or cancel the survey at any time subject to our refund policy: Hunter Geophysics will refund to the client any payments made, less any expenses (including - but not limited to - staff wages) that had been incurred by Hunter Geophysics prior to the cancellation of the contract by the client, or as otherwise required for by law.

Weather and site geology/soils

In the event of prohibitive weather, work will be delayed until acceptable weather conditions are present. In the instance of poor weather conditions, the client will be charged for any additional costs incurred, but only up to a maximum amount of $800 per day. While ideal weather cannot be guaranteed, Hunter Geophysics attempts to time any on-site work to coincide with ideal weather based on forecasts. Prohibitive weather includes - but is not limited to - excessive rain, storms, excessive heat, or excessive humidity.

Certain weather, geological and soil conditions may cause degradation in data quality. Surface or near-surface metallic objects will cause a reduction in data quality in close proximity to the metallic object. Nearby radio transmitters, including wireless modems, two-way radios, buried electrical cabling and mobile phones may introduce interference into geophysical datasets and may reduce the quality of collected data. Hunter Geophysics will not be held liable for any failings of a geophysical survey in the event data is degraded due to any of the conditions detailed in this paragraph.

Contract variations

Any mutually agreeable variation in the scope of works not detailed within this document may result in additional charges being incurred by the client.

Liability

Hunter Geophysics accepts no responsibility for any damage to underground services caused by any future excavation. No guarantee is provided that underground services would be detectable under the proposed survey. The results and interpretations of the geophysical survey proposed herein should not be considered an absolute representation of the underlying soil or archaeological features, but instead as a hypothesis yet to be verified. Confirmation of geophysical interpretations is only possible through archaeological excavation.

Hunter Geophysics will not be held liable for any buried features that remain undetected that are located outside the areas covered by the geophysical survey proposed herein.

Unless specified, no allowance has been made for making good any area affected by work undertaken by Hunter Geophysics. The client is advised that Hunter Geophysics may use water-based spray-paint and chalk on ground surfaces within and surrounding the site. The client is responsible for gaining the relevant permissions. Usually, spray-paint is used only on grass and chalk is used on permanent surfaces such as roads and concrete.

Hunter Geophysics will not be held liable for any short-comings of any project undertaken should

the client or any non-Hunter Geophysics person interfere with equipment or processes that form part of the service. The client is responsible for securing the site and preventing anyone from interfering with works.

Heritage reporting

Where required by legislation, Hunter Geophysics will report to government and provide recommendations for the protection of any heritage objects or archaeological features located by the survey proposed herein.

Intellectual property and publicity

All images, maps, reports and any other output of the proposed survey remains the intellectual property of Hunter Geophysics. Copyright is also retained by Hunter Geophysics. The client will be provided with a license to make use of this material as the client sees fit, on the condition that work is appropriately credited (i.e. authorship and creation of all materials is credited to 'David Hunter of Hunter Geophysics, Melbourne, Australia').

Hunter Geophysics may use or publicise any results, images, maps or reports resulting from the proposed survey for promotional or academic purposes. Details that may reveal the identity and/or location of the site or client may not be published by Hunter Geophysics unless the client provides permission for such to occur. Such permission is not implied by acceptance of this contract. Hunter Geophysics is willing to negotiate on this clause should the client prefer complete confidentiality.

Quotation validity

This quotation is valid until 31st January 2016. A revised quotation will be available upon request after this date. This quotation is subject to fulfilment of the site preparation requirements, detailed in the section below.

Site preparation requirements

The following requirements must be fulfilled prior to our arrival at the survey site. If they are not, Hunter Geophysics will charge the client for any costs to fulfil the requirements, as well as an additional charge to cover any delay or any increase in workload (including - but not limited to - additional instrument costs, wages and accommodation costs). These conditions are required due to both technical and safety requirements. No allowance has been made for any costs that may be incurred by the client to fulfil these conditions.

- Survey areas must be cleared of debris such as fallen trees, branches, grass cuttings, rocks and rubbish.

- Plants, shrubs and low-hanging tree branches (closer than seven feet to the ground) within the survey area must be removed. Tree stumps should be kept in-situ (in the ground) but clearly visible so as not to create a tripping hazard.

  Plants/trees with heritage values are exempt from this requirement.

- Grass/vegetation must be no more than 10 centimetres in length when a survey is being undertaken. Grass cuttings must be removed from survey areas.

- The client shall restrict access to the site to Hunter Geophysics staff only while on-site

work is being undertaken. Interruptions to works by site visitors (including any delays caused by funerals) will incur additional costs.

- Radio transmitters (including two-way radios, wireless Internet devices and mobile phones) are not to enter the site while on-site work is being undertaken.

- Hunter Geophysics have allocated up to thirty minutes at the start of each work day for discussions with the client. At all other times, the client and non-Hunter Geophysics staff must vacate the site. Additional consultations delay work and will incur additional costs.

The photograph below shows an example of a survey area prepared to Hunter Geophysics' specifications.

Above: Example of a survey area (highlighted in yellow) prepared to Hunter Geophysics specifications.

References

[1]The Melbourne Australia 1:250,000 geological map (accessed via http://www.geoscience.gov.au/geoportal-geologicalmaps/download?map=250dpi/sj5505.jpg on 6th May 2015), published by the Department of Mineral Resources, 1995.

[2]JONES, Geoffrey, 2008, 'Geophysical Mapping of Historic Cemeteries', Technical Briefs in Historical Archaeology, No. 3, page 27.