

1979/37. Garden Point Caravan Park, Port Arthur.  
Archaeological assessment - Geophysics

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*Abstract*

Evaluation of low mounds at Garden Point Caravan Park has shown that some have significant magnetic and metal anomalies. Strong correlation between anomalies and iron content has been shown to exist where mounds have been excavated. Although much of the site is now in a disturbed condition, several other clusters of anomalies have been located. Most lie immediately south and east of the main amenities block in the camping area.

INTRODUCTION

Development of the Garden Point area [EN698238] near Port Arthur as a caravan-camping park revealed a number of low mounds, some of which contained brickwork. Several mounds and some trenches were excavated during September-October 1968 and cobbled areas, foundations, brickwork, pottery and some ironware was found. It was concluded that the area contains the remains of both convict and post-convict agricultural buildings. Full details of the site development and initial condition and content of mounds are given by Lister (1979).

As development of the site continued, some disturbance was inevitable and many of the mounds were either partly or totally modified. Although some modifications to the site development were promised, few were ultimately undertaken, apparently due to contractual schedules and site restrictions.

However before Stages 2 and 3 of the caravan park and work on the camping site was advanced beyond the planning stage, further work was requested on the site in order that planning could either allow for new finds or at least allow a more leisurely and complete examination of them prior to letting of contracts for work.

Lister (1979) listed eight recommendations for geophysical work at Garden Point in order to assess whether other sites may exist within the general region of future development. The recommendations and suggestions may be summarised as follows.

*Method evaluation*

Some structures (e.g. mounds 1, 4) contain iron artefacts (nails, hooks) and should be located using magnetic methods.

Other structures (e.g. mounds 2, 3) contained cobbled areas but no iron/metal. Resistivity and/or seismic methods were suggested as useful approaches to these.

Unexcavated parts of 1, 2, 4 and trench GP 78/26 to be closely surveyed in order to establish extent of occupation and provide an outline of observation signatures in order to identify similar structures.

*Area coverage*

Stages 2 and 3 of the caravan park to be intensively surveyed prior to development. Some attention should also be given to the camping area.

Several other earthworks have been indicated by site survey (namely 7, 13, 14, 15) and these are also to be examined closely.

This report includes a discussion of the possible geophysical approaches to the two assignments summarised above. Useful signatures have been recognised for the first class of structures (metal-bearing) and the methods providing these signatures have been extended across the entire areas of the camping site and caravan park Stages 2 and 3.

#### ASSESSMENT OF METHODS

Dolerite forms the bedrock of most of the Garden Point peninsula and its properties dominate any consideration of geophysical approach. Unweathered dolerite is a highly resistive, high velocity, variably but intensely magnetic medium in strong contrast with its decomposition products and soil. The latter are relatively thin, generally less than 500 mm thick, but overlie a variable surface of more massive rock, both in terms of depth and quality. A dense yellow clay is the most common decomposition product and in contrast to the dolerite, is exceptionally conductive.

The above listed properties mean that shallow prospecting of the site by geophysical methods as suggested in the recommendations is virtually impossible.

The reasons may be summarised:

##### *i) Nature of target and physical contrast*

Two types of target have been specified. Iron artefacts of very small size could be located by magnetic means. However the dolerite bedrock contributes a wide range of magnetic anomalies and although the anomalies due to iron objects are abrupt negative doublets and thus normally distinctive, they are imprinted on a complex field signature. The occasionally intense doublets cover small areas unless the amount or spread of the iron sources is large.

Similarly, cobbles placed in soil could be located by electrical or seismic means if the cobbles contrast appropriately with the soil or clay. In this case they do. At Garden Point, however, the clay has a very low resistivity and fills the gaps between cobbles. The effect of the clay/soil thus swamps the effect of the cobbles and a very fine detailed sounding procedure is needed to resolve them. Unfortunately the irregular weathering profile of the bedrock may yield similar or confusing results and separation of the types of results is not possible unless wide areas behave consistently. The nature of the geology at Garden Point precludes this. The seismic case is similar.

##### *ii) Scale*

The discussion above indicates that all the target objects, whether of iron or cobbles, can be located by the methods listed, even in very difficult circumstances. Great care is necessary and a very high density of observations is essential due to the very small deviations to be resolved amongst very large swamping effects.

For example, magnetic anomalies due to small or single objects such as a nail are themselves relatively small, both in magnitude and areal extent. Traverse separations of around 500 mm may be necessary if the observations are taken at a height of 1-1.5 m, or less than 150 mm if near

ground level. Readings should either be taken continuously or at intervals no greater than the traverse separation.

Similarly resistivity soundings would necessitate electrode spacings ranging from 0.3 to 1.5 m with 500 mm centres. Resistivity traversing, if undertaken, would need to have specifications similar to the magnetic survey.

A seismic survey would need geophone and traverse separations of 500 mm to resolve the features requested.

The area involved in the camping site and Stages 2 and 3 of the park would require about 15 days for the magnetic survey, 100 days for the seismic survey and almost for ever for the resistivity survey.

With the exception of the magnetic survey, in the particular circumstances, there would be no guarantee of success. Severe ambiguity in the resistivity and seismic survey could be anticipated due to the complex interaction of target scale, placement, nature and situation in a patchy extreme geology. It is really the latter factor which imposes the very extreme conditions. This would not normally be the situation with these same targets in other geological backgrounds.

It was therefore concluded that the combination of methods suggested was workable but impractical certainly on the scale suggested.

Other methods such as induced polarisation and electromagnetics were considered but both have deficiencies similar to those described for resistivity. These methods depend on induction and conductor contrasts respectively and could resolve drain fills or metal. The presence of iron in several of the structures suggested electromagnetic methods and consequently a metal detector was tested around mounds 1 and 2.

Electromagnetic methods normally employ a pair of coils transmitting and receiving an oscillating signal. If a conductor interferes with the field produced by the transmitter the receiver responds by noting the deviation from expectation. Metal detectors operate with smaller coils, lower power output and hence shallower penetration than standard electromagnetic geophysical instruments. Provided an object of nail size is within 200-300 mm of the surface, it will be detected. A concentration of small objects enhances the chances of location at depths up to 500 mm. The best modern portable metal detectors of average power output are unlikely to recognise nail accumulations below this depth unless the accumulation covers a sizeable area or is substantial. Recognition is a function of depth, areal extent and nature of conductor. The advantage of conductor methods, and in particular the metal detector, over all other methods in the restricting physical environment described is that areal coverage is much easier. Three metre by 500 mm sweeps are possible along each traverse and fanning is possible at slow walking pace. Thus the entire site could be examined in less than two days. The principal deficiency of the technique/instrument is the limited depth of penetration, a restriction which does not apply to any of the other, if more ambiguous in this case, methods described.

Tests of the metal detector around mound 1 revealed that magnetometer and detector anomalies correlated well and that with few exceptions iron was implied. Resolution with the detector was never as good as with the magnetometer, as the objects seemed in general to be single or very small groups. However the detector was able to find them easily, whereas magnetic location was more tedious. For this reason only the detector was

used for the main survey and Figure 1 presents the location of detector anomalies. Only in the area south and west of the tank stand were these anomalies cross-checked magnetically.

Several problems were encountered during the survey as a result of the history of the site and its recent disturbance and redevelopment. These relate to the introduction of many foreign metal bodies, many of which are also magnetic. At least 80% of all 'anomalies' recognised at the site could be simply correlated with bottle tops, crushed cans, silver paper, flip tops, wire fragments, steel rod, aluminium offcuts and galvanised fragments. Even a spanner was found. Most such 'anomalous' bodies lie between the bus park, road 1, the amenities block and the tank stand. It is therefore quite possible that the survey of this part of the camping area was much too late and that results over the most disturbed parts of this area are of little use.

#### SURVEY AND RESULTS

As described above, for the physical reasons outlined, the entire area requested for survey was examined with a metal detector using 3 m sweeps. The detector used was a low frequency discriminating model with large coils for increased penetration in the highly conductive clay soil. It is unlikely that penetration anywhere exceeded 300-500 mm. Some anomalies west of the tank stand in the camping area were also tested magnetically. Only those anomalies unaccounted for after checking the surface, soil top and/or with a magnetic response are shown in Figure 1.

Great care was taken in the region of mounds 1, 2, 7, 13, 14 and 15, in accordance with survey specification (Lister, 1979). The figure shows the location of all anomalies for which no source was immediately apparent. The positions shown in Figure 1 are derived from a multi-bearing compass survey and are not the result of precise survey. As a result some deviations from the base map are apparent. The base map taken is that by Fowler, England and Newton for the development of the site with additions from the archaeological survey plan of mounds and trenches. Some deviations suggest that some alterations may have occurred during construction of Stage 1, since the triangle (tank, site 11, site 16) seems correct, whereas the access road to the west appears misplaced to the north by at least 8-10 m. The frequency of occurrence of anomalous features is clearly shown although any future relocation of any of these will require a further compass survey and localised scanning with the detector.

Most anomalies are located east of the bus parking area but southwest of the tank stand and amenities block. Unfortunately some highly disturbed ground occurs in this region and no attempt has been made to plot the features in such areas, since many introduced metal objects are obvious. Most of the anomalies shown are in lightly disturbed or simply cleared areas (relatively undisturbed on plan).

No attempt was made to examine Stage 1 in detail, due to the presence of so many interfering objects, the development being complete at the time of survey. However a detailed examination was made of the area near mounds 1 and 15 at the bus park. Many anomalies were recorded, some very large (108 especially, associated anomaly >6K nT doublet). Only the southernmost are marked on the map (1, 2, 3, 4, 5, 108, 109, 110) of which 1 and 110 are in the general region of mound 15 and the remainder are peripheral to mound 1. Unfortunately the northern part of mound 1 has been landscaped and many obvious metal objects confuse the situation. It is for this reason that no detector anomalies have been plotted between mound 1 and the

amenities block.

Features 61, 62 and 63, 64 appear to correspond to mounds 14 and 13 respectively, although this survey places the anomalies 5-10 m east of the positions shown on the archaeological plan. Anomalies 61, 62 are located on the flanks of a definite mound south of the main track around the camping area. A large stump, used for survey control, occurs to one side of the mound. These positions are considered reliable, but it must be admitted that many others may be more uncertain. For this reason relocation by restricted scanning is recommended.

Feature 106, Stage 2 area, may correspond to the flank of mound 7. No other possible correlations have been recognised between this and the archaeological surface survey but several other previously unrecognised features are evident.

If the sparsity of anomalies and correlation with mounds 1, 7, 13, 14 and 15 is taken as a guide, then every anomaly may have significance. More probably single anomalies are due to spurious but unsighted objects and will not be discussed further.

There are, however, several significant groupings of anomalous features. They are:

Camping area: group 20, 21; 1 m<sup>2</sup> patch plus 2 close anomalies.  
 group 34; 9 anomalies around small depression, 1.5 m radius.  
 group 47, 48, 49, 50; 8 anomalies over 5 m diameter.  
 group 53-58; isolated quasi-cluster.

Stage 3: alignment 73-78, 83-85  
 group 72, 81, 82, 86, 87; 7 anomalies, 5 m diameter.

Other lesser groupings, e.g. by pairs, are also apparent and which by analogy with 63, 64 (M 13) or 61, 62 (M 14) may be relevant to the archaeology of the site.

Most of the anomalies recorded in the Stage 2 area are related to moderately disturbed ground and may represent spurious objects introduced during construction. The adjacent area southward to the tank stand contains many obviously recent metal objects.

#### CONCLUSIONS

Most normal geophysical methods were found impractical under the conditions pertaining at this site in light of background geology and target specification. Magnetic, seismic and resistivity methods offer a means of locating iron objects or cobbled, bricked areas but require a very intense effort. The metal detector, while not useful for the latter may locate the former at depths less than 500 mm. Several named mounds possess magnetic and detector anomalies (especially M1, 13, 14, 15).

Several groups of detector anomalies have been defined which could usefully be investigated, including the correlation of features 1 and 110 to M15, 63 and 64 to M13, 61 and 62 to M14. The extreme anomalies 108 and 109 at M1 should be resolved.

No reliable investigation was possible in the region of mounds 2 and 4 and trench 26 due to interference from introduced objects.

Anomaly 34, which is made up of 9 features arrayed about a shallow depression, is a most interesting feature and is perhaps the single feature most likely to be of significance. No other groupings other than those listed above with mound correlations have any surface expression.

REFERENCE

LISTER, A., 1979. A report on the excavations at Garden Point, Port Arthur, 6 September - 11 October 1978. *Unpubl.Rep.Nat.Parks Wildlife Service Tasm.*

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