



**Pozières Battlefield**

**Resistivity Survey Report**

**AHMS and John Hunter**

**November 2014**

**AHMS**

ARCHAEOLOGICAL & HERITAGE  
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**Prepared by Archaeological & Heritage Management Solutions (AHMS) Pty Ltd**

**For Fallen Diggers**

ARCHAEOLOGICAL & HERITAGE  
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## CONTENTS

<b>1</b>	<b>INTRODUCTION.....</b>	<b>2</b>
1.1	Introduction and Project Aims .....	2
1.2	Surveyed Sites .....	2
1.3	Methodology and Results.....	3
1.4	Future Work.....	3
1.5	Acknowledgments .....	3
<b>2</b>	<b>SURVEY REPORT .....</b>	<b>4</b>

# 1 INTRODUCTION

## 1.1 Introduction and Project Aims

In mid-2014 AHMS completed a Research Design and survey methodology for several sites across portions of the former battlefields at Pozieres and Mouquet Farm. This report was completed on behalf of Fallen Diggers Inc.

The proposed survey had a number of initial objectives:

- To evaluate the use of resistivity as a survey technique in the specific area;
- To identify sub-surface features where a position had been estimated from historical evidence ; and
- On the basis of successful identification of features to formulate further potential survey objectives based on those results.

In September 2014 Prof John Hunter (MFL Archaeology), was commissioned to undertake an initial survey of three of the areas identified in the Research Design. The survey took place between the 13th and 15th of October and 3,900 sq m of area was surveyed by the team in cold and trying conditions. John Hunter's report follows this project introduction.

## 1.2 Surveyed Sites

The original Research Design identified the following sites for potential survey. They were designated A to G:

A - is centred on the site of the former quarry to the south of the farm complex. This area was noted as a small German defensive position that was later utilised by the Allied forces as a mustering point; Stokes Mortar position and Aid post;

B - is centred on the trench line leading up to the farm from the south-east;

C- is centred on a trench line running north-west from the farm;

D- is centred on a former communications trench line north of Pozieres, running north-east, and known as "Tom's Cut" (German *Ganter Weg*);

E- is centred on the line of Old German defensive trench (OG1), east of Pozieres;

F- is centred on the line of Old German defensive trench (OG2), east of Pozieres; and

G- is centred on the potential position of a Mark 1 "Female" Tank (No. 503 "Chablis") buried adjacent to the Pozieres - Bapaume Road.

Due to time, site access and budgetary constraints three areas were eventually surveyed.

They were Area G the potential remains of the Mark 1 Tank, Area F the line of German trench referred to as OG2 and a communications trench to the north of OG2 not previously identified in the Research Design.

### 1.3 Methodology and Results

The methodology and results are detailed in the following section completed by Prof Hunter. In summary the survey:

- Could not positively identify the presence of the Mark 1 tank adjacent to the memorial along the Route de Baupame; Further investigating with GPR in the near future.
- Identified 2 sections of OG2 including the main trench and wire entanglement works;
- Has potentially identified a fortification associated with the actions of Albert Jacka, V.C on August 7, 1916.

### 1.4 Future Work

Fallen Diggers Inc proposes further survey to refine these results and expand understanding of the remains of the Pozieres battle. With this goal in mind the next stage of the survey work will focus on areas of OG1, and the potential site of the bunker associated with the actions of Albert Jacka in August, 1916. The former fortifications at Mouquet Farm to the north of Pozieres town also remain a potential focus of future work should access to the land be allowed.

At this stage there is no proposal to excavate or expose for viewing any of the features revealed in the survey. The sections of OG 2 trench revealed by the work have clarified their position in relation to the creation of the proposed Pozieres Memorial park. They can now be avoided by works proposed for that park.

The results of any future survey work will be provided to the relevant French authorities (DRAC) for their information. Relevant Australian Government bodies, such as the Department of Veterans Affairs and the Unrecovered War Casualties-Army will also be informed.

### 1.5 Acknowledgments

Fallen Diggers Inc., AHMS and Prof Hunter would like to thank the following for taking part in the survey:

Bill James; Les Matthews; Richard Lund; Michael Kelly, and Scott Brand. For Their support and enthusiasm (and for also taking part in the survey) and especial thankyou to the Mayor of Pozieres Bernard Delattre. Barry Gracey (Pozieres Remembrance Association) Dennis Frank and the Fallen Diggers team who worked so hard to get the project up and running.



**2 SURVEY REPORT**

**POZIERES**

**GEOPHYSICS REPORT**

**October 2014**

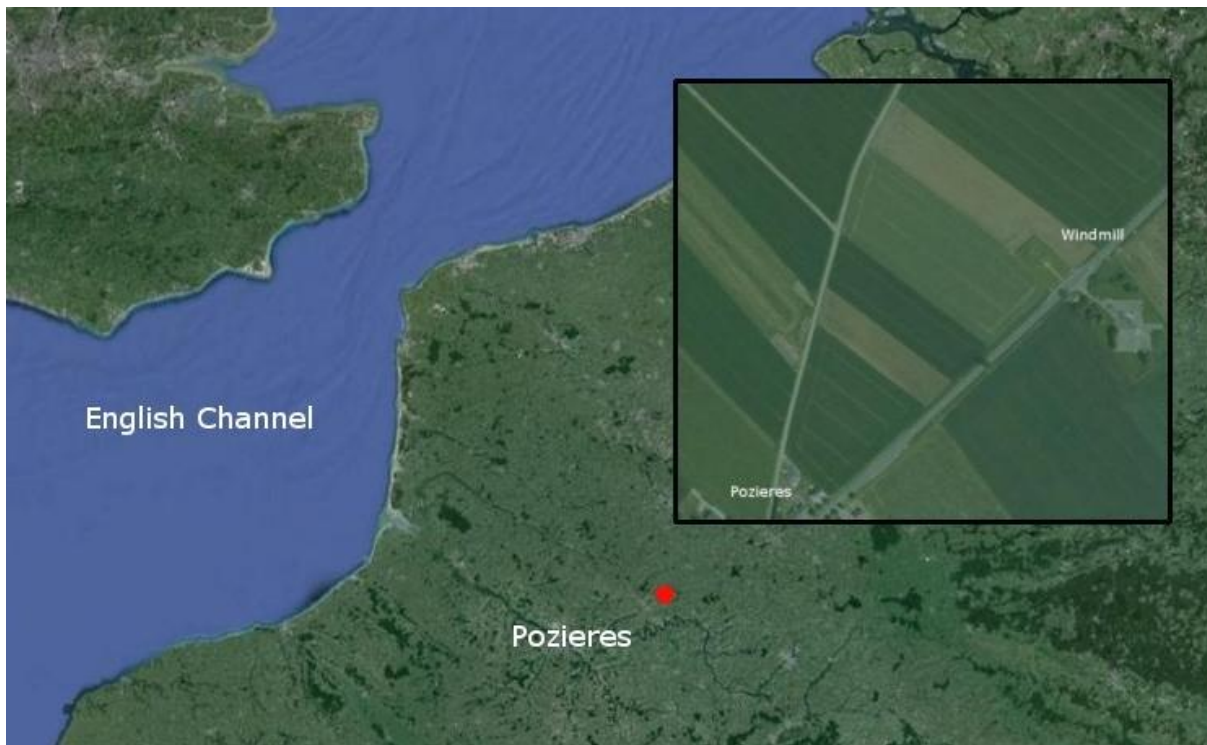
**J R Hunter**

## 1. Aims and background

**1.1** The area immediately around Pozières, northern France, was a key location during WW1 and the focus of significant Australian military activity. Much of this activity centred in the area to the north and east of the village in the vicinity of Mouquet Farm, but also in the area around a windmill site which stood on the road from Baupame to Albert (the current D 929) (Figure 1). The ruined site of the windmill is now a memorial to the Australian fallen. A more substantial memorial park is now planned for the area between the windmill and the village.

**1.2** During the week of October 13<sup>th</sup> 2014 targeted geophysical survey (resistivity) was undertaken in areas between the windmill site and the village, and towards Mouquet Farm to the south-west. The purpose was threefold:

- To assess the effectiveness of using resistance survey as a locator of buried objects in the local clay soils in the Pozieres area
- To assess the feasibility of geophysics in identifying assumed trench positions and other military features which may have become obscured during post-war landscape levelling, notably within the area of the proposed memorial park
- To attempt to locate the recorded position of a military tank which is recorded as buried in the vicinity of the windmill.



*Figure 1.* Location



## **2. Method**

**2.1** Resistivity survey was used, a method which involves passing a small current through the ground between two probes, taking systematic measurements of the resistance to that current across a grid defined on the ground. Electrical resistance can vary according to moisture content in the substrates, hence a buried infilled ditch is likely to be more moisture retentive (hence give a lower electrical resistance) and a buried wall is likely to be less moisture retentive (hence give a higher electrical resistance). The method is particularly suited to identifying linear features such as walls, ditches, cable trenches etc. However, in order for buried features such as these to be detected, they need to be in relatively undisturbed ground. If the surrounding ground is heavily disturbed the responses are harder to interpret within the disturbed background.

**2.2** Resistance readings are normally taken at one metre intervals on a grid laid out across the ground, typically 20 x 20m (ie 400 readings per grid). In order to increase potential resolution the interval can be reduced to 0.5m (ie 1600 readings per grid), but this takes considerably longer. The nominal depth penetration is argued to be half the distance between the two probes used, in this case the depth would be only 25cm, but in reality much more in this type of soil. It is important to remember that the method will detect disturbance, ie the disturbance caused by infilling of any feature, not the feature itself.

**2.3** The presentation of data here is expressed in light intensity, ie in various degrees of lightness or darkness according to the readings made. Wetter, heavier soils are presented as dark, stony or drier soils as light, with various gradations in between.

## **3 Observations**

**3.1** Other methods of geophysical survey are also available, notably magnetometry (highly sensitive) and Ground Penetrating Radar (GPR) (good for greater penetration, especially through dense materials). Given the propensity of ferrous material on the immediate surface and in the substrates (shrapnel, casings and general military detritus) magnetometry is unlikely to be effective owing to this background cultural 'noise'. GPR offers considerable possibilities but may encounter difficulties with the clay component of the soil which can attenuate the signals.

**3.2** Permission was granted for the work through the auspices of the Mayor of Pozieres, Monsieur Bernard Delattre. Ownership of land around Pozieres is vested in field strips as opposed to enclosed fields; some fields were unavailable for survey, others were under cultivation. There is little topographical or vegetation evidence of buried features.

## **4. Areas covered**

**4.1** Five areas were examined during the project (Figure 2; Figure 7)

- Area 1: an 80 x 20m strip along the north-west side of the road intended to identify the former German trench line OG2. This was conducted at 1m intervals.

- Area 2: a 20 x 20 square adjacent to the windmill in order to detect the buried tank position. This was conducted at 0.5m intervals.
- Area 3: a 60 x 20 strip to the north-east of, and at right-angles to Area 1 in order to identify a communication trench running between the two German lines OG1 and OG2. This was conducted at 1m intervals.
- Area 4: a 20 x 20m located adjoining the north-east of Area 3 to see if more detailed survey would produce greater benefits. This was conducted at 0.5m intervals.
- Area 5: a 50 x 6m transect across the reputed location of 'Jacka's Bunker' and OG1. This was carried out at 1m intervals.



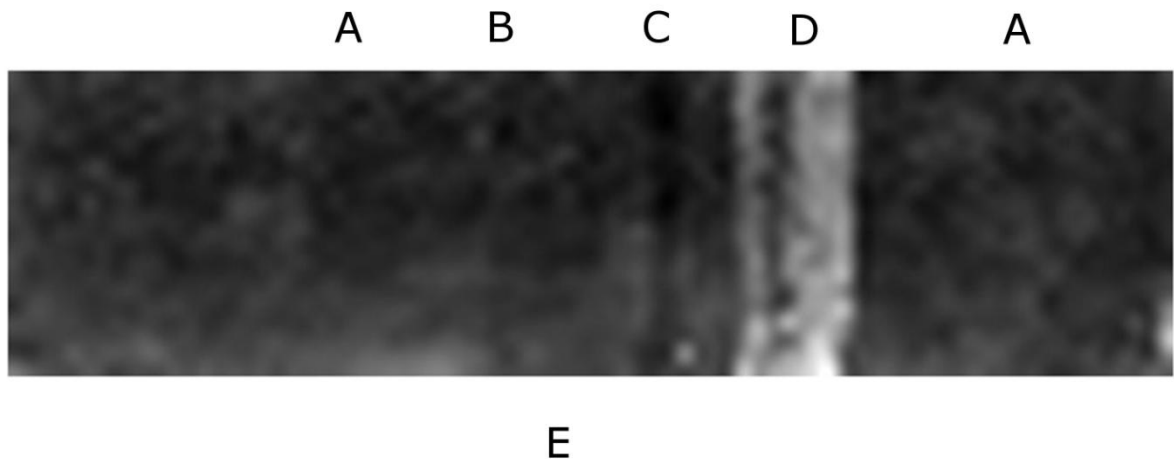
*Figure 2.* Location of five areas surveyed.

#### 4.2 Area 1 (Figure 3)

This was an area measuring 80 x 20m running approximately north-west/south-east exhibiting a number of features. **A** represents the general background and is generally consistent, other than at the bottom of the image against the road where the higher readings (whiter) represent the make up for the roadway itself (**E**).

The most interesting elements are the linear features running from top to bottom (**B**, **C** and **D**). These would appear to represent the German trench OG2 which has been bisected by the survey. The main element of this is **D** which might be argued to be the infilled trench itself, approximately 10m wide in its final levelled form and showing higher resistance values

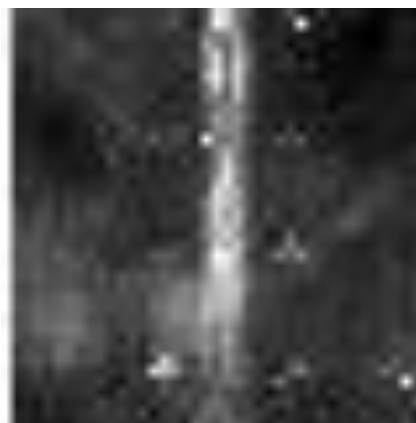
(lighter). This may represent an infill using the deeper, harder substrates which were upcast when the trench was initially dug. The darker line running down the lighter area of **D** is a linear low resistance feature; it is either an original feature which has been filled around when the ground was levelled, or is a later farming service trench utilising the German position. There is no evidence of banking either side of the main trench. **B** and **C** are approximately 10m apart, the former being less obvious, but both run parallel to the main trench and would seem to be related. They would appear to represent cuts (for wires?). The total width of the complete assemblage of trench features is approximately 20m.



*Figure 3. Area 1*

#### **4.3 Area 2 (Figure 4)**

This was an area measuring 20 x 20m with measurements taken at 0.5m intervals in order to assess the value of higher resolution of any buried features. The grid was positioned within the current memorial area directly adjacent to the tarmac road in an effort to identify the possibility of a recorded tank burial. Given the ground build-up in the area where the survey took place the results predictably showed only modern features, notably the flagged pathway leading to the main memorial which ran through the centre of the grid, and the eight concrete-based plinths which were aligned with it. These all show up as high resistance (lighter) readings. The general background is disturbed showing patches of higher and lower readings.



*Figure 4. Area 2*

#### 4.4 Areas 3 and 4 (Figure 5)

Three 20 x 20m grids (Area 3) were located further to the north-west in order to identify features running between OG1 (to the west) and OG2 (to the east). It was hoped to test whether the technique was able to detect a narrow communication trench which was recorded as connecting the two. An additional grid was added to the right of this (Area 4) using increased readings taken at 0.5m intervals

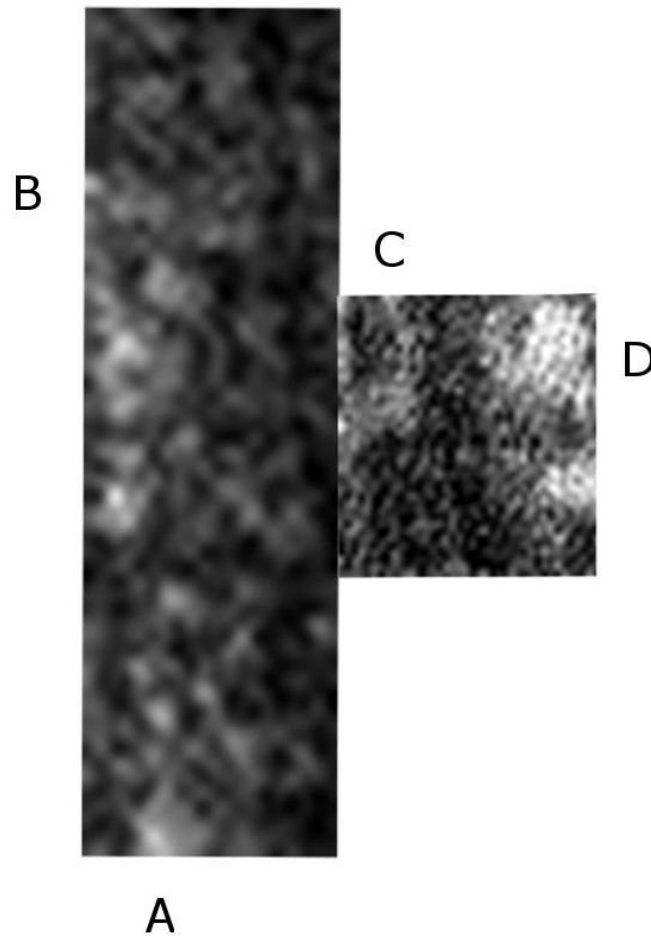


Figure 5. Area 3 (60 x 20m) to left, and Area 4 (20 x 20) to right

There is no great clarity in the results in comparison to Area 1, but a number of linear features can be identified, notably the higher resistance (lighter) line running up the left hand side (A), and a series of darker bands running parallel (C). The parallel nature of these linear features suggest that they are related; the fact that they present both higher and lower readings would indicate they belong to trench activity as opposed to being an agriculture signature. The likely position of the recorded communications trench is a higher resistance line running between the letters B and C. The areas of higher resistance to the right (D) may be disturbance from the OG2 trench likely to be running to the right (north). The use of 0.5m measurement intervals here does not appear to have been especially advantageous.

#### 4.5 Area 5 (Figure 6)

This consisted of a 50 x 6m grid located to transect the likely position of ‘Jacka’s Bunker’ and the adjacent OG1. The bunker was known to have been blown up; OG1 is recorded as lying to the left (south). The image shows a substantial low resistance area commensurate with a major disturbance (**B**) together with a series of faint parallel lines (**A**) transacted by the grid. The former may represent the removal and infilling of the bunker, the latter possibly defences associated with the OG2 trench running parallel outside the grid to the right (north). The area of white at the top left is likely to be measurement error.



Figure 6. Area 5



Figure 7. Distribution of geophysical plots

## **5. Summary**

A number of points can be made in summary:

- Resistivity can be a useful tool in detecting buried features in this terrain and geology, particularly linear features, and is especially effective in locating substantial groundworks (eg OG2)
- The use of controlled excavation might be considered for ground-truthing the extent and nature of the features detected
- The use of multiple grids is desirable over using narrow transects
- Readings taken at 0.5m intervals would appear to show no great advantage over those taken at 1.0m intervals
- The location of the buried tank was not identified by this method. Alternative methods (eg GPR) might be more suited, and/or the likely location reviewed

## **6. Acknowledgements**

The project is grateful to the support of the Mayor of Pozieres, Monsieur Bernard Delattre, for his assistance in facilitating access to the land and for his support and interest throughout. The work was carried out by a small team of British and Australian nationals with local advice (and lunches) generously provided by Barry Gracey. The project was set up and arranged by Matthew Kelly and Jon Sterenberg of AHMS on behalf of Dennis Frank of Fallen Diggers.

Raw data and archive material is held by AHMS.

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## APPENDIX: DATA - POZIERES (Mouquet Farm) October 2014

Illustration of field measurements, co-ordinates and individual geophysics datasets (10 grids: mq1 – mq 10). Red dots indicate geophysics starting points, moving up the left hand side of the grid, turning at the top and zig-zagging up and down for each grid. All grids except mq5 and mq9 were undertaken at 1m intervals (400 Readings). Mq5 and mq9 were measured at 0.5m intervals (1600 readings).



A	50 02 39.28 N	2 44 06.77 E
B	50 02 40.96 N	2 44 09.79 E
C	50 02 42.48 N	2 44 02.46 E
D	50 02 41.01 N	2 44 04.46 E
E	50 02 43.61 N	2 43 55.44 E
F	50 02 44.91 N	2 43 56.89 E