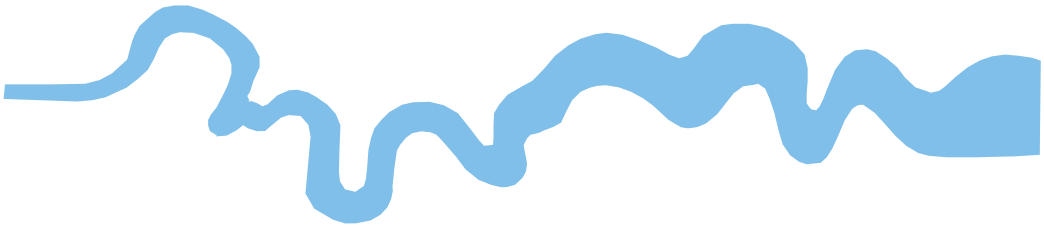
T V A S



NORTH MIDLANDS

# Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire

**Geophysical Survey (Magnetic)**

**by Kyle Beaverstock**

**Site Code: PFB20/109**

**(TA 0490 3859)**

# Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire

**Geophysical Survey (Magnetic) Report**

**For Lakeminster Park Ltd**

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code PFB 20/109

**July 2020**

## Summary

**Site name:** Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire

**Grid reference:** TA 0490 3859

**Site activity:** Magnetometer survey

**Date and duration of project:** 22nd - 23rd July 2020

**Project coordinator:** Tim Dawson

**Site supervisor:** Kyle Beaverstock

**Site code:** PFB20/109

**Area of site:** 4.35ha

**Summary of results:** The geophysical survey revealed the presence of an active service as well as an area of significant magnetic debris in the western area of the site. There are three possible archaeological features, also at the western end of the site, which may be buried field boundary ditches. The eastern and southern parts of the site were too overgrown to survey effectively.

**Location of archive:** The archive is presently held at TVAS, Reading in accordance with TVAS digital archiving policies.




| | |
|---|---|
| Report edited/checked by: | Steve Ford✓ 5.8.20 |
| | Tim Dawson✓ 5.8.20 |

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# Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire
# A Geophysical Survey (Magnetic)

by Kyle Beaverstock

**Report 20/109**

## Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Palmer's Field, Hull Road, Beverley (TA 0490 3859) (Fig. 1). The work was commissioned by Helen Martin-Bacon, Principal Heritage Consultant for Avalon Heritage on behalf of Mr. Willy Flannigan, Lakeminster Park Ltd, 2 The Orchard, Mossways Park, Wilmslow, Cheshire, SK9 5PA.

A pre-planning advice enquiry (20/10298/STPREP) has been made to East Riding of Yorkshire Council for the extension of the Lakeminster Park static caravan site into fields to the north. The Principal Development Management Officer's comments on the proposed development included the suggestion of undertaking an archaeological field evaluation by geophysical survey in order to identify any potential below ground archaeological features. This is in accordance with the *National Planning Policy Framework* (NPPF 2019) and the Council's policies on archaeology. The fieldwork was undertaken by Kyle Beaverstock between the 22nd and 23rd of July 2020 and the site code is PFB20/109.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

## Location, topography and geology

The site is located on the south-eastern fringes of the town of Beverley, some 13km to the north of Hull and the Humber Estuary (Fig. 1). The site itself consists of a single large grass field at its western end and a series of overgrown smaller paddocks to the south and east, separated by a drain and dirt tracks. The northern boundary borders Minster Way and its roundabout junction with Hull Road, to the east is Williams Way, to the south is the demolished remains of Lakeminster Caravan Park and to the west is a field. The site lies at 5m above Ordnance Datum and the underlying geology is recorded as Devensian Till for the western field and alluvium for the remainder of the area, both overlying Flamborough Chalk Formation (BGS 2020). Conditions during the survey were dry with sunny spells (Pl. 1-2).

## Site history and archaeological background

The site lies within the modern district of Beverley Parks, an area south of the borough of Beverley but within the boundary of the liberties of Beverley (VCH 1989). The name derives from the archbishop's medieval deer park, which occupied most of the area and remained a largely agricultural landscape until the late 19th century. The site lies immediately to the north of the site of a bleaching yard, which was first recorded in 1775 and again as dealing with sailcloth in 1852. Other medieval and post-medieval landscape features have been identified to the north and west as well as the site of a Romano-British settlement some 500m to the north of the survey area.

## Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating zig-zag pattern on a southwest to northeast orientation across the survey area. Whilst the western and southwestern areas of the site were mostly unobstructed other than a small building in the southwest of the site. The eastern paddocks were overgrown and unable to survey. The conditions were mostly dry.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to $10^{-9}$ Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both European Archaeological Council (EAC 2015) and the Chartered Institute *for* Archaeologists (2002, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10 mounted at the rear of the cart. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

| **Process** | **Effect** |
|---|---|
| Clip from -22.00 to 22.10 nT | Enhance the contrast of the image to improve the appearance of possible archaeological anomalies. |
| De-stripe: median, all sensors | Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies. |
| De-spike: threshold 1, window size 3×3 | Compresses outlying magnetic points caused by interference of metal objects within the survey area. |
| De-stagger: all grids, both by -1 intervals | Cancels out effects of site's topography on irregularities in the traverse speed. |

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 2) with the processed data then presented as a second figure (Fig. 3), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 2.18.15 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

## Results

The results of the geophysical survey show significant magnetic disturbance across the site. This is represented by a bipolar linear anomaly running west to east across the central area of the site which is most likely a service with a high amplitude such as an electric line. To the south of this is a large area of magnetic debris, this is represented by an area containing positive and negative responses of a high amplitude. The form suggests that the magnetic debris covers a former paddock surrounding an abandoned building suggesting that this area has numerous buried ferrous objects.

In the far west of the site there are two weak positive linear anomalies. The first runs north to south from the northern boundary of the site for c.37m into an area of magnetic disturbance caused by the service. Parallel to this, 11.5m to the west, possibly forming a trackway running for 32m from the northern boundary of the site into the area of the magnetic disturbance then reappearing on the south side of the magnetic disturbance and running along an uneven path for 25m before turning to the west for 20m possibly forming a corner of a field boundary. In the far south of the site is another weak positive linear running north to south for 25m before turning to the southwest for 12m. This may be the remnant of a former field boundary.

## Conclusion

The geophysical survey revealed the presence of an active service as well as an area of significant magnetic debris in the western area of the site. There are three possible archaeological features, two weak positive linear anomalies: one running north to south and parallel to this another running north to south before turning to the

west. These may be forming part of a field system and trackway. In the far south there is another weak positive linear anomaly orientated north to south with a bend to the southwest forming a field boundary of indeterminate date.

## References


BGS, 2020, *Geology of Britain Viewer*, 1:50,000, http://mapapps.bgs.ac.uk/geologyofbritain/home.html (accessed 5/8/20)

CI*f*A, 2014, 'Standard and Guidance for archaeological geophysical survey', Reading

EAC, 2015, *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*, EAC Guidelines 2, Namur

IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading

NPPF, 2019, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London

VCH, 1989, *A History of the County of York East Riding: Volume 6, the Borough and Liberties of Beverley*, London

# Appendix 1. Survey and data information

**Programme:**
Name: TerraSurveyor
Version: 3.0.25.0

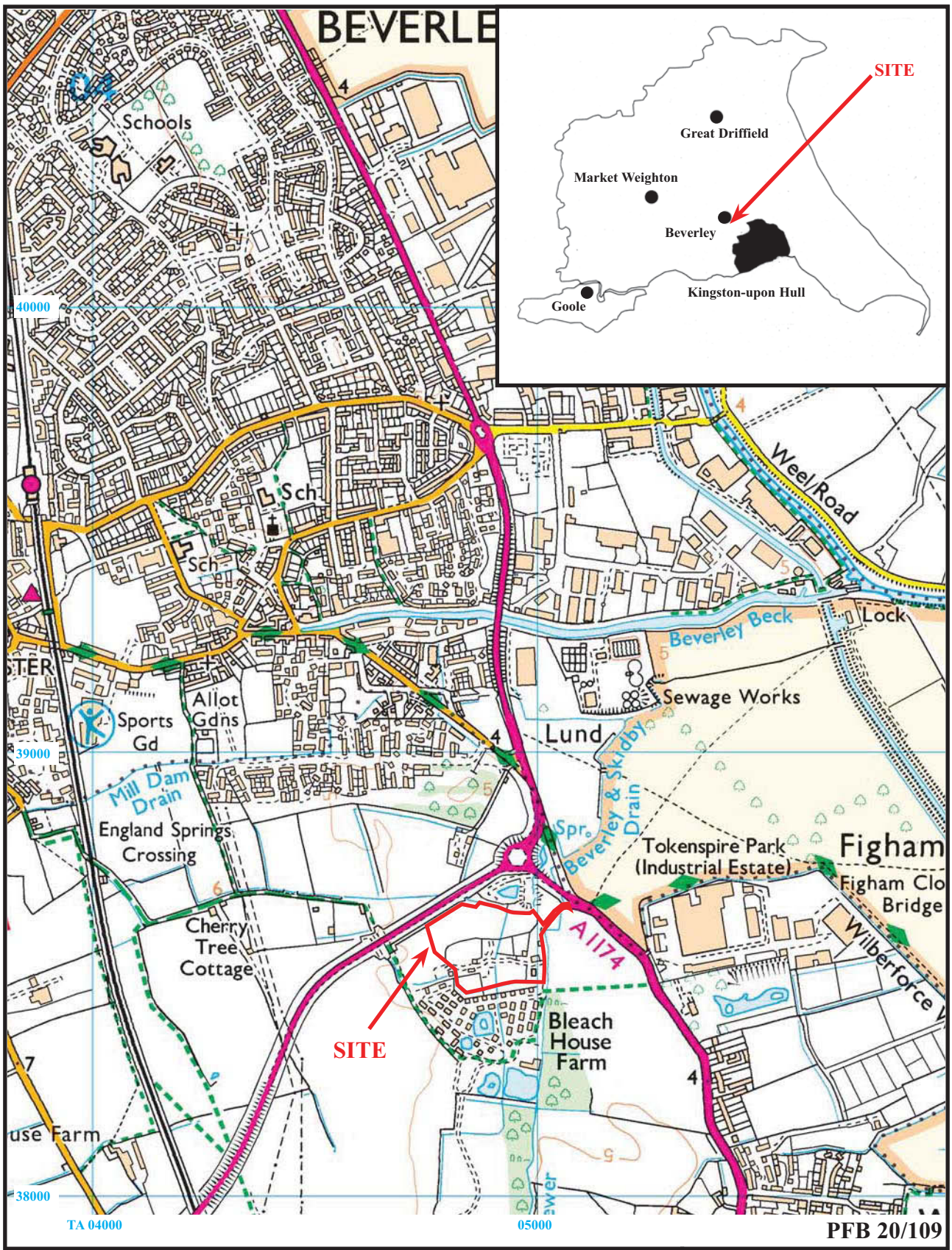
**Raw data**
Filename: Beverley.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 670372.875491113, 5968131.09110044 m
Southeast corner: 670614.935491113, 5967918.02110044 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 242 m x 213 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 74995, Recorded: 74995

Stats
Max: 107.76
Min: -109.76
Std Dev: 41.45
Mean: -3.22
Median: -0.37
Composite Area: 5.1576 ha
Surveyed Area: 2.4942 ha

**Processed data**
Filename: Beverley.xcp
Stats
Max: 22.10
Min: -22.00
Std Dev: 11.98
Mean: -0.51
Median: 0.03
Composite Area: 5.1576 ha
Surveyed Area: 2.4942 ha

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -20.00 to 20.00
5 DeStagger by: 50.00cm, Shift Positions

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**Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire, 2020**
**Geophysical Survey (Magnetic)**

Figure 1. Location of site within Beverley and East Riding of Yorkshire.



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**Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire, 2020**
**Geophysical Survey (Magnetic)**
Figure 2. Plot of raw gradiometer data.

0m 100m

+100
nT
-100

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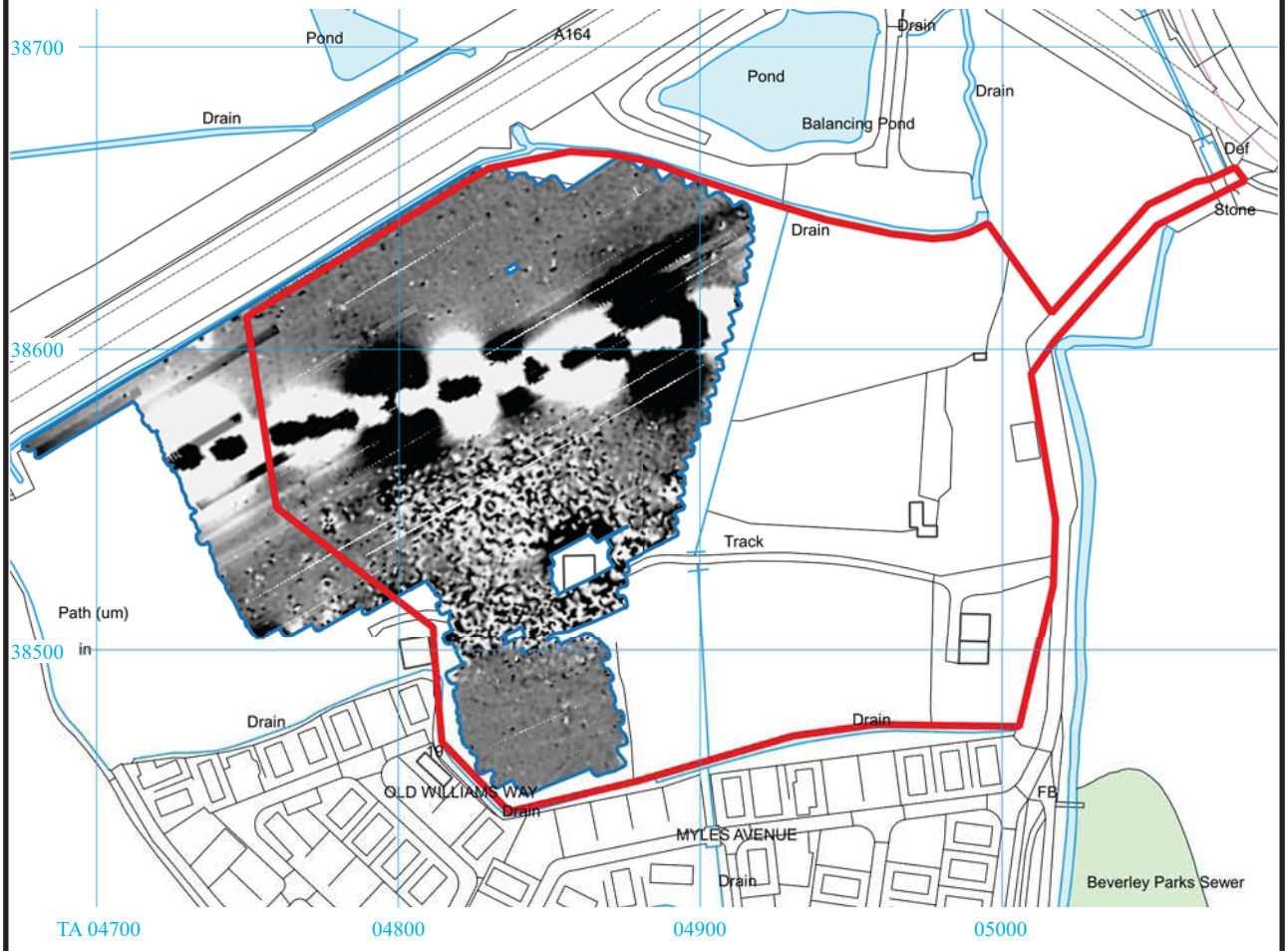


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**Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire, 2020**
**Geophysical Survey (Magnetic)**
Figure 3. Plot of processed gradiometer data.

0m 100m

+22.1
nT
-22.0

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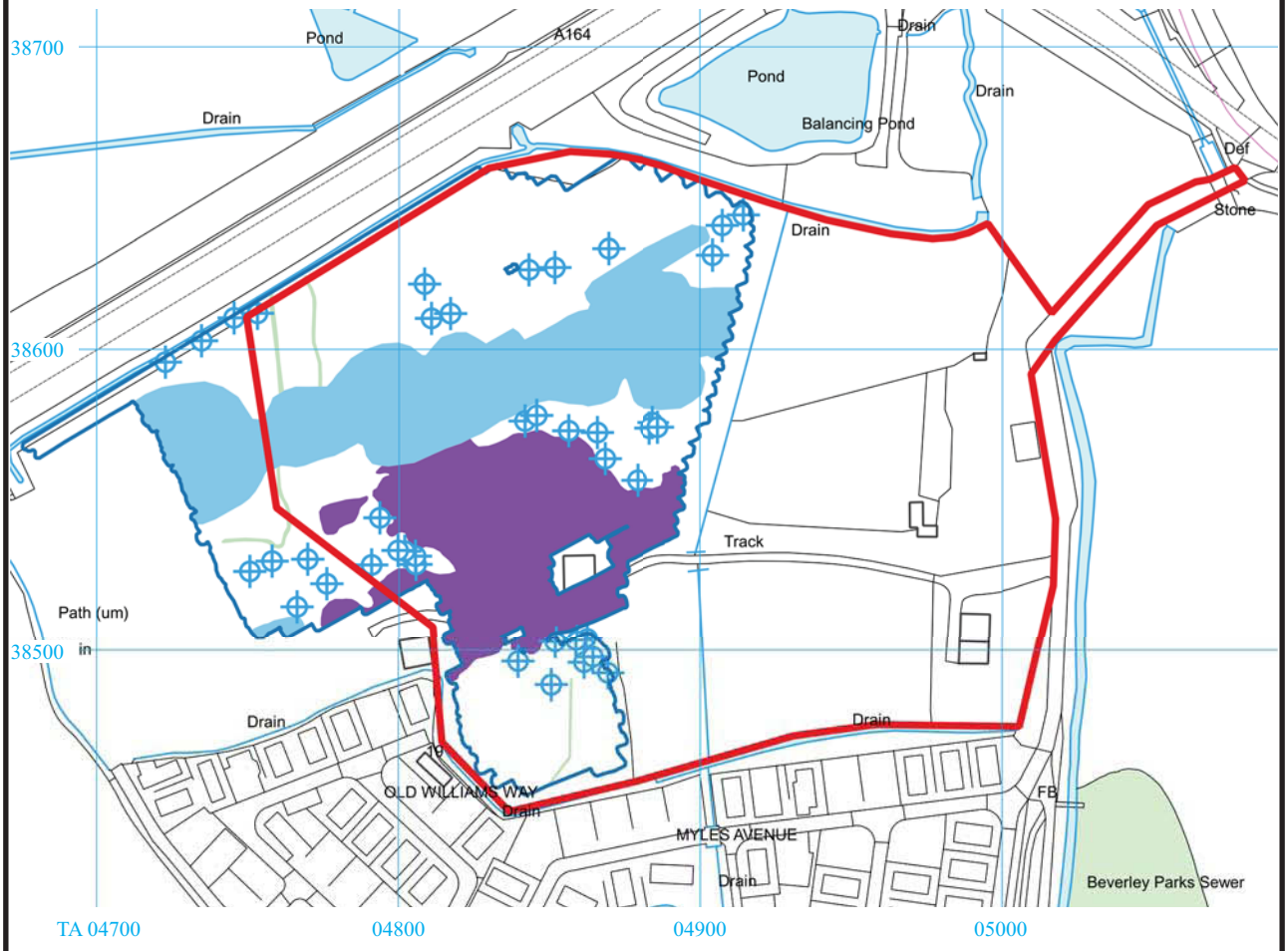


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**Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire, 2020**
**Geophysical Survey (Magnetic)**
Figure 4. Interpretation plot.

0m 100m

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Plate 1. Western end of the site, looking north-west.

Plate 2. Eastern paddocks, looking north.



**Palmer's Field, Hull Road, Woodmansey, Beverley, East Riding of Yorkshire, 2020**
**Geophysical Survey (Magnetic)**
Plates 1 and 2.

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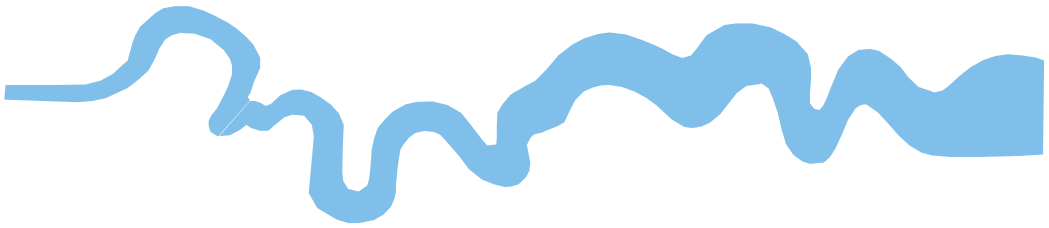
# TIME CHART

| | Calendar Years |
|---|---|
| Modern | AD 1901 |
| Victorian | AD 1837 |
| Post Medieval | AD 1500 |
| Medieval | AD 1066 |
| Saxon | AD 410 |
| Roman | AD 43 |
| | AD 0 BC |
| Iron Age | 750 BC |
| Bronze Age: Late | 1300 BC |
| Bronze Age: Middle | 1700 BC |
| Bronze Age: Early | 2100 BC |
| Neolithic: Late | 3300 BC |
| Neolithic: Early | 4300 BC |
| Mesolithic: Late | 6000 BC |
| Mesolithic: Early | 10000 BC |
| Palaeolithic: Upper | 30000 BC |
| Palaeolithic: Middle | 70000 BC |
| Palaeolithic: Lower | 2,000,000 BC |



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