THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

New Attenuation Pond, Oxford Road, Calne, Wiltshire

Geophysical Survey

by Kyle Beaverstock

Site Code: ORC19/37

(SU 0063 7283)

New Attenuation Pond, Oxford Road, Calne, Wiltshire

Geophysical Survey (Magnetic) Report

For Uplands Retail Limited

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code ORC 19/37

April 2019

Summary

Site name: New Attenuation Pond, Oxford Road, Calne, Wiltshire

Grid reference: SU 0063 7283

Site activity: Magnetometer survey

Date and duration of project: 1st – 2nd of April 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: ORC19/37

Area of site: c.1.7ha

Summary of results: Although some evidence of ridge and furrow was detected, no anomalies of archaeological interest were identified within the surveyed area.

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

Report edited/checked by:	Steve Ford✓ 09.04.19
	Tim Dawson✓ 09.04.19

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New Attenuation Pond, Oxford Road, Calne, Wiltshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 19/37

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Oxford Road, Calne, Wiltshire (SU 0063 7283) (Fig. 1). The work was commissioned by James Green on behalf of Uplands Retail Ltd. 7 Brook Office Park, Folly Brook Road, Emersons Green, Bristol, BS16 7FL.

Planning permission (18/04867/FUL) has been gained from Wiltshire County Council to construct a new attenuation pond and pipeline on land adjacent to Oxford Road, Calne, Wiltshire (SU 0051 7278). The consent is subject to a condition relating to archaeology. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012) and the County's policies on archaeology. The field investigation was carried out to a specification approved by Melanie Pomeroy-Kellinger county archaeologist for Wiltshire County Council. The fieldwork was undertaken by Kyle Beaverstock and Mike Murray between 1st and 2nd of April 2019 and the site code is ORC19/37.

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 north-eastern edge of Calne approximately 8.5km east of Chippenham (Fig. 2). This rectangular parcel of land is relatively flat and sitting at a height of *c*.80m above Ordinance Datum. It is bounded to the west by Oxford Road, the A3102 and the roundabout that joins them, to the north by a small copse, to the south by a farm track and to the east by the remaining half of the field. The land is currently being utilised for pastoral farmland and the underlying geology is stated as Kimmeridge Clay (BGS 1974).

Site history and archaeological background

The archaeological potential of the site stems from its location on the periphery of the Saxon/medieval core of Calne. The settlement is first recorded in the 10th century and also in Domesday Book (AD 1086) where Calne is listed as a royal holding (as it had been before the Norman Conquest) (Williams and Martin 2002). Nearby

Beversbrook was also recorded in Domesday Book, and was a far smaller estate, with land held by William Delamere and Nigel the Physician.

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 set 1m apart. 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 2m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating northeast to southwest zig-zag orientation across the survey area. No significant obstructions were encountered across the survey area.

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 -11.00 to 11.05 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.

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 3.4.5 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 most significant magnetic anomaly detected were a series of parallel negative and positive responses orientated north-east to south-west across along the long axis of the site, these anomalies suggest a series of buried ditches and banks typical of a ridge and furrow-type farming system. Along the surrounding boundary in the south, north and west magnetic disturbance was detected due to the fencing in these areas. This was represented by high positive and negative responses. In the north-western corner a strong bipolar linear anomaly was detected running from the south-west to the north-east, this most likely represents a buried service.

Conclusion

No anomalies of archaeological interest were detected over the course of the survey. There was however evidence of extensive ridge and furrow across the site as well as some magnetic disturbance and magnetic spikes.

References

BGS, 1974, *British Geological Survey*, 1:50,000, Sheet 266, Drift Edition, Keyworth
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, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London
Williams, A and Martin, G H, 2002, *Domesday Book, a complete translation,* London

Appendix 1. **Survey and data information**

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data
Filename: Oxford Road, Calne 1-2-19 RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 400610.040177781, 172957.000329148 m
Southeast corner: 400701.820177781, 172714.550329148 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702

Dimensions
Survey Size (meters): 91.8 m x 242 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 21639, Recorded: 21639

Stats
Max: 55.40
Min: -106.83
Std Dev: 7.38
Mean: -1.70
Median: -1.03
Composite Area: 2.2252 ha
Surveyed Area: 0.61729 ha

Filename: Oxford Road, Calne 2-4-19 RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 400575.204315703, 172977.17741368 m
Southeast corner: 400682.064315703, 172721.59741368 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702

Dimensions
Survey Size (meters): 107 m x 256 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 31639, Recorded: 31639

Stats
Max: 106.71
Min: -109.72
Std Dev: 19.23
Mean: -0.05
Median: -0.24
Composite Area: 2.7311 ha
Surveyed Area: 1.1571 ha

Processed data
Filename: Oxford Road, Calne 1-2-19.xcp

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip from -10.00 to 10.00

Stats
Max: 11.05
Min: -11.00
Std Dev: 1.29
Mean: -0.03
Median: 0.01
Composite Area: 2.2252 ha
Surveyed Area: 0.61729 ha

Filename: Oxford Road, Calne 2-4-19.xcp

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip from -10.00 to 10.00

Stats
Max: 11.05
Min: -11.00
Std Dev: 4.11
Mean: 0.09
Median: 0.00
Composite Area: 2.7311 ha
Surveyed Area: 1.1571 ha

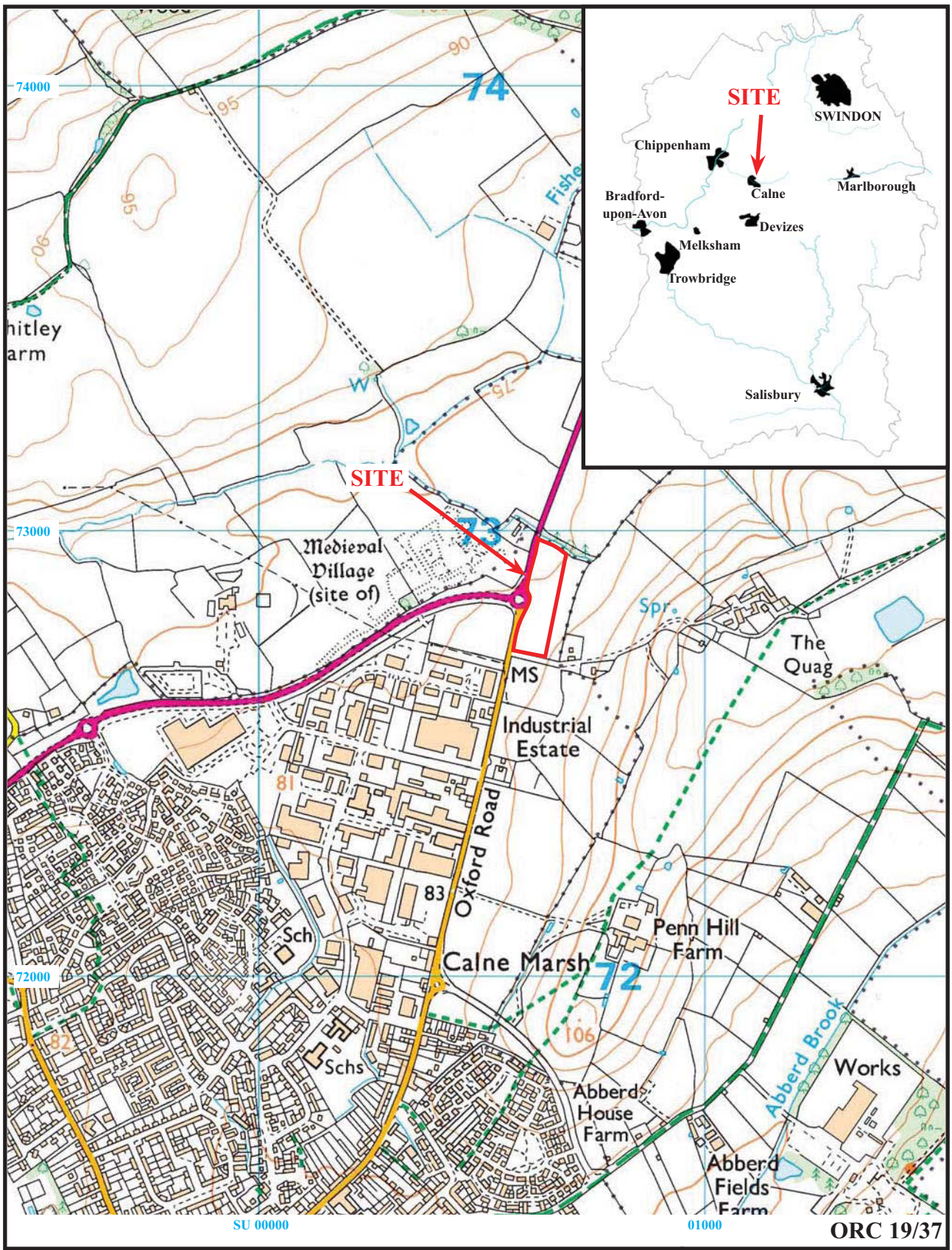

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Figure 1. Location of site within Calne and Wiltshire.

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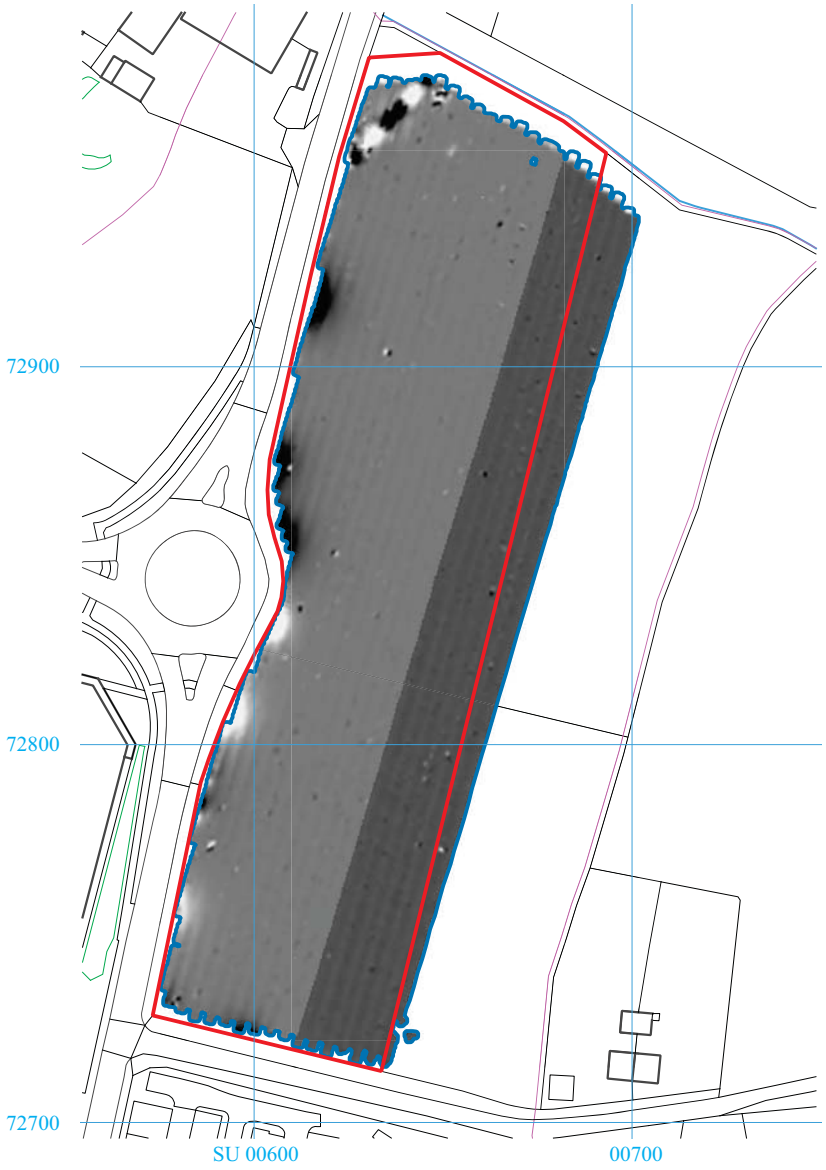

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Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.

0m 100m

+100
nT
-100

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N

New Attenuation Pond, Oxford Road,
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Figure 3. Plot of processed gradiometer data.

0m 100m

+11
nT
-11

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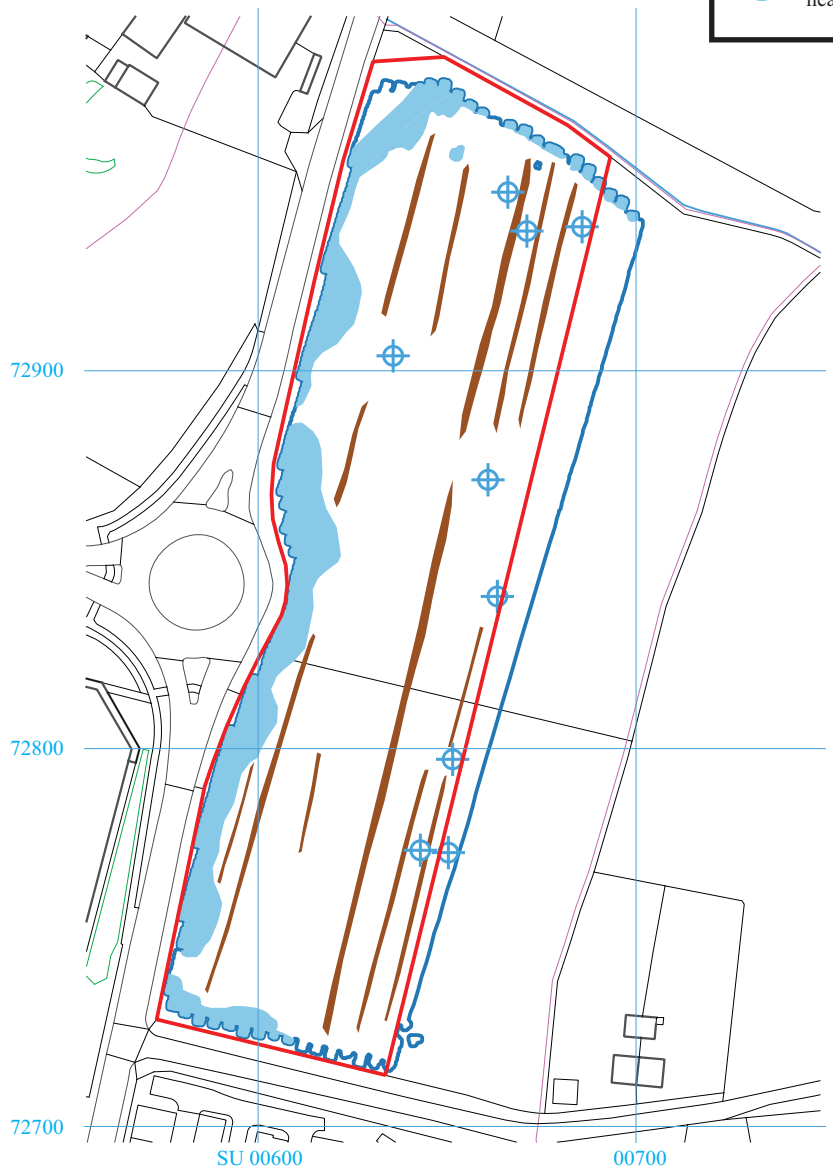

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Figure 4. Interpretation plot.

0m 100m

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Plate 1. Survey area looking north

Plate 2. Eastern boundary looking north-east

Plate 3. Western boundary looking north-east

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New Attenuation Pond, Oxford Road,
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Plates 1 to 3.

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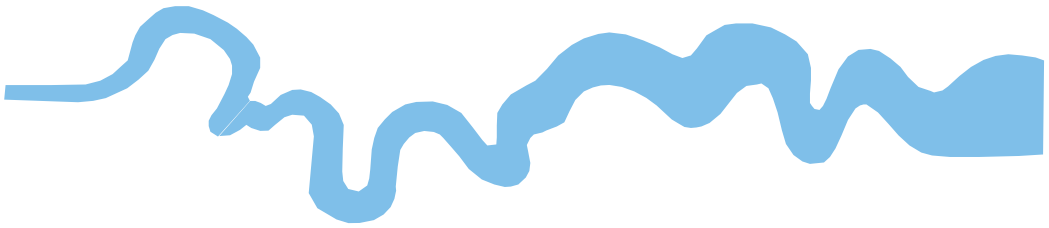
TIME CHART

	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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