A6S/13141 Aldington, Evesham, Worcestershire

Detailed Gradiometer Survey Report

Report Ref.:
233441.03
February 2021

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Document Information

Document title	A6S/13141 Aldington, Evesham, Worcestershire
Document subtitle	Detailed Gradiometer Survey Report
Document reference	233441.03
Client name	Severn Trent Water Ltd
Address	Endeavour House Raynesway Derby
Site location	Aldington, Evesham
County	Worcestershire
National grid reference	406565 244160 (SP 06565 44160)
Statutory designations	None
Planning authority	Wychavon District Council
WA project name	A6S/13141 Aldington - TGS
WA project code	233441
Date of fieldwork	06/01/2021
Fieldwork directed by	Chris Hirst
Project management by	Tom Richardson
Document compiled by	Alexander Schmidt
Graphics by	Alexander Schmidt

Quality Assurance

Issue and date		Status	Author	Approved by
1	09/02/2021	Draft	AJS	TR
2	22/02/2021	Client comment	AJS	TR

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Summary

A detailed gradiometer survey was conducted over land at Aldington, Evesham, Worcestershire (centred on NGR 406565 244160). The project was commissioned by Severn Trent Water Ltd with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site.

The site comprises arable fields located north-east of Aldington, covering an area of 1 ha. The geophysical survey was undertaken on Wednesday 6 January 2021 and has demonstrated the presence of a number of anomalies of potential archaeological interest.

Several parallel linear and recti-linear anomalies indicate ditches. These could be evidence of former boundary features. However, the anomalies are weak, and a more confident interpretation is not possible. It is equally possible these anomalies are associated with the former land use recorded on historical mapping.

In addition, a weak circular anomaly is noted that could be indicate settlement activity. However, this also could be associated with modern agricultural activity, such as ploughing, or former orchards.

The remaining anomalies are thought to be modern, associated with the modern land use including plough lines and ferrous responses associated with a telegraph pole.

Acknowledgements

Wessex Archaeology would like to thank Severn Trent Water Ltd for commissioning the geophysical survey. The assistance of Mohammad Dabeshlim is gratefully acknowledged in this regard.

The fieldwork was undertaken by Chris Hirst and Amy Dunn. Alexander Schmidt processed and interpreted the geophysical data, wrote the report and prepared the illustrations. The geophysical work was quality controlled by Tom Richardson, who managed the project on behalf of Wessex Archaeology.

A6S/13141 Aldington, Evesham, Worcestershire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Severn Trent Water Ltd to carry out a geophysical survey at Aldington, Evesham, Worcestershire (centred on NGR 406565 244160) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the site.

1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

1.3 The site

1.3.1 The site is located 100 m to the north-east of the village of Aldington and 3 km east-north-east of Evesham, in the county of Worcestershire.

1.3.2 The survey comprises 1 ha of agricultural land, currently utilised for a mixture of pasture and arable. The site is bounded by agricultural land to the north and east, and residential property to the south and west.

1.3.3 The site is on a slight incline sloping from 33 m above Ordnance Datum (aOD) at the north-western edge to 27 m aOD at the eastern edge.

1.3.4 The solid geology comprises Mudstone of the Blue Lias and Charmouth Formation with overlying superficial geological deposits of alluvium to the east of the site (BGS 2021).

1.3.5 The soils underlying the site are likely to consist of typical calcareous pelosols of the 411b (Evesham 2) association (SSEW SE Sheet 3 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

2 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The following historical and archaeological background has been compiled using publicly available online resources, combined with the results of Wessex Archaeology's previous investigations in the area, and in-house resources. The following background is not exhaustive but is summarised from aspects that are considered relevant to the interpretation of the geophysical survey data.

2.2 Summary of the archaeological resource

2.2.1 There are 16 Grade II/II* listed buildings within an approximate 1 km study area of the site. These consist of 17th – 19th century dwellings and outhouses within the settlement of Aldington to the immediate south-west of the site and Badsey, 900 m to the south-east.

2.2.2 Remains associated with the Iron Age were found including a ditch terminal and possible pit containing probable Iron Age pottery and animal bone, 1 km south-east of the site in Badsey.

2.2.3 A possible Roman occupation site is recorded at Black Banks, Badsey. Finds including a quern stone, coins dating from Claudius to Gratianus, a bronze handle and clasp as well as glassware were found in the early part of the 20th century. Further Romano-British finds have been identified at allotments west of Badsey.

2.2.4 A scheduled Anglo-Saxon cemetery is noted 1.6 km north-north-east of the site on Bennett's Hill, between Offenham and South Littleton (NHLE 1020258). The remains of Evesham Abbey is a scheduled site located 2.8 km west south-west of the site (NHLE 1005297).

2.2.5 An Anglo-Saxon burial was found in 1852, during ploughing near Offenham, 700 m north of the site. Remains of armour from the head to lower thigh were found, as well as a sword and javelin.

2.2.6 Ridge and furrow earthworks are recorded to the north of Chapel Lane, immediately north of the site, in Aldington. These are clearly visible in aerial imagery. Further ridge and furrow is recorded south of The Furrows, 560 m south-west of the site as well as being plentiful in the surrounding landscape.

2.2.7 On the earliest available OS mapping dating to 1885 – 1886, the site appears to fall within an area of plantation, such as an orchard, which was prominent in the surrounding landscape continuing to the present day. The site appears to have continued with this land use until the latter half of the 20th century and is visible in aerial imagery from 1945.

2.2.8 Lime kilns associated with the 19th and 20th century are recorded on 1st edition OS maps between 1885 and 1955 close to Badsey Railway Station and south of Littleton. The 1841 tithe map for Offenham shows only meadows.

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on Wednesday 6 January 2021. Field conditions were adequate throughout the period of survey. An overall coverage of 0.6 ha was achieved. Some portions of the site were unsuitable for survey due to obstructions, overgrown vegetation, and woodland.

3.1.2 The methods and standards employed throughout the geophysical survey conform to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and

- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and
- Where possible, to determine the general nature of any anomalies of archaeological potential.

3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four Bartington Grad-01-1000L gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of 0.03 nT at a rate of 10 Hz, producing intervals of 0.15 m along transects spaced 4 m apart.

3.4 Data processing

3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'DeStripe' function (±5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

4.1.1 The detailed gradiometer survey has identified magnetic anomalies across the site. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:750 (**Figures 2** and **3**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image.

4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figure 3**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

4.1.5 Gradiometer survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and

appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

4.2 Gradiometer survey results and interpretation

4.2.1 The anomalies at **4000** – **4005** are all interpreted as possible archaeological activity. The linear anomalies could indicate former boundaries with the rectilinear anomalies providing evidence of possible enclosures. However, it is equally possible these anomalies are associated with earlier land use that is visible in the surrounding landscape, including orchards.

4.2.2 A weakly positive, circular anomaly has been identified in the centre of the surveyed area at **4000**. This is 7 m in diameter but is incomplete on the southern site. The anomaly indicates a ring-ditch; however, the weak magnitude of the anomaly makes a more confident interpretation impossible. It is equally possible the anomaly is associated with more recent agricultural activity.

4.2.3 At the western side of the survey area a broadly recti-linear anomaly has been identified at **4001**. This measures 11 m north – south and 13 m east – west, although the western extent has not been identified. A second recti-linear anomaly is noted 20 m to the south of **4001** at the southern boundary of the site (**4002**). This measures 13 m east – west and 8 m north – south. These anomalies indicate ditch features in a broadly recti-linear alignment and could indicate small enclosures. It is not clear whether these are archaeological or relate to more recent boundaries associated with orchards.

4.2.4 Two parallel linear anomalies have been identified across the survey area on a north-east to south-west alignment at **4003** and **4004**. The anomaly at **4003** is 35 m long and 1 m wide. The response at **4004** is 17 m to the west of **4003** and is 10 m long by 1 m wide. These anomalies indicate ditch features and could be evidence of former boundary features of uncertain origin.

4.2.5 A broad area of positive magnitude response has been identified to the north-east of the survey area at **4005**. This has been interpreted as possibly archaeological in origin as it aligns to the north-eastern end of the ditch-feature at **4003**. However, it is not clear whether the two anomalies are associated. The anomaly at **4005** could indicate an area of extraction activity or a spread of variable underlying material. Such activity could evidence earlier periods; however, it is equally possible it represents natural variation.

4.2.6 Several weakly positive discrete anomalies measuring 1 m in diameter have been identified throughout the survey area. These are also interpreted as possible archaeological activity and indicate pit-like features. Such features could be evidence of wider settlement activity, such as extraction or refuse pits. However, it is equally possible these anomalies are natural in origin and pertain to localised variations in the magnetic susceptibility of the underlying geological deposits.

4.2.7 Numerous closely spaced (less than 1 m), parallel linear trends have been identified on a north – south alignment within the survey area. Examples of these anomalies are noted at **4006**. These are indicative of modern ploughing activity.

4.2.8 The remaining anomalies are thought to be modern and include a highly ferrous response from a telegraph pole (**4007**) and peripheral ferrous responses from the current field boundaries.

5 DISCUSSION

5.1.1 The detailed gradiometer survey has been successful in detecting anomalies that are interpreted as possibly archaeological in origin. Several parallel linear and recti-linear anomalies indicate ditches. These could be evidence of former boundary features. However, the anomalies are weak, and a more confident interpretation is not possible. It is equally possible these anomalies are associated with the former land use recorded on historical mapping. Orchards are widely recorded in the surrounding area and some are still in use to the present day.

5.1.2 In addition, a weak circular anomaly is noted that could indicate settlement activity in the form of a ring-ditch. However, the weak magnitude of this anomaly makes a more confident interpretation impossible. It is equally possible this is associated with more recent agricultural activity or the aforementioned orchards. The removal of these features can leave features in the underlying deposits that appear like archaeological activity in geophysical survey data and further investigation may be required to confirm the origin of these anomalies.

5.1.3 The remaining anomalies are thought to be modern, associated plough lines and a telegraph pole.

REFERENCES

Bibliography

Chartered Institute for Archaeologists [CIfA] 2014 *Standards and guidance for archaeological geophysical survey*. Reading, CIfA

Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A and Fassbinder, J. 2015 *Guidelines for the use of geophysics in archaeology: questions to ask and points to consider.* EAC Guidelines 2, Belgium: European Archaeological Council.

Cartographic and documentary sources

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 3, Soils of Midland and Western England.* Southampton.

Online resources

British Geological Survey Geology of Britain Viewer (accessed January 2021) http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Google Earth (accessed January 2021)

Heritage Gateway (accessed January 2021) https://www.heritagegateway.org.uk/gateway/

Magic Maps (accessed January 2021) https://magic.defra.gov.uk/MagicMap.aspx

National Library of Scotland (accessed January 2021) https://maps.nls.uk/geo/explore

Old Maps (accessed January 2021) https://www.old-maps.co.uk

APPENDICES

Appendix 1: Survey Equipment and Data Processing

Survey methods and equipment

The magnetic data for this project were acquired using a non-magnetic cart fitted with 4x Bartington Grad-01-1000L magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03 nT over a ±100 nT range, and measurements from each sensor are logged at intervals of 0.25 m. All of the data are then relayed to a Leica Viva CS35 tablet, running the MLgrad601 program, which is used to record the survey data from the array of Grad601 probes at a rate of 10 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Viva system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125 m intervals along traverses spaced up to 0.25m apart.

Post-processing

The magnetic data collected during the detail survey are downloaded from the Bartington cart system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

The cart-based system generally requires a lesser amount of post-processing than the handheld Bartington Grad 601-2 fluxgate gradiometer instrument. This is largely because mounting the gradiometers on the cart reduces the occurrence of operator error; caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

Typical data and image processing steps may include:

- GPS Destripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.

- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).

- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies. XY trace plots are available upon request.

- Greyscale – Presents the data in plan using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

Appendix 2: Geophysical Interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural, and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.

- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.

- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.

- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.

- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.

- Trend – used for low amplitude or indistinct linear anomalies.

- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.

Appendix 3: OASIS form

Project Details:

Project name	A6S/13141 Aldington, Evesham, Worcestershire				
Type of project	Detailed gradiometer survey (Field evaluation)				
Project description	The site comprises arable fields located north-east of Aldington, covering an area of 1 ha. The geophysical survey was undertaken on Wednesday 6 January 2021 and has demonstrated the presence of a number of anomalies of potential archaeological interest. Several parallel linear and recti-linear anomalies indicate ditches. These could be evidence of former boundary features. However, the anomalies are weak, and a more confident interpretation is not possible. It is equally possible these anomalies are associated with the former land use recorded on historical mapping. In addition, a weak circular anomaly is noted that could be indicate settlement activity. However, this also could be associated with modern agricultural activity, such as ploughing, or former orchards. The remaining anomalies are thought to be modern, associated with the modern land use including plough lines and ferrous responses associated with a telegraph pole.				
Project dates	**Start:** 06/01/2021		**End:** 06/01/2021		
Previous work	Not known				
Future work	Not known				
Project Code: 233441	**HER event no.**	N/A	**OASIS form ID:**	wessexar1-415019	
	NMR no.	N/A			
	SM no.	N/A			
Planning Application Ref.					
Site Status	None				
Land use	Cultivated Land 3 – Operations to a depth of more than 0.25 m				
Monument type		**Period**			

Project Location:

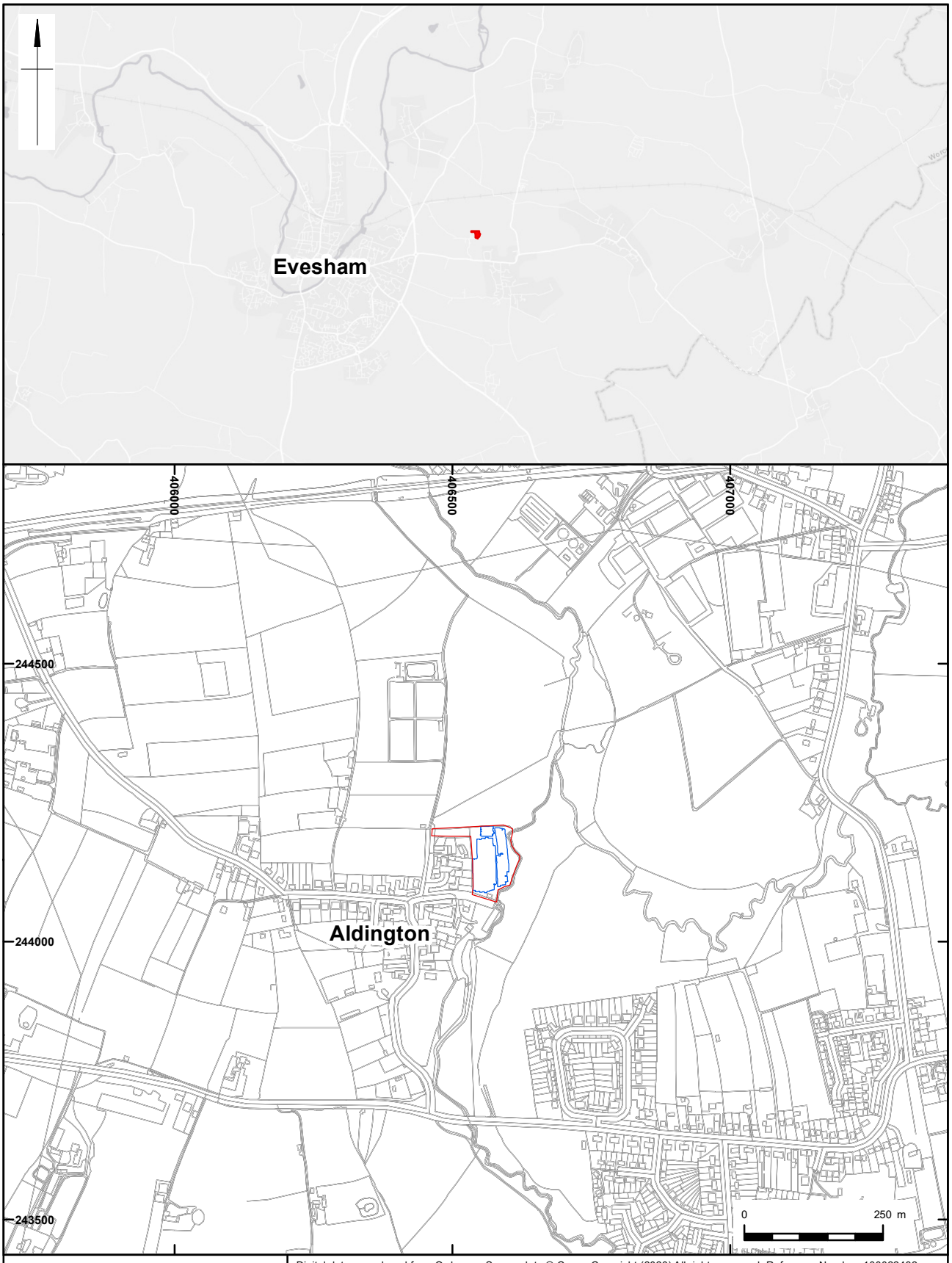
Site Address	Aldington, Evesham, Worcestershire			**Postcode**	WR11 7YF
County	Worcestershire	**District**	Wychavon	**Parish**	Aldington
Study Area	1 ha	**Height OD**	27 - 33 m aOD	**NGR**	406565 244160

Project Creators:

Name of Organisation	Wessex Archaeology		
Project brief originator	Severn Trent Water Ltd	**Project design originator**	Wessex Archaeology
Project Manager	Tom Richardson	**Project Supervisor**	Chris Hirst
Sponsor or funding body	Severn Trent Water Ltd	**Type of Sponsor**	Client

Project Archive and Bibliography:

Physical archive	N/A	**Digital Archive**	Geophysical survey and report	**Paper Archive**	N/A
Report title	A6S/13141 Aldington, Evesham, Worcestershire Detailed Gradiometer Survey Report			**Date**	2021
Author	Wessex Archaeology	**Description**	Unpublished report	**Report ref.**	233441.03



VML_SP054...
Site boundary
Detailed survey extent

Date:	22/02/2021	Revision Number:	0
Scale:	1:100,000 & 1:10,000 at A4	Illustrator:	AJS
Path:	S:\PROJECTS\233441\GIS\FigsMXD\Geophysics		

Site location and survey extent

Figure 1

406500

406600

244200

244100

+6 nT

-4 nT

Site boundary

Detailed survey extent

0 25 m

Date:	22/02/2021	Revision Number:	0
Scale:	1:750 at A3	Illustrator:	AJS
Path:	S:\PROJECTS\233441\GIS\FigsMXD\Geophysics		

Detailed gradiometer survey results: greyscale plot (-4 - +6 nT)

Figure 2

406500

406600

244200

244100

4007

4005

4000

4001

4006

4003

4004

4002

Site boundary

Detailed survey extent

Possible archaeology

Ploughing

Ferrous

Trend

0 25 m

Date:	22/02/2021	Revision Number:	0
Scale:	1:750 at A3	Illustrator:	AJS
Path:	S:\PROJECTS\233441\GIS\FigsMXD\Geophysics		

Detailed gradiometer survey results: interpretation

Figure 3

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