Buckmore Park North, Petersfield, Hampshire

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land at Buckmore Park North, Petersfield, Hampshire (centred on NGR 473725 124040). The project was commissioned by Foreman Homes 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 as a residential area.

The site comprises 2.5 ha of land, located immediately north-west of the town of Petersfield, Hampshire. The geophysical survey was undertaken on 15 – 16 June 2022. The gradiometer survey has not identified any anomalies thought to relate to archaeological activity.

Anomalies have been identified that may relate to pathways or water management associated with Buckmore House and gardens to the north of the site.

The remaining anomalies are thought to relate to natural variation and modern ferrous debris.

Acknowledgements

Wessex Archaeology would like to thank Foreman Homes Ltd for commissioning the geophysical survey. The assistance of Andy Gibbs is gratefully acknowledged in this regard.

The fieldwork was undertaken by Pamela Warne and Callum Jervis. The geophysical data was processed, interpreted and reported on by Alastair Trace. The geophysical work was quality controlled by Tom Richardson. The project was managed on behalf of Wessex Archaeology by Patricia Edwards.

Buckmore Park North,

Petersfield, Hampshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Foreman Homes Ltd to carry out a geophysical survey at Buckmore Park North, Petersfield, Hampshire (centred on NGR 473725 124040) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for residential 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 immediately north-west of the town of Petersfield, in the county of Hampshire

1.3.2 The survey comprises 2.5 ha of agricultural land, currently utilised for pasture. The site is bounded by woodland to the north, with a tree line separating further pasture to the south, east, and west.

1.3.3 The site is on a slight incline from 76 m above Ordnance Datum (aOD) at the south-eastern edge to 86 m aOD at the north-eastern edge.

1.3.4 The solid geology comprises Mudstone of the Marehill Clay Member with overlying superficial geological deposits of clay, silt, sand, and gravel (BGS 2022).

1.3.5 The soils underlying the site are likely to consist of typical argillic brown earths of the 571g (Fyfield 4) association (SSEW SE Sheet 6 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 An archaeological desk-based assessment (DBA) was prepared by Wessex Archaeology (2018) for the land at Buckmore Park North, Petersfield, Hampshire which examined the potential for the survival of buried archaeological remains within the development area and a 1 km study area. The following background is not exhaustive but is summarised from aspects of the DBA that are considered relevant to the interpretation of the geophysical survey data.

2.2 Summary of the archaeological resource

2.2.1 There are no designated heritage assets within the site. Within the study area there are 2 Grade II* listed buildings, 33 Grade II listed buildings, and Petersfield Conservation Area.

2.2.2 A Mesolithic occupation site was identified within the centre of Petersfield, located approximately 900 m to the south-west of the site. This was characterised by a large scatter of worked flint, debitage, and a quantity of burnt flint (Hampshire County Council, 2018).

2.2.3 Although beyond the study area, 2.1 km to the south-east of the site is Petersfield Heath, where 21 Bronze Age barrows are located. The barrow cemetery was once larger but became encroached upon by development to the north of the town of Petersfield.

2.2.4 Several Romano-British villas have been identified in the area around Petersfield, including those at Buriton, Stroud, and Froxfield. Findspots of pottery have been found in and around the town centre, which were interpreted as evidence of Romano-British settlement.

2.2.5 Throughout the medieval period, the site was presumably situated within a sparsely populated rural expanse composed of unimproved pasture and arable land. In 1996, the Royal Commission on the Historical Monuments of England (RCHME) conducted the 'Medieval Settlement Project' in Hampshire and the Isle of Wight. A variety of archaeological, architectural, and documentary sources were consulted, and number of possible medieval farmsteads were identified and are recorded by the HAHBR in the wider landscape surrounding the site.

2.2.6 A medieval plot of land recorded as 'Alresnape' in AD 1248, is now the site of the early 19th century Grade II listed Aldersnap Farm (NHLE: 1247984) and is located 700 m to the west of the site. Further Grade II listed farmsteads thought to date back to the medieval period include Dunhill Farmhouse (NHLE: 1094449) 600 m to the north of the site, first documented in AD 1288 as 'Duniendehulle', and Soal Farmhouse (NHLE: 1247993) 1 km to the north-west of the site, first documented in AD 1320 as 'Atte Sole'. In addition to these, Berelands Farm some 200 m to the west, was first documented in the early 16th century.

2.2.7 The 1841 Tithe map of the Parish of Buriton shows that Buckmore Farm (NHLE 1261844) once was located within an extensive agricultural landscape on the periphery of the town of Petersfield. The Site and the surrounding area remained relatively unchanged between 1841 and the turn of the century. The only significant alterations during this period included the renaming of the original 'Beckham Lane' which ran on an east to west trajectory to the south of the site boundary, to the current 'Winchester Road'. Also, the footpath was established across the Site and can be seen upon the First Edition 1871 Ordnance Survey (OS) map.

2.2.8 The northern extent of the site underwent development first seen on 1909 OS mapping comprising the construction of Buckmore house, which exists today and the division of land into small plots of garden, pasture, and woodland. Within the garden boundary of Buckmore house, a large circular feature is illustrated which may represent a large water feature. This is further confirmed by the mention of a 'hydraulic ram' upon the northern border of the site.

2.3 Recent investigations in the area

2.3.1 Wessex Archaeology carried out an archaeological trial trench evaluation, in 2016 upon land immediately to the south of the site. Several north-south aligned ditches were revealed and were interpreted as being part of a post-medieval to modern field system.

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 15 – 16 June 2022. Field conditions at the time of the survey were clear and sunny throughout the period of survey. An overall coverage of 2 ha was achieved. A small overgrown portion of the site was located centrally, which prevented survey of that area.

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 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 SenSYS FGM650/3 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 20 Hz, producing intervals of 0.01m 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 Results are presented as a greyscale plot and archaeological interpretation at a scale of 1:1,000 (**Figures 2** and **3**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images.

4.1.2 The interpretation of the datasets highlights the presence of potential former field boundaries, ferrous responses, 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 Two dipolar linear anomalies have been identified bisecting the eastern portion of site at **4000** and **4001**. The anomaly at **4000** is 47 m long by 4 m wide and the anomaly at **4001** is 30 m long by 3 m wide. The exact origin of these anomalies is unclear, but their magnetically strong response suggests a relatively modern date. It is most likely that they relate to a former pathway or drainage system corresponding to the formal gardens at Buckmore House immediately to the north of the site. These features are evident as a linear depression in LiDAR data, which would be consistent with either interpretation.

4.2.1 An area of increased magnetic response has been identified surrounding vegetation at **4002**. The anomaly is 22 m in diameter. Additionally, a magnetically strong dipolar linear anomaly is noted extending away from **4002**, towards the south-west at **4003**. The anomaly at **4003** is 71 m long and indicates a service. At the southern end of these anomalies a pond is noted on the 1895 OS map. Further, the 1967 map shows drainage away from this area towards the east. It is likely the service at **4003** is associated with this drainage system, the anomaly at **4002** possibly relating to a backfilled pond not shown on available mapping.

4.2.2 A series of weak positive amorphous anomalies have been noted across the site. Due to their lack of any coherent pattern or shape, these have been interpreted natural geological variation.

4.2.3 The survey has detected multiple isolated clusters of low magnitude anomalies that have been interpreted as geological in origin. These likely relate to natural variation in the soils and background geology.

5 DISCUSSION

5.1.1 The gradiometer survey has not identified any anomalies thought to relate to archaeological activity. There is no evidence of Roman activity, which is noted around the town of Petersfield. The data indicates the area has been agricultural land since the medieval period, as suggested by the DBA.

5.1.2 Anomalies have been identified that may relate to pathways or water management associated with Buckmore House and gardens to the north of the site.

5.1.3 The remaining anomalies are thought to relate to natural variation and modern ferrous debris.

REFERENCES

Bibliography

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

Hampshire County Council. 2018. Hampshire County Integrated Character Assessment. Available at: http://www3.hants.gov.uk/landscape-and-heritage/hampshire-integrated-character-assessment.htm

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.

Wessex Archaeology. 2018. *Land at Buckmore Park North, Petersfield, Hampshire: Archaeological Desk-based Assessment*. Unpublished grey literature ref. 210170.01. *Revised in 2014.*

Wessex Archaeology 2016. *Land at Buckmore Farm, Petersfield, Hampshire*. Archaeological Evaluation Report. Unpublished report ref. 112780.03

Cartographic and documentary sources

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 6, Soils of Southern and Eastern England.* Southampton.

Online resources

British Geological Survey Geology of Britain Viewer (accessed July 2022) http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Google Earth website http://earth.google.com (accessed July 2022)

Historic England (HE) https://historicengland.org.uk (accessed July 2022)

Heritage Gateway website https://www.heritagegateway.org.uk/gateway/ (accessed July 2022)

National Library of Scotland (NLS) https://maps.nls.uk/geo/explore/ (accessed July 2022)

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 four SenSys FGM650/3 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 0.6 m 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 ±8 µT over ±1000 nT range. All of the data are then relayed to a CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 probes at a rate of 20 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 Captivate 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 0.01 m intervals along traverses spaced up to 0.25m apart.

Post-processing

The magnetic data collected during the survey is downloaded from the 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.

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 within the defined window. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.

- 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.

- 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).

Typical displays of the data used during processing and analysis:

- Greyscale – Presents the data in plan view 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.

- 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 plots can be made available upon request)

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		Buckmore Park North, Petersfield, Hampshire			
Type of project		Detailed gradiometer survey (Field evaluation)			
Project description		A broken linear anomaly was identified bisecting the eastern portion of the site on a north-south orientation. Whilst this feature may pertain to a former field boundary, predating historic maps, it is likely that this anomaly is associated with a drainage gully corresponding to the formal gardens of Buckmore House to the north of the site. This interpretation is further supported by a linear depression noted in LiDAR data. An area of increased magnetic response was noted in the western portion of the site, with a linear dipolar anomaly extending away toward the south-west. Although the anomalies likely pertain to an area of wet ground and a modern service respectively, it is likely these anomalies overlay an earlier water feed to a Hydraulic Ram noted on the OS 25 Inch 1892 – 1914 map. Further, situated at the southern extremity of a field boundary aligned with the linear anomaly on site, is a noted well in Buckmore Farm on the same map. The alignment of the linear anomaly and position of the well suggests a water source for the Ram. LiDAR data further supports this interpretation, with a linear depression running from the Hydraulic Ram to the field boundary to the south. Areas of weak positive anomalies were identified across the northern portion of the site. These have been interpreted as variation is local geology. A series of three linear trends were noted immediately north of the area of increased magnetic response. It is likely these are associated with the former water feed for the Hydraulic Ram but are too weak to confidently interpret further.			
Project dates		**Start:** 15-06-2022		**End:** 16-06-2022	
Previous work		DBA			
Future work		Not Known			
Project Code:	264190	**HER event no.**	N/A	**OASIS form ID:**	wessexar1-507863
		NMR no.	N/A		
		SM no.	N/A		
Planning Application Ref.		Not Known			
Site Status		None			
Land use		Pasture			
Monument type		None	**Period**	None	

Project Location:

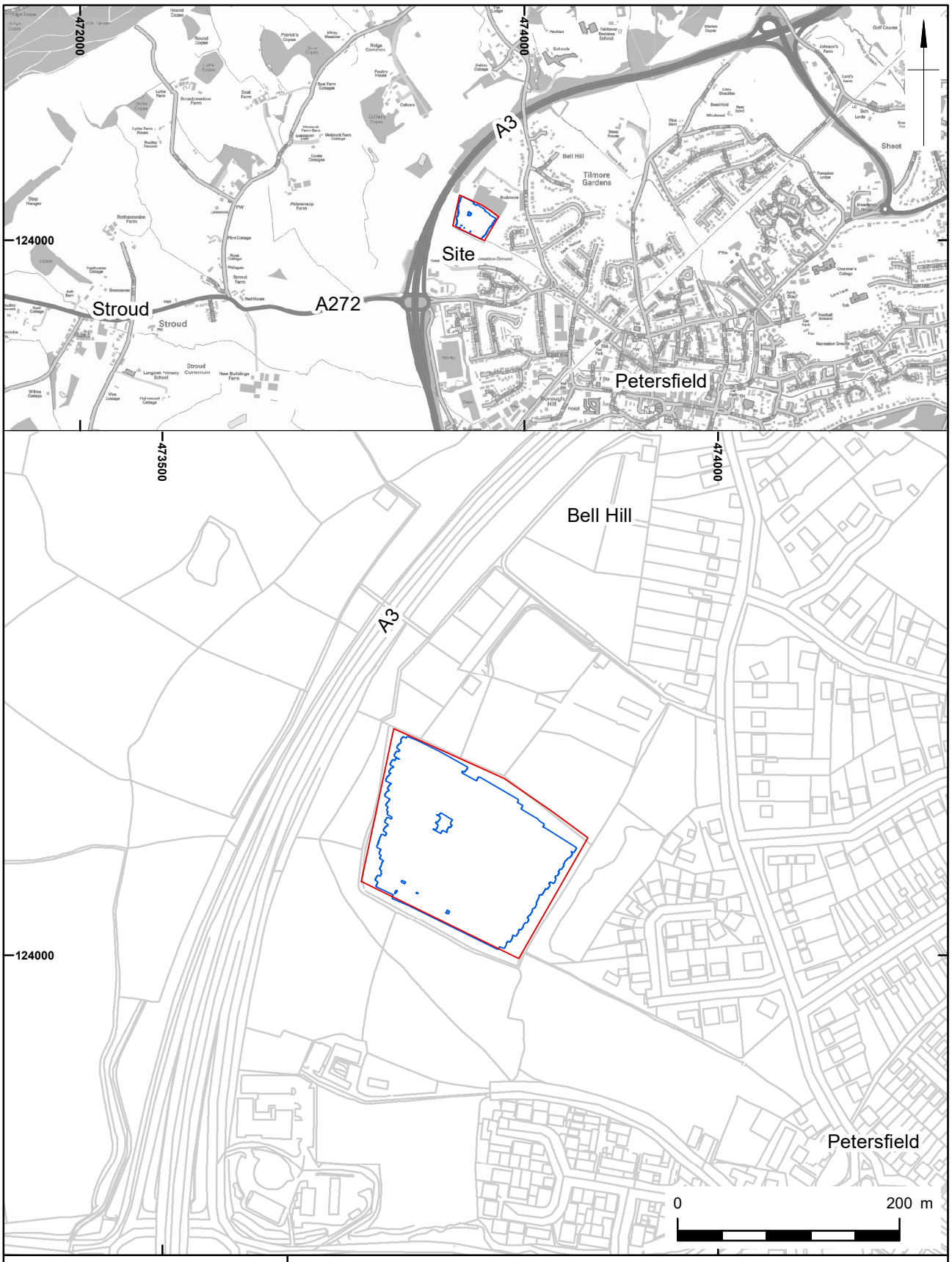
Site Address	Buckmore Park North, Petersfield, Hampshire			**Postcode**	GU32 3BN
County	Hampshire	**District**	East Hampshire	**Parish**	Petersfield
Study Area	2.4 ha	**Height OD**	76 – 86 m aOD	**NGR**	SU 73725 24040

Project Creators:

Name of Organisation	Wessex Archaeology		
Project brief originator	Foreman Homes Ltd	**Project design originator**	Foreman Homes Ltd
Project Manager	Patricia Edwards	**Project Supervisor**	Pamela Warne
Sponsor or funding body	Foreman Homes Ltd	**Type of Sponsor**	Private

Project Archive and Bibliography:

Physical archive	N/A	**Digital Archive**	Geophysical survey and report	**Paper Archive**	N/A
Report title	Buckmore Park North, Petersfield, Hampshire			**Date**	2022
Author	Wessex Archaeology	**Description**	Unpublished report	**Report ref.**	264190.03



Site boundary

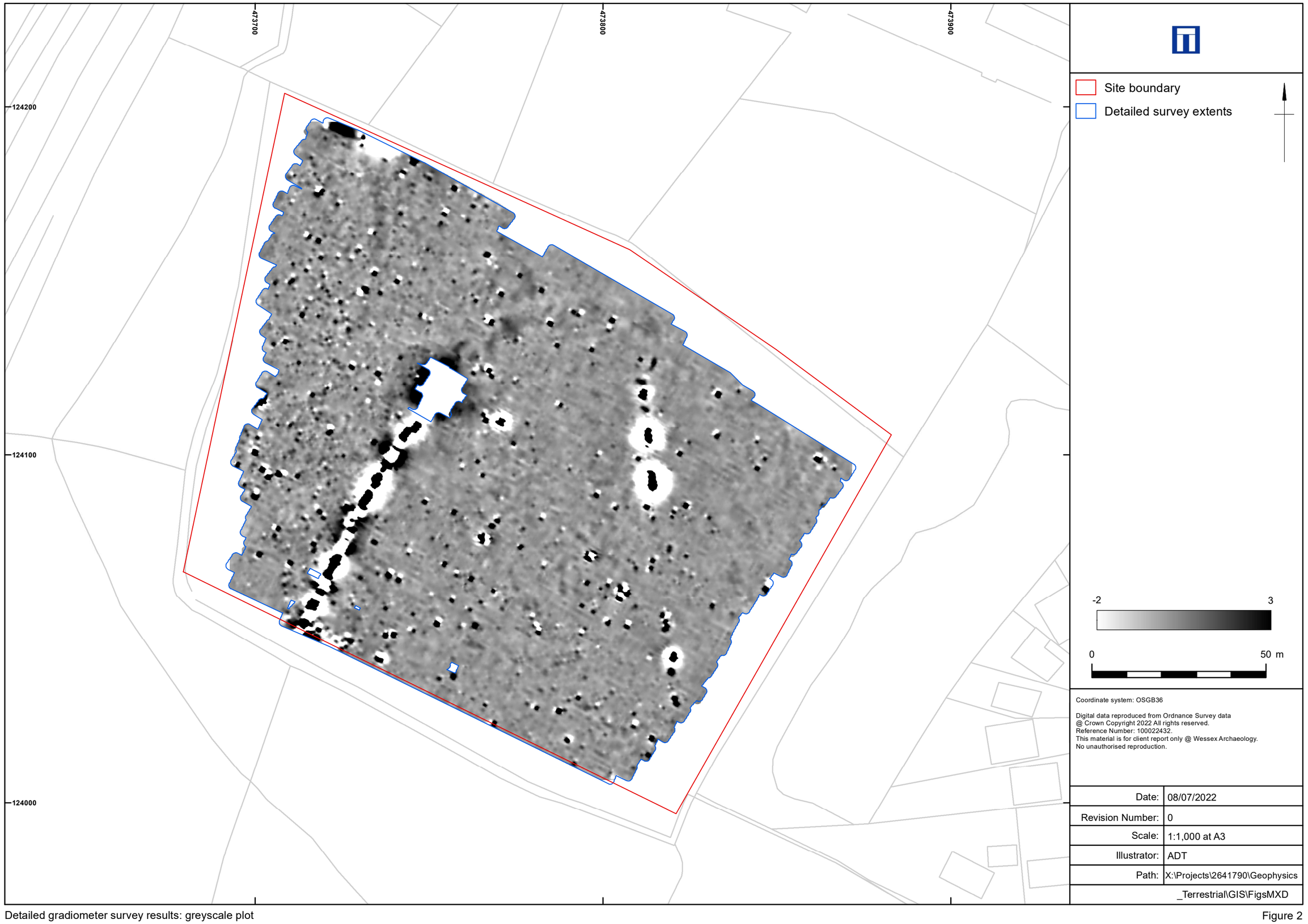
Detailed survey extents

Coordinate system: OSGB36

Date:	05/07/2022	Revision Number:	0
Scale:	1:25,000 & 1:5,000 at A4	Illustrator:	ADT
Path:	X:\Projects\264190\Geophysics_Terrestrial\GIS\FigsMXD		

Site location and survey extent

Figure 1



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Revision Number:	0
Scale:	1:1,000 at A3
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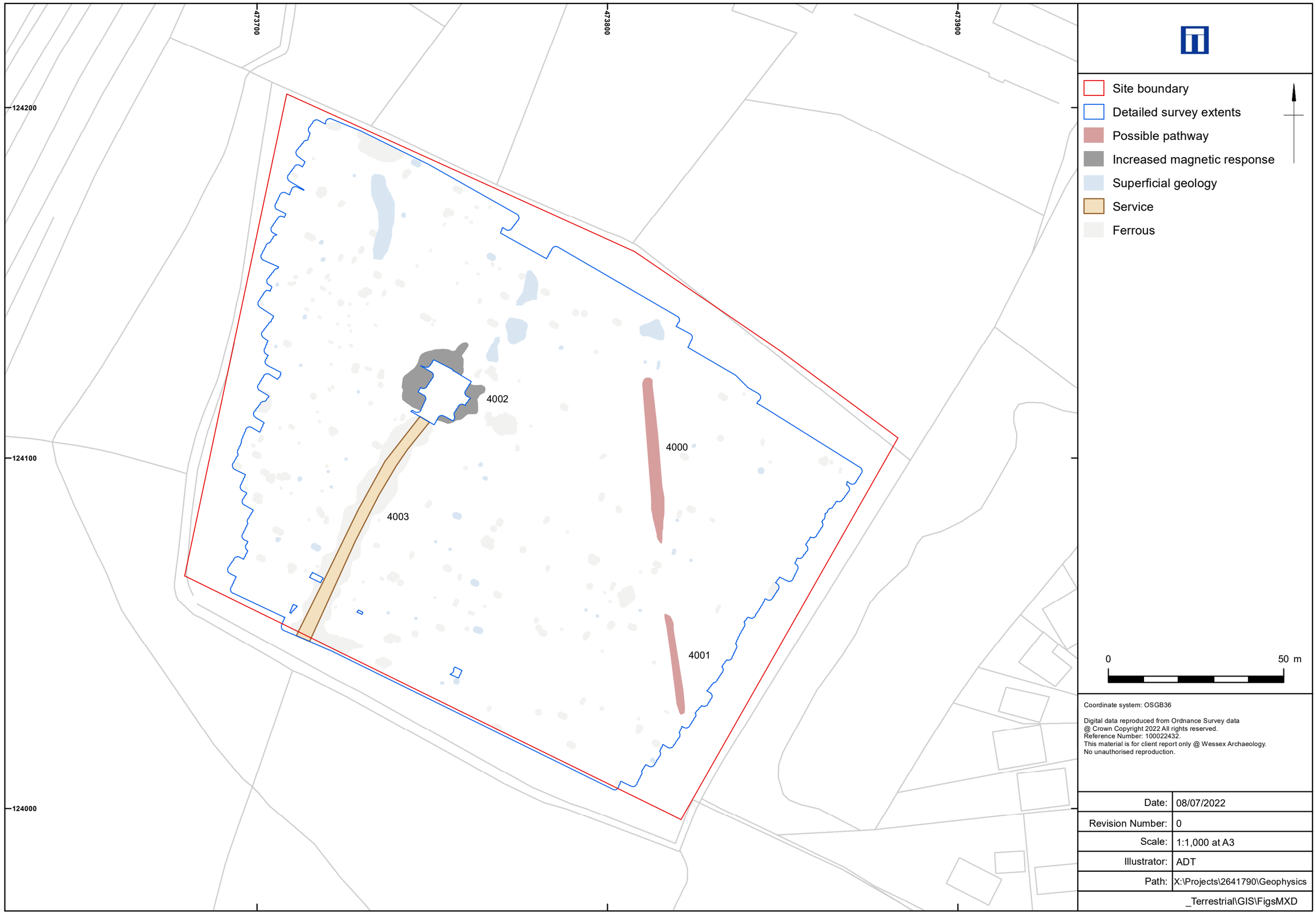
Detailed gradiometer survey results: greyscale plot

Figure 2



Coordinate system: OSGB36

Date:	08/07/2022
Revision Number:	0
Scale:	1:1,000 at A3
Illustrator:	ADT
Path:	X:\Projects\2641790\Geophysics
	_Terrestrial\GIS\FigsMXD

Detailed gradiometer survey results: interpretation

Figure 3

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