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Woodacre Green
Bardsey
West Yorkshire

**Archaeological Evaluation - Geophysical Survey and
Trial Trenching**

Report no. 2497

July 2013

Client: Prospect Archaeology Ltd



Woodacre Green Bardsey West Yorkshire

Archaeological Evaluation - Geophysical Survey and Trial Trenching

Summary

An archaeological evaluation comprising geophysical (magnetometer) survey and trial trenching was carried out at the site of a proposed housing development in Bardsey. Due to the boggy and overgrown nature of the eastern, lower lying, parts of the site the evaluation was restricted to the sloping higher ground to the west. Other than the variation in response due to the soils and geology only two linear trend anomalies, interpreted as of likely agricultural origin, and a sewer/drain were identified by the magnetic survey. The trial trenching subsequently confirmed the presence of a drain but did not identify any feature corresponding with the two linear trends. Changes in the natural deposits were however, noted at these locations. No archaeological features, deposits or artefacts were present in any of the five excavated trenches. On the basis of the evaluation this part of the proposed development area is considered to have little or no archaeological potential.



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Report Information

Client: Prospect Archaeology Ltd
Address: Prospect House, Garden Lane, Sherburn in Elmet, Leeds,
LS25 6AT
Report Type: Geophysical Survey and Trial Trenching
Location: Bardsey
County: West Yorkshire
Grid Reference: SE 3655 4375
Period(s) of activity: post-medieval
Report Number: 2497
Project Number: 4081
Site Code: WGB13
Planning Application No.: 12/05259/FU
Museum Accession No.: Not assigned
OASIS ID: archaeo111- 156210
Date of fieldwork: July 2013
Date of report: July 2013
Project Management: Alistair Webb BA MifA
Geophysical survey team: Sam Harrison BSc MSc AIfA
Fieldwork team: Louise Felding
Report: Alistair Webb
Illustrations: Sam Harrison

Authorisation for
distribution: -----



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1 Introduction

Archaeological Services WYAS was commissioned by Nansi Rosenberg of Prospect Archaeology Ltd on behalf of their client Park Lane Homes to carry out an archaeological evaluation, comprising a geophysical (magnetometer) survey followed by trial trenching, at a site to the south of Woodacre Green, Bardsey (see Fig. 1). The evaluation was carried out as a condition of the planning permission (12/05259/FU) to develop the site for housing.

Site location, topography and land-use

The proposed development area (PDA) comprises an irregular shaped parcel of land, centred at SE 3655 4375, of approximately 1.3 hectares to the north of the village of Bardsey. The PDA is bounded by housing bordering Woodacre Green and Bankfield to the north and Bardsey Beck to the east. Fields extend to the south and west.

The site slopes sharply from the west, at approximately 50m above Ordnance Datum (aOD) down towards the beck at 40m aOD. The western part of the PDA comprises grazed pasture. To the east the land is low lying and boggy with substantial tree and shrub cover. This area was unsuitable for either survey or trial trenching (see Plate 1).

Soils and geology

The solid geology comprises mudstone, siltstone and sandstone of the Millstone Grit Group. These are overlain by superficial deposits of Devensian till to the west with alluvium adjacent to Bardsey Beck. The soils are classified in the Dunkeswick association being characterised as slowly permeable, seasonally waterlogged fine loams over clay.

2 Archaeological and Historical Background

Although there are no confirmed heritage sites within the application area an ancient road is shown on the first edition mapping as crossing the southern edge of the PDA from east to west. The site is also situated within a landscape which contains cropmark evidence for Iron Age/Roman activity in the vicinity. The alignment of these cropmarks suggests that they might extend into the PDA (see Fig. 2). Bardsey Castle, a 12th century motte and bailey castle is located 330m to the south of the site.

3 Aims and Objectives

The overall aim of the evaluation was to establish and clarify the nature of the archaeological resource within the PDA and was undertaken as a condition of the planning application (12/05259/FU) to develop the site for housing. The results will be used to determine what, if any, further archaeological work may be required to mitigate the effects of the development. The scope of work was set out in a Specification (see Appendix 2) produced on behalf of

Park Lane Homes by the West Yorkshire Archaeology Advisory Service (WYAAS), archaeological advisors to Leeds City Council.

Specifically the aim of the geophysical survey was to provide information about the nature and possible interpretation of any magnetic anomalies identified during the survey and thereby determine the presence or absence and likely extent of any buried archaeological remains. The results of the geophysical survey would be used to determine the location of a programme of trial trenching.

The aims of the trial trenching were to gather sufficient information to establish the presence or absence of archaeological remains within the area, and to establish the extent, condition, character and date of any archaeological features and deposits. The objective of the trial trenching was to excavate a total of nine trenches either targeted on magnetic anomalies, or located in order to test apparently 'blank' areas.

4 Methodology and Presentation

Magnetometer survey

A VRS differential GPS system was used to set out the site grid (see Appendix 4). The survey was carried out using a Bartington Grad601 instrument taking readings at 0.25m intervals on zig-zag traverses 1m apart within 30m by 30m grids so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further technical information on the equipment used, data processing and survey methodologies are given in Appendix 3.

The survey methodology, reporting standards and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Institute for Archaeologists (IfA 2010), and are in compliance with the Specification (WYAAS 2013). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

Trial Trenching

All trenches were located using a VRS differential GPS system.

The area of each trench, 30m by 2m, was excavated by a JCB 3CX fitted with a toothless ditching bucket. All excavations were under direct archaeological supervision with topsoil

and any subsequent deposits removed in level spits until the first archaeological horizon or undisturbed natural deposits were reached. The resultant surfaces and sections of each trench were then inspected for the presence of archaeological remains with any further excavation being undertaken by hand.

Linear features were subject to a 10% sample by length with each excavated section measuring no less than 1m in length.

A written, drawn and photographic record was produced for all excavated deposits with sections drawn at no less than 1:20 scale and plans produced at a scale of 1:50. The depth and nature of all principle strata were recorded regardless of the presence of archaeological remains.

All investigations and recording was undertaken in accordance with ASWYAS standard methods (2011) and relevant professional standards (Institute for Archaeologists 2008) and in compliance with the Specification (WYAAS 2013).

Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey mapping is shown in Figure 1. Figure 2 presents a more detailed site location showing the magnetometer data at a scale of 1:2500. Figures 3, 4 and 5 display the processed (greyscale) and minimally processed (X-Y trace plot) data together with an interpretation of the anomalies at a scale of 1:1000. The location of the trial trenches are shown in Figure 6.

5 Results and Discussion

Magnetometer Survey (Figs 3, 4 and 5 inclusive)

Ferrous anomalies

Isolated dipolar ('iron spike') anomalies have been identified throughout the survey area. These anomalies are typically caused by ferrous (magnetic) material, either on the ground surface or in the topsoil horizon, which causes rapid variations in the magnetic readings giving a characteristic 'spiky' XY trace. Unless there is supporting evidence for an archaeological interpretation little importance is normally attributed to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious clustering to these anomalies that might suggest some potential significance and they are therefore interpreted as being due to random ferrous debris.

A linear dipolar anomaly running along the southern site boundary is probably caused by a pipe, possibly a sewer.

Geological anomalies

Numerous discrete anomalies, characterised as localised areas of magnetic enhancement, have been identified across the whole of the survey area. The low magnitude, widespread distribution and lack of any apparent pattern suggests these anomalies have a geological origin, being due to localised variations in the underlying superficial deposits and/or soils.

Agricultural anomalies

Two linear trend anomalies on the same south-west/north-east alignment have been identified. These are interpreted as having an agricultural origin being caused by either field drains or ploughing.

Trial Trenching (see Fig. 6)*Stratigraphy*

The trenches varied in depth between 0.3m to 0.7m. Topsoil comprised a mid, dark brown sandy silt ranging between 0.2m and 0.3m in depth. Sub-soil was recorded in all trenches and comprised light brown sandy silt of between 0.2m and 0.5m depth. Natural deposits comprised mainly yellow sands with clay pockets of varying colour and size and with variable amounts of stone. Natural deposits were recorded at between 49.6m aOD, at the southern end of T1, to 43.25m aOD at the eastern end of T2.

All excavated trenches were 30m in length and 2m in width (Fig. 6). The results are tabulated in Table 1 below. No archaeological features, deposits or finds were identified in any of the trenches.

Table 1. Summary of trenching results

Trench No.	Trench depth	Topsoil depth	Subsoil depth	Comments
1	0.45m-0.65m	0.2m-0.25m	0.2m-0.3m	Linear trend in the magnetic data corresponds with a change between clay/stone natural to a sandier natural
2	0.3m-0.5m	0.2m-0.3m	0.2m-0.3m	Two stone lined field drains at eastern end of trench aligned north-west/south-east (see Plate 4). The cut for the line of a sewer (identified by the geophysical survey) on a similar alignment was also seen in plan.
3	0.55m-0.7m	0.25m-0.3m	0.3m-0.5m	Linear trend in the magnetic data corresponds with a geological change.
4	0.4m-0.5m	0.2m	0.2m-0.3m	No features or geological variation noted.
5	0.45m-0.75m	0.2m-0.3m	0.25m-0.45m	No features or geological variation noted.
6				Not excavated – overgrown/boggy
7				Not excavated – overgrown/boggy
8				Not excavated – overgrown/boggy
9				Not excavated – overgrown/boggy

6 Conclusions

Both the geophysical survey and the subsequent trial trenching has confirmed that the steeply sloping part of the site has little or no archaeological potential with the only features recorded being two stone lined field drains of probable 19th century origin and the line of a modern drain or sewer.

No fieldwork was carried out in the eastern part of the site which was both very boggy and overgrown. This area is adjacent to Bardsey Beck and is known to be prone to flooding. Given the location it would seem highly unlikely that this (larger) part of the site would have any archaeological potential.

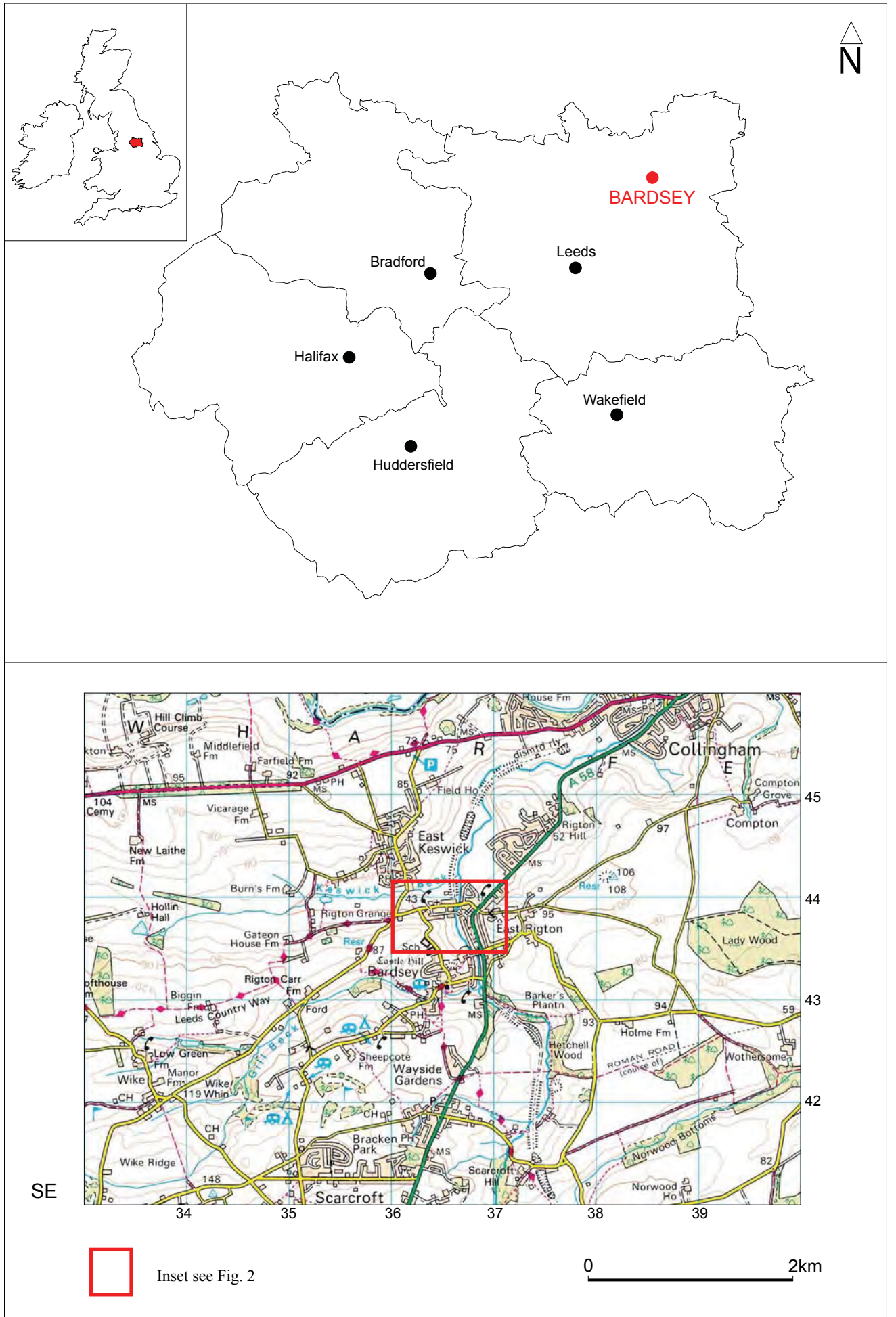


Fig. 1. Site location

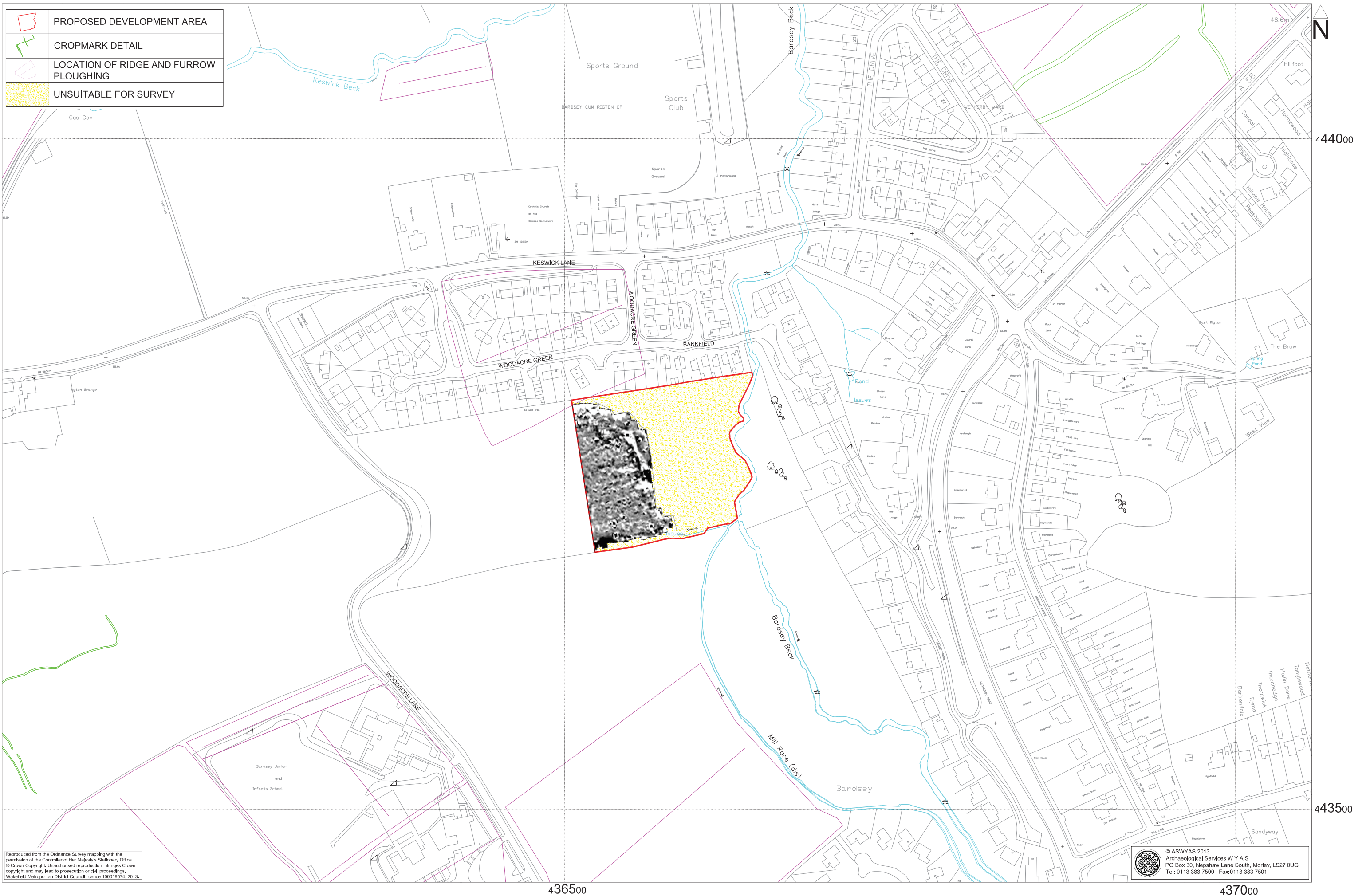


Fig. 2. Site location showing proposed development area and magnetometer data (1:2500 @ A3)

0 25m

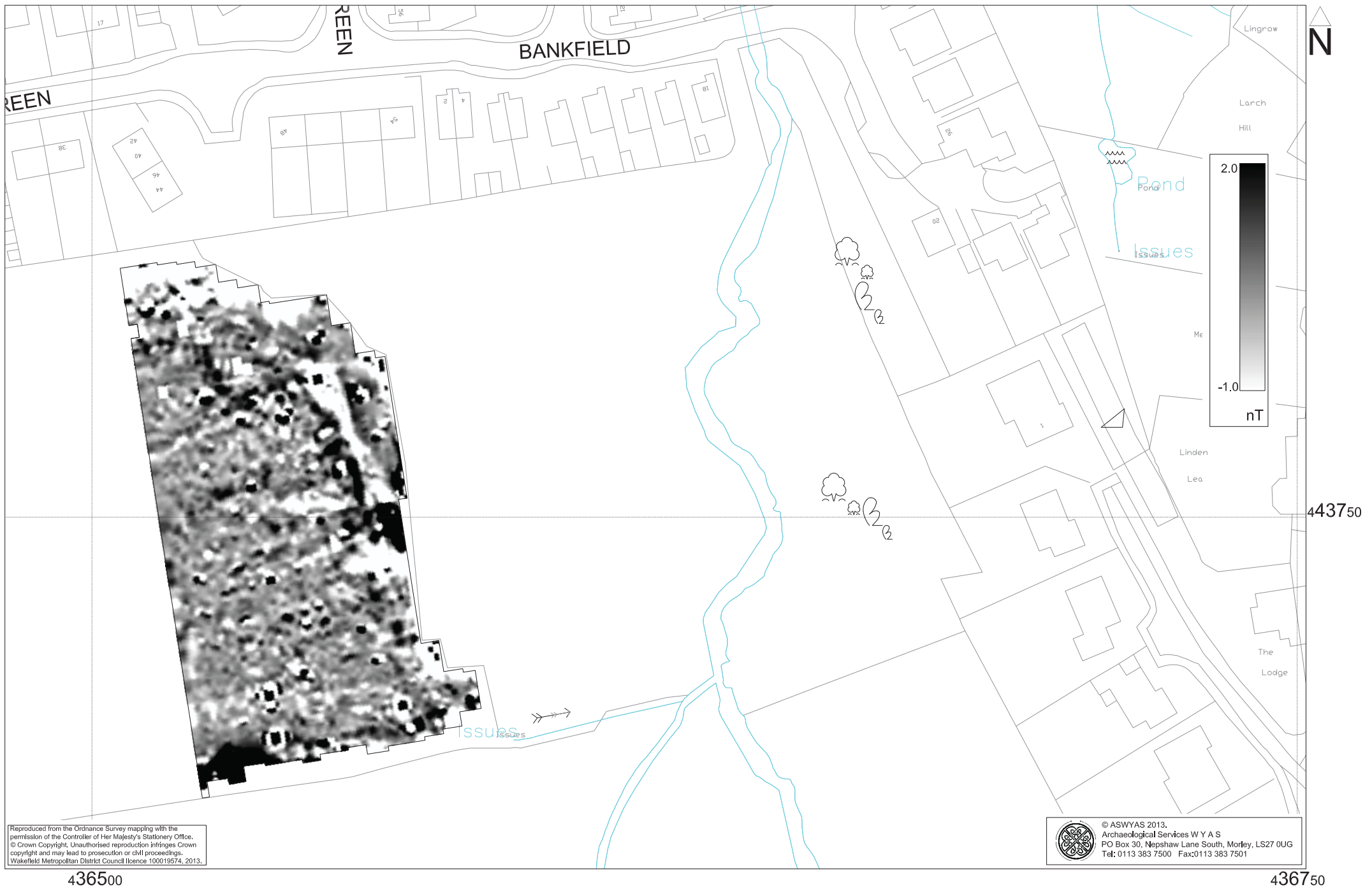


Fig. 3. Processed greyscale magnetometer data (1:1000 @ A4)

0 25m

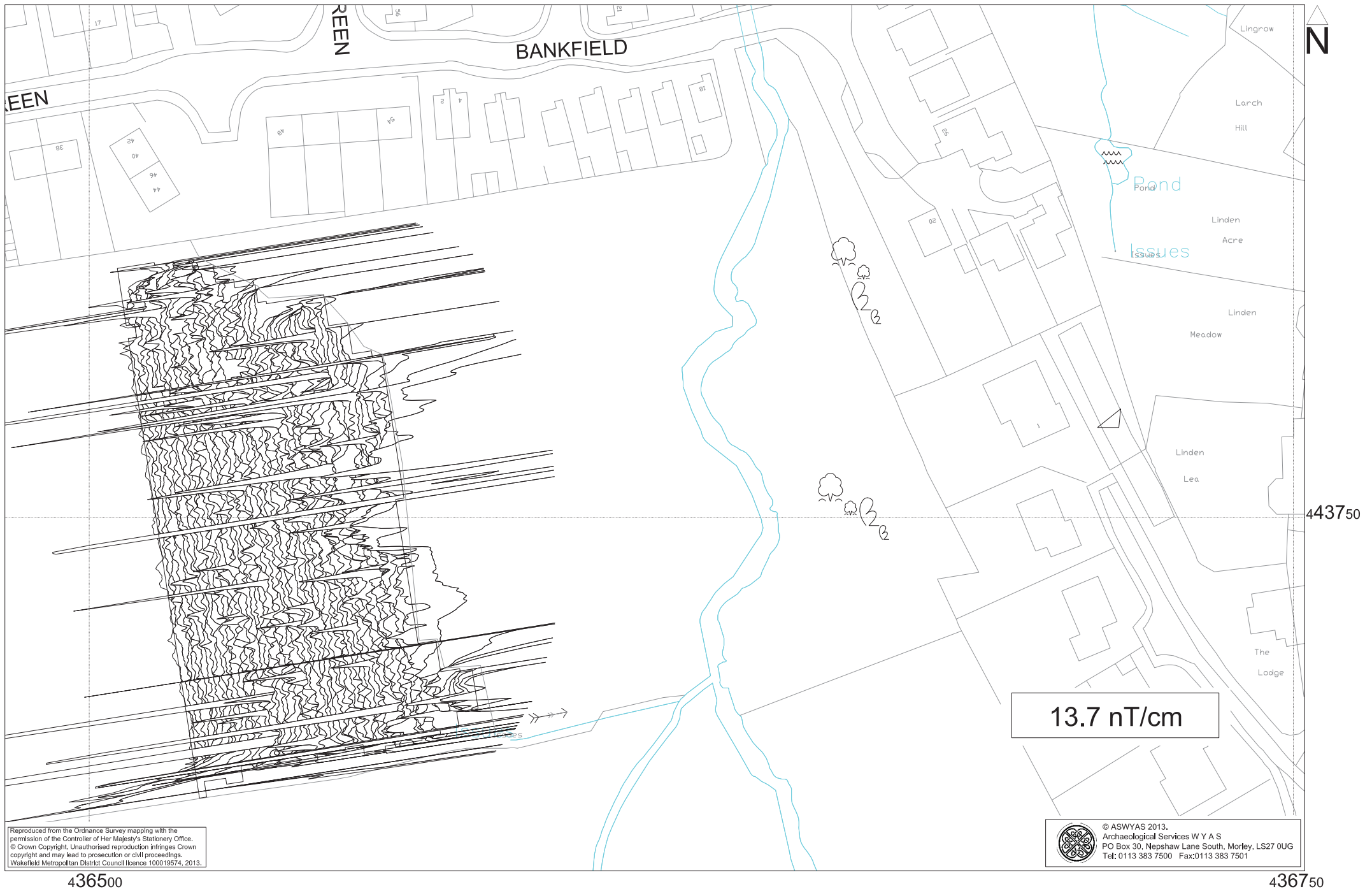


Fig. 4. XY trace plot of minimally processed magnetometer data (1:1000 @ A4)

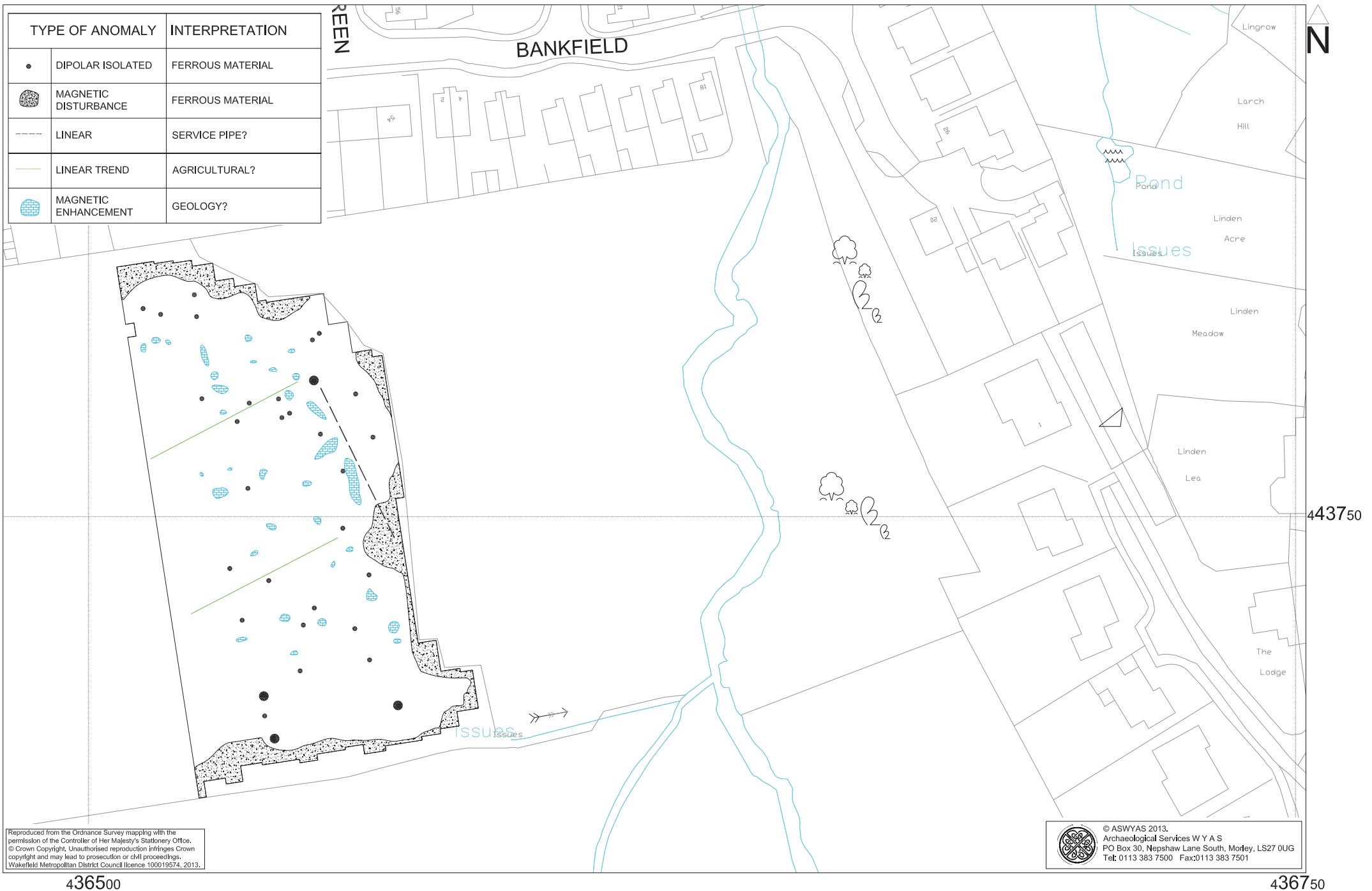


Fig. 5. Interpretation of magnetometer data (1:1000 @ A4)

0 25m

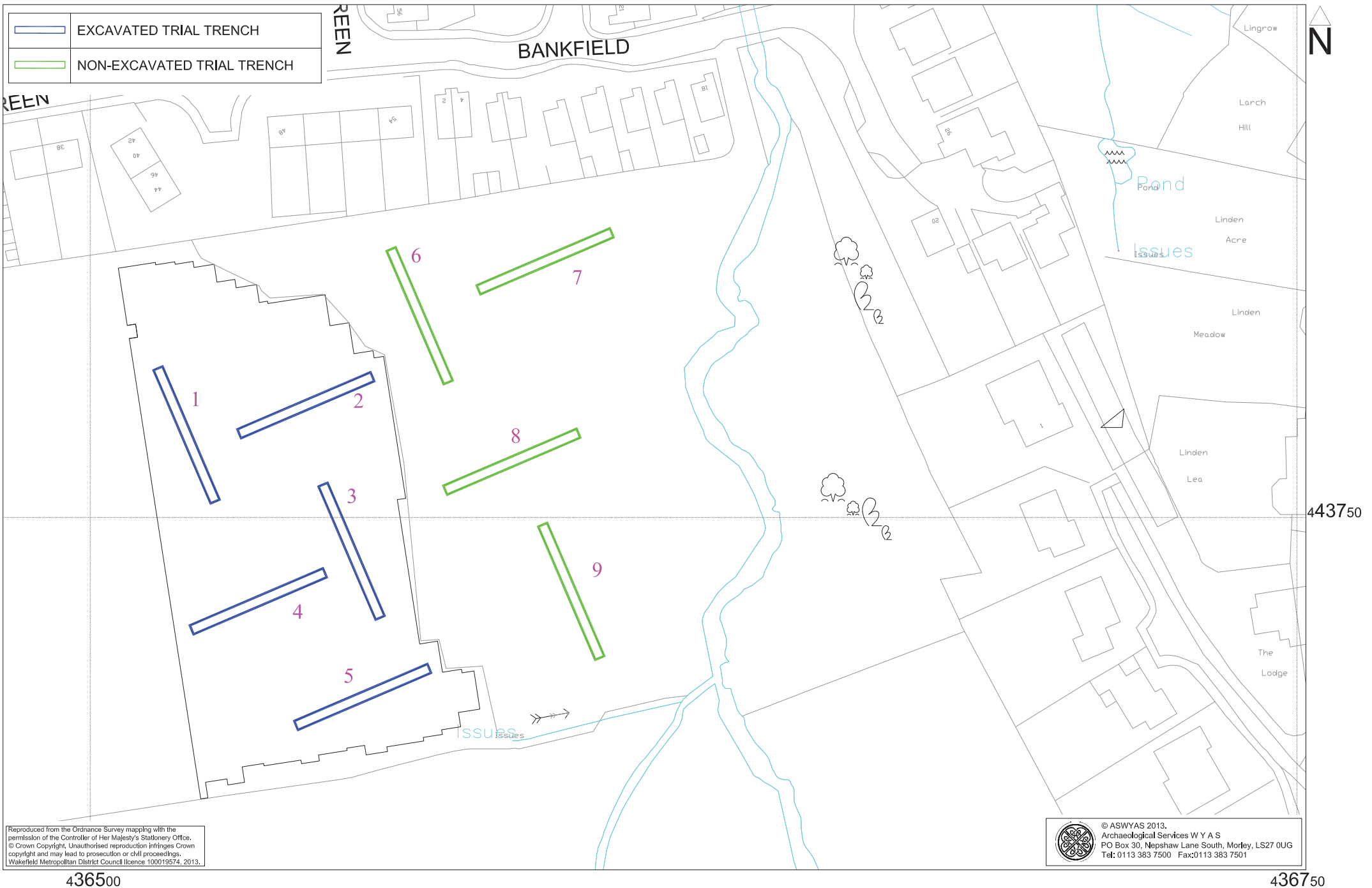


Fig. 6. Location of trial trenches with magnetometer data (1:1000 @ A4)

0 25m



Plate 1. General view of development area showing area unsuitable for archaeological investigation



Plate 2. General view of development area, looking south



Plate 3. Trench 1, facing north-east



Plate 4. Trench 2, facing south-west



Plate 5. Trench 3, facing north-east



Plate 6. Trench 4, looking south-west



Plate 7. Trench 5, looking south-west



Plate 8. View of reinstatement of Trench 1 and Trench 2, looking north-east

Appendix 1: Inventory of primary archive

File/Box No	Description	Quantity
File no.1	Daily Site Recoding Form	5
	Trench Record Sheet	5
	Context Register	/
	Context Record Cards	/
	Drawing Register	/
	Drawing Sheet Register	/
	Levels Sheet	/
	Digital Photograph Record Sheet	1
	Finds and Samples Record	/
	Photo register sheets	/
	Colour negative strips	/
	B&W negative strips	/
	Permatrace sheets	/

Appendix 2: Specification

**WEST YORKSHIRE ARCHAEOLOGY ADVISORY SERVICE (WYAAS):
SPECIFICATION FOR GEOPHYSICAL SURVEY AND TRIAL TRENCHING TO
EVALUATE ARCHAEOLOGICAL REMAINS IN ADVANCE OF DEVELOPMENT
AT WOODACRE GREEN, BARDSEY**

Specification prepared for Ben Smith of Parklane Homes on behalf of Leeds City Council (Planning Application reference 12/05259/FU)

1.0 Summary

1.1 A limited amount of archaeological work consisting of trial trenching and geophysical survey is proposed to help establish the archaeological significance of the above site. Any work arising from the results of the evaluation will be covered by a further specification.

1.2 This specification has been prepared by the West Yorkshire Archaeology Advisory Service, the holders of the WY Historic Environment Record

NOTE: The requirements detailed in paragraphs 6.3, 6.4, 6.5, 6.6 and 9.1 are to be met by the archaeological contractor prior to the commencement of fieldwork by completing and returning the attached form to the WY Archaeology Advisory Service.

2.0 Site Location & Description

Grid Reference (centred): SE 3656 4376

2.1 The proposed site consists of an irregular shaped parcel of land, measuring approximately 1.3 hectares, to the north of Bardsey Village. It is bounded to the north by residential properties along Woodacre Green and Bankfield, to the east by Bardsey Beck and to the south and west by fields. The site slopes quite sharply from 50m AOD at the west to 40m AOD at the east. It is overgrown, and the area of land immediately adjacent to the beck is prone to flooding. There are no overhead power lines, and access to the site can currently be gained via a gate off Woodacre Lane. The geology of the site consist of mudstone, siltstone and sandstone of the Millstone Grit Group overlain by Devensian Till deposits to the west and alluvial deposits to the east. The soils are recorded as slowly permeable seasonally wet slightly acid but base rich loamy clays.

3.0 Planning Background

3.1 Planning permission (12/05259/FU) has been submitted to Leeds City Council for a residential development of 14 houses on the site in question.

3.2 The Planning Authority have been advised by the West Yorkshire Archaeology Advisory Service that there is reason to believe that important archaeological remains may be affected by the proposed development. This specification is for a pre-determination archaeological evaluation. Depending upon the results obtained, additional archaeological work governed by separate specifications of work, may be required.

3.3 This specification has been prepared by the West Yorkshire Archaeology Advisory Service at the request of Mr Ben Smith of Parklane Homes (0113 2683416. bensmith@parklanehomes.co.uk), to detail what is required for the evaluation and to allow an archaeological contractor to provide a quotation.

4.0 Archaeological Interest

4.1 The proposed development site is located c.330 due north of the Scheduled Monument Castle Hill, a 12th century Motte and Bailey Castle.

4.2 The site location is within a landscape which contains evidence of Iron Age/Roman crop mark features. Such cropmarks are recorded 370m west and 280m east of the proposed site and their form and orientation suggest that they might extend into the development area.

4.3 The First edition Ordnance Survey 6 inch to 1 mile map (sheet 188) marks the course of '*an ancient ridge or road*' running east to west across the southern part of the development site.

5. Aim of the Specified Work

5.1 The aim of the evaluation is to gather sufficient information to establish the extent, condition, character and date (as far as circumstances permit) of any archaeological features and deposits within the area of interest. The information gained will allow the Planning Authority to make a reasonable and informed decision on the planning application as to whether archaeological deposits should be preserved in-situ, or more appropriately, be recorded prior to destruction (whether this be a summary record from a salvage excavation or watching brief, or a detailed record from full open area excavation).

6. General Instructions

6.1 Health and Safety

6.1.1 The archaeologist on site will naturally operate with due regard for Health and Safety regulations. This work may require the preparation of a Risk Assessment of the site, in accordance with the Health and Safety at Work Regulations. The WYAAS and its officers cannot be held responsible for any accidents or injuries that may occur to outside contractors while attempting to conform to this specification. Any Health and Safety issues which may hinder compliance with this specification should be discussed with WYAAS at the earliest possible opportunity (see section 13.2).

6.2 Location of Services, etc.

6.2.1 The archaeological contractors will be responsible for locating any drainage pipes, service pipes, cables *etc.* which may cross any of the trench lines, and for taking the necessary measures to avoid disturbing such services.

6.3 Confirmation of Adherence to Specification

6.3.1 Prior to the commencement of *any work*, the archaeological contractor must confirm adherence to this specification in writing to the WYAAS, or state (with

reasons) any proposals to vary the specification. Should the contractor wish to vary the specification, then written confirmation of the agreement of the West Yorkshire Archaeology Advisory Service to any variations is required prior to work commencing. Unauthorised variations are made at the sole risk of the contractor. **Modifications presented in the form of a re-written specification/project design will not be considered by the WYAAS.** Any technical queries arising from the specification detailed below should be addressed to the WYAAS *without delay*.

6.4 Confirmation of Timetable and Contractors' Qualifications

6.4.1 Prior to the commencement of *any work*, the archaeological contractor **must** provide WYAAS in **writing** with:

- a projected timetable for the site work;
- details of the staff structure and numbers;
- names and CVs of key project members (the project manager, site supervisor, any proposed specialists, sub-contractors *etc.*),

6.4.2 All project staff provided by the archaeological contractor must be suitably qualified and experienced for their roles. The timetable should be adequate to allow the work to be undertaken to the appropriate professional standard, subject to the ultimate judgement of WYAAS.

6.5 Notification

6.5.1 WYAAS should be provided with **as much notice as possible in writing** (and certainly not less than one week) of the intention to start work. A copy of the archaeological contractor's risk assessment of the site should accompany the notification.

6.5.2 The Leeds Museums curator, Katherine Baxter, should be notified of the date of commencement of fieldwork (Tel.: 0113 2141558; email: Katherine.baxter@leeds.gov.uk).

6.5.3 As a courtesy, English Heritage's Science Adviser, Andy Hammon, should also be notified of the intention to commence fieldwork. (Tel.: 01904 601983; email: andy.hammon@english-heritage.org.uk).

6.6 Documentary Research

6.6.1 Prior to the commencement of *fieldwork*, the HER should be visited by either the project manager or the site supervisor, in order to gain an overview of the archaeological/historical background of the site and environs. In addition to providing a knowledge base for the work in hand, the results of this assessment may be incorporated into the contractor's report where they are considered to contribute to that report, but any extraneous material should be omitted. Please note that the HER makes a charge for consultations of a commercial nature. The results of this exercise should be used to inform the whole project. A formal desk-based report is not required and the results of this stage of work should be incorporated in the final report.

7.0 Geophysical Survey Methodology

Geophysical survey contractors are expected to adhere to the English Heritage *Geophysical Survey in Archaeological Field Evaluation* (2008), but also see para. 7.2 below.

7.1 Data Collection

7.1.1 The area of the proposed development to be subject to a magnetic (gradiometer) survey recording data at 0.25m. intervals. Data is to be recorded at 0.25m. stations on 1.0m. spaced traverses. Data may be acquired by rapid survey measuring to (nominally) 0.1nT or better in the first instance. If during the survey, it appears that useful results might only be obtained by higher resolution measurements, and if this would add significantly to the survey time, then the client and the WYAAS should be contacted and the matter discussed and agreed before implementation.

7.1.2 The gradiometer survey is to be carried out over the entire site area.

7.2 Data Presentation

The results of the gradiometer survey should be processed and the results then discussed at a meeting between the contractor and the WYAAS (the client may also wish to attend). The results of the gradiometer survey should be presented in at least two different formats at a minimum 1:500 scale, one of which must be an X/Y trace plot. There must also be an accompanying interpretation drawing at an appropriate scale.

8.0 Trenching Methodology

8.1 Trench Size and Placement

7.1.1 The work will involve the excavation of nine 30m by 2m trenches, which can be machine-opened. The contractor should also allow for a contingency amount of 30 square metres. The use of the contingency will depend upon the results obtained in the initial trial trenching. The use of the contingency will be at the decision of the WYAAS, whose decision will be issued in writing, if necessary in retrospect after site discussions. Proposed trench locations are shown on Figure 2, but **please note that the location of these are presented for tendering purposes only and may be subject to change following the results of the geophysical survey.**

Total site area: **13140m²**

Total area of trenching: **540m²**

Contingency trenching: **30m²**

8.2 Method of Excavation

8.2.1 The trial trenches may be opened and the topsoil and recent overburden removed down to the first significant archaeological horizon in successive level spits of a **maximum** 0.2m. thickness, by the use of an appropriate machine using a wide toothless ditching blade. **Under no circumstances should the machine be used to cut arbitrary trenches down to natural deposits.** Any machine work must be carried out under direct archaeological supervision and the machine halted if significant archaeological deposits are encountered. The top of the first significant

archaeological horizon may be exposed by the machine, but must then be cleaned by hand and inspected for features and then dug by hand.

8.2.2 No archaeological deposits should be entirely removed unless this is unavoidable in achieving the objectives of this evaluation, although **all** features identified are expected to be half-sectioned and the **full** depth of archaeological deposits must be assessed. All trenches are to be the stated dimensions at their base.

8.2.3 All artefacts are to be retained for processing and analysis except for unstratified 20th-century material, which may be noted and discarded. Finds will be stored in secure, appropriate conditions following the guidelines in First Aid for Finds (3rd edition).

8.3 Method of Recording

8.3.1 The trenches are to be recorded according to the normal principles of stratigraphic excavation. The stratigraphy of each area is to be recorded, even when no archaeological deposits have been identified.

8.3.2 Section drawings (at a minimum scale of 1:20) must include heights A.O.D. Plans (at a minimum scale of 1:50) must include O.D. spot heights for all principal strata and any features. At least one section of each trench edge, showing a representative and complete sequence of deposits from the modern ground surface to the natural geology, will be drawn.

8.3.3 The actual areas of excavation and all archaeological (and possibly archaeological) features should be accurately located on a site plan and recorded by photographs, scale drawings and written descriptions sufficient to permit the preparation of a detailed archive and report on the material. The trench locations, as excavated, will be accurately surveyed, tied into the O.S. National Grid and located on an up-to-date 1:1250 O.S. map base.

8.3.4 Except where otherwise requested, black and white photography using orthodox monochrome chemical development should be used. Film should be no faster than ISO400. Slower films should be used where possible as their smaller grain size yields higher definition images. Technical Pan (ISO 25), Pan-F (ISO50), FP4 (ISO125) and HP5 (ISO400) are recommended. The use of dye-based films such as Ilford XP2 and Kodak T40CN is unacceptable due to poor archiving qualities. Black and white photography should be supplemented by colour photography; this should be in transparency format (i.e. slides or digital photography as an acceptable alternative, see paragraph 8.3.5 below).

8.3.5 Digital photography: as an alternative for colour slide photography, good quality digital photography may be supplied, using cameras with a minimum resolution of 8 megapixels. Note that conventional black and white print photography is still required and constitutes the permanent record. Digital images will only be acceptable as an alternative to colour slide photography if each image is supplied in three file formats (as a RAW data file, a DNG file and as a JPEG file). The contractor must include metadata embedded in the DNG file. The metadata must include the following: the commonly used name for the site being photographed, the relevant centred OS grid

coordinates for the site to at least six figures, the relevant township name, the date of photograph, the subject of the photograph, the direction of shot and the name of the organisation taking the photograph. **Any digital images are to be supplied to WYAAS on gold CDs by the archaeological contractor accompanying the hard copy of the report.**

8.4 Use of Metal Detectors

8.4.1 Spoil heaps are to be scanned for non-ferrous metal artefacts using a metal detector capable of making this discrimination, operated by an experienced metal detector user (if necessary, operating under the supervision of the contracting archaeologist). Modern artefacts are to be noted but not retained (19th-century material and earlier should be retained.)

8.4.2 If a non-professional archaeologist is to be used to carry out the metal-detecting, a formal agreement of their position as a sub-contractor working under direction must be agreed in advance of their use on site. This formal agreement will apply whether they are paid or not. To avoid financial claims under the Treasure Act a suggested wording for this formal agreement with the metal detectorist is: "In the process of working on the archaeological investigation at [*location of site*] between the dates of [*insert dates*], [*name of person contributing to project*] is working under direction or permission of [*name of archaeological organisation*] and hereby waives all rights to rewards for objects discovered that could otherwise be payable under the Treasure Act 1996."

8.5 Environmental Sampling Strategy

8.5.1 Bulk samples must be taken from **all** securely stratified deposits using a strategy which combines systematic and judgement sampling, but which also follows the methodologies outlined in the English Heritage (2011) 'Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (Second Edition)' guidance

8.5.2 Samples for specialist environmental analysis and scientific dating (soil profiles, archaeomagnetic dating, dendrochronology etc.) should be taken if suitable material is encountered during the excavation. The English Heritage Science Advisor should be consulted (Dr Andy Hammon, tel.: 01904 601983, email: andy.hammon@english-heritage.org.uk) and provision should be made for an appropriate specialist(s) to visit the site, take samples and discuss the sampling strategy, if necessary.

8.6 Conservation Strategy

8.6.1 A conservation strategy must be developed in collaboration with a recognised laboratory. All finds must be assessed in order to recover information that will contribute to an understanding of their deterioration and hence preservation potential, as well as identifying potential for further investigation. Furthermore, all finds must be stabilised and packaged in accordance with the requirements of the receiving museum. As a guiding principle, only artefacts of a "displayable" quality would warrant full conservation, but metalwork and coinage from stratified contexts would be expected to be x-rayed if necessary, and conservation costs should also be included as a contingency.

8.7 Human Remains

8.7.1 Any human remains that are discovered must initially be left *in-situ*, covered and protected. WYAAS will be notified at the earliest opportunity. If removal is necessary the remains must be excavated archaeologically in accordance with the *Guidance for Best Practice for Treatment of Human Remains Excavated from Christian Burial Grounds in England* published by English Heritage (2005), a valid Ministry of Justice licence, if appropriate, and any local environmental health regulations.

8.8 Treasure Act

8.8.1 The terms of the Treasure Act 1996, as amended, must be followed with regard to any finds that might fall within its purview. Any finds must be removed to a safe place and reported to the local coroner as required by the procedures as laid down in the "Code of Practice". Where removal cannot be effected on the same working day as the discovery, suitable security measures must be taken to protect the finds from theft.

8.9. Unexpectedly Significant or Complex Discoveries

8.9.1 Should there be unexpectedly significant or complex discoveries made that warrant, in the professional judgement of the archaeologist on site, more detailed recording than is appropriate within the terms of this specification, then the archaeological contractor should urgently contact the WYAAS with the relevant information to enable them to resolve the matter with the developer.

8.10 Access/Monitoring Arrangements

8.10.1 The representative of the WYAAS will be afforded access to the site at any reasonable time. It is usual practice that the visit is arranged in advance, but this is not always feasible. The WYAAS' representative will be provided with a site tour and an overview of the site by the senior archaeologist present and should be afforded the opportunity to view all trenches, any finds made that are still on site, and any records not in immediate use. It is anticipated that the records of an exemplar context that has previously been fully recorded will be examined. Any observed deficiencies during the site visit are to be made good to the satisfaction of the WYAAS' representative, by the next agreed site meeting. Access is also to be afforded at any reasonable time to English Heritage's Archaeological Science Advisor.

8.10.2 Please note that WYAAS now make a charge for site monitoring visits. An invoice will be raised on the archaeological contractor. One monitoring visit will be charged for this project. Please contact us for the current charge.

9. Excavation Archives Deposition.

9.1 Before commencing any fieldwork, the archaeological contractor must contact the relevant District museum archaeological curator in writing (copied to WYAAS) to determine the museum's requirements for the deposition of an excavation archive. In this case the contact is: Katherine Baxter, Leeds Museum Discovery Centre, Carlisle Road, Hunslet, Leeds, LS10 1LB (Tel.:0113 2141558; email: Katherine.baxter@leeds.gov.uk).

9.2 It is the policy of the Leeds Museum to accept complete excavation archives, including primary site records and research archives and finds, from all excavations carried out in the District, which it serves.

9.3 It is the responsibility of the archaeological contractor to endeavour to obtain consent of the landowner, in writing, to the deposition of finds with the Leeds Museum.

9.4 It is the responsibility of the archaeological contractor to meet the Leeds Museum's requirements with regard to the preparation of fieldwork archives for deposition.

10. Post-Excavation Analysis and Reporting

10.1 Finds and Samples

10.1.1 On completion of the fieldwork, any samples taken shall be processed and any finds shall be cleaned, identified, assessed/analysed, dated (if possible), marked (if appropriate) and properly packed and stored in accordance with the requirements of national guidelines.

10.1.2 Samples should be processed for the recovery of artefactual material, animal/fish/human bones, industrial residues (including hammerscale), shell, molluscs, charcoal and mineralised plant remains as a minimum. 'Specialist' samples (e.g. monoliths, cores, plant/invertebrate macrofossils) should be processed separately as appropriate.

10.1.3 Material suitable for scientific dating (e.g. charcoal) should be identified to species and assessed for suitability by an environmental specialist prior to submission to a dating laboratory. Any human remains submitted for C14 dating should also have carbon (delta 13C) and nitrogen isotope analysis carried out by the radiocarbon laboratory.

10.1.4 All finds and biological material must be analysed by a qualified and experienced specialist.

10.1.5 Following identification, finds of 20th-century date should be noted, quantified and summarily described, but can then be discarded if appropriate. All finds which are of 19th century or earlier date should be retained and archived.

10.3 Field Archive

10.3.1 A fully indexed field archive shall be compiled consisting of all primary written documents, plans, sections, photographic negatives and a complete set of labelled photographic prints/slides. Standards for archive compilation and transfer should conform to those outlined in *Archaeological Archives – a guide to best practice in creation, compilation, transfer and curation* (Archaeological Archives Forum, 2007). The contractor should also take account of any additional requirements imposed by the recipient museum (see section 9.1 above). An index to the field archive is to be deposited with the West Yorkshire Archaeology Advisory Service (preferably as an appendix in the report).

10.3.2 Prints may be executed digitally from scanned versions of the film negatives, and may be manipulated to improve print quality (but not in a manner which alters detail or perspective). **All digital prints, including those presented in the report, must be made on paper and with inks which are certified against fading or other deterioration for a period of 75 years or more when used in combination. If digital printing is employed, the contractor must supply details of the paper/inks used in writing to the WY Archaeology Advisory Service, with supporting documentation indicating their archival stability/durability.** Written confirmation that the materials are acceptable must have been received from the WYAAS prior to the commencement of work on site.

10.3.3 The original archive is to accompany the deposition of any finds, providing the landowner agrees to the deposition of finds in a publicly accessible archive (see para. 8.4 above). In the absence of this agreement the field archive (less finds) is to be deposited with the West Yorkshire Archaeology Advisory Service.

10.4 Report Format and Content

10.4.1 A report should be produced, which should include background information on the need for the project, a description of the methodology employed, and a full description and interpretation of results produced. It is not envisaged that the report is likely to be published, but it should be produced with sufficient care and attention to detail to be of academic use to future researchers.

10.4.2 Location plans should be produced at a scale which enables easy site identification and which depicts the full extent of the site investigated (a scale of 1:50,000 is not regarded as appropriate unless accompanied by a more detailed plan or plans). Site plans should be at an appropriate scale showing trench layout (as dug), features located and, where possible, predicted archaeological deposits. Upon completion of each evaluation trench all sections containing archaeological features will be drawn. Section drawings (at a minimum scale of 1:20) must include heights O.D. Plans (at a minimum scale of 1:50) must include O.D. spot heights for all principal strata and any features. Where no archaeological deposits are encountered at least one long section of each trench will be drawn.

10.4.3 Artefact analysis is to include the production of a descriptive catalogue, quantification by context and discussion/interpretation if warranted, with finds critical for dating and interpretation illustrated.

10.4.4 Environmental analysis is to include identification of the remains, quantification by context, discussion/interpretation if warranted, and a description of the processing methodology. Radiocarbon results must be presented in full (laboratory sample number, conventional radiocarbon age, delta C13 value, calibration programme). Copies of the laboratory-issued dating certificates must be included as an appendix to the report.

10.4.5 Details of the style and format of the report are to be determined by the archaeological contractor, but should include a full bibliography, a quantified index to the site archive, and as an appendix, a copy of this specification.

10.5 Summary for Publication

10.5.1 The attached summary sheet should be completed and submitted to the WYAAS for inclusion in the summary of archaeological work in West Yorkshire to be published on WYAAS' website.

10.6 Publicity

If the project is to be publicised in any way (including media releases, publications etc.), then it is expected that the WYAAS will be given the opportunity to consider whether it wishes its collaborative role to be acknowledged, and if so, the form of words used will be at the WYAAS' discretion.

10.6 Consideration of Appropriate Mitigation Strategy

11.6.1 The report should not give a judgement on whether preservation or further investigation is considered appropriate, but should provide an interpretation of results, placing them in a local and regional, and if appropriate, national context. However, a client may wish to separately commission the contractor's view as to an appropriate treatment of the resource identified.

11. Report Submission and Deposition with the HER

11.1 A hard copy of the report (plus a digital copy on gold disk) is to be supplied directly to the WYAAS, in a timely manner to allow further work, if necessary, to be scheduled and the planning application to be determined in an informed manner, and certainly within a period of two months following completion of fieldwork so as not to delay a planning decision to be made, unless specialist reports are awaited. In the latter case a revised date should be agreed with the WYAAS. Completion of this project and advice from WYAAS on an appropriate mitigation strategy are dependant upon receipt by WYAAS of a satisfactory report which has been prepared in accordance with this specification. Any comments made by WYAAS in response to the submission of an unsatisfactory report will be taken into account and will result in the reissue of a suitably edited report to all parties, within a timescale which has been agreed with WYAAS.

11.2 The report will be supplied on the understanding that it will be added to the West Yorkshire Historic Environment Record where it will be publicly accessible once deposited unless confidentiality is explicitly requested, in which case it will become publicly accessible six months after deposition.

11.3 Copyright - Please note that by depositing this report, the contractor gives permission for the material presented within the document to be used by the WYAAS, in perpetuity, although The Contractor retains the right to be identified as the author of all project documentation and reports as specified in the *Copyright, Designs and Patents Act 1988* (chapter IV, section 79). The permission will allow the WYAAS to reproduce material, including for non-commercial use by third parties, with the copyright owner suitably acknowledged.

11.4 A copy of the final report (in .pdf format) shall also be supplied to English Heritage's Science Advisor (Andy Hammon, English Heritage, 37 Tanner Row, York YO1 6WP).

11.5 The West Yorkshire HER supports the Online Access to Index of Archaeological Investigations (OASIS) project. The overall aim of the OASIS project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large-scale developer funded fieldwork. The archaeological contractor must therefore complete the online OASIS form at <http://ads.ahds.ac.uk/project/oasis/>. Contractors are advised to contact the West Yorkshire HER officer prior to completing the form. Once a report has become a public document by submission to or incorporation into the HER, the West Yorkshire HER may place the information on a web-site. Please ensure that you and your client agree to this procedure in writing as part of the process of submitting the report to the case officer at the West Yorkshire HER.

12. General Considerations

12.1 Authorised Alterations to Specification by Contractor

12.1.1 It should be noted that this specification is based upon records available in the West Yorkshire Historic Environment Record and on a brief examination of the site by the WYAAS. Archaeological contractors submitting tenders should carry out an inspection of the site prior to submission. If, on first visiting the site or at any time during the course of the recording exercise, it appears in the archaeologist's professional judgement that

- i) a part or the whole of the site is not amenable to recording as detailed above, and/or
- ii) an alternative approach may be more appropriate or likely to produce more informative results, and/or

then it is expected that the archaeologist will contact WYAAS as a matter of urgency. If contractors have not yet been appointed, any variations which the WYAAS considers to be justifiable on archaeological grounds will be incorporated into a revised specification, which will then be re-issued to the developer for redistribution to the tendering contractors. If an appointment has already been made and site work is ongoing, WYAAS will resolve the matter in liaison with the developer and the Local Planning Authority.

12.2 Unauthorised Alterations to Specification by Contractor

12.2.1 It is the archaeological contractor's responsibility to ensure that they have obtained WYAAS' consent in writing to any variation of the specification prior to the commencement of on-site work or (where applicable) prior to the finalisation of the tender. Unauthorised variations may result in WYAAS being unable to recommend determination of the planning application to the Local Planning Officer based on the archaeological information available and are therefore made solely at the risk of the contractor.

12.3 Technical Queries

Similarly, any technical queries arising from the specification detailed above, should be addressed to WYAAS without delay.

12.4 Valid Period of Specification

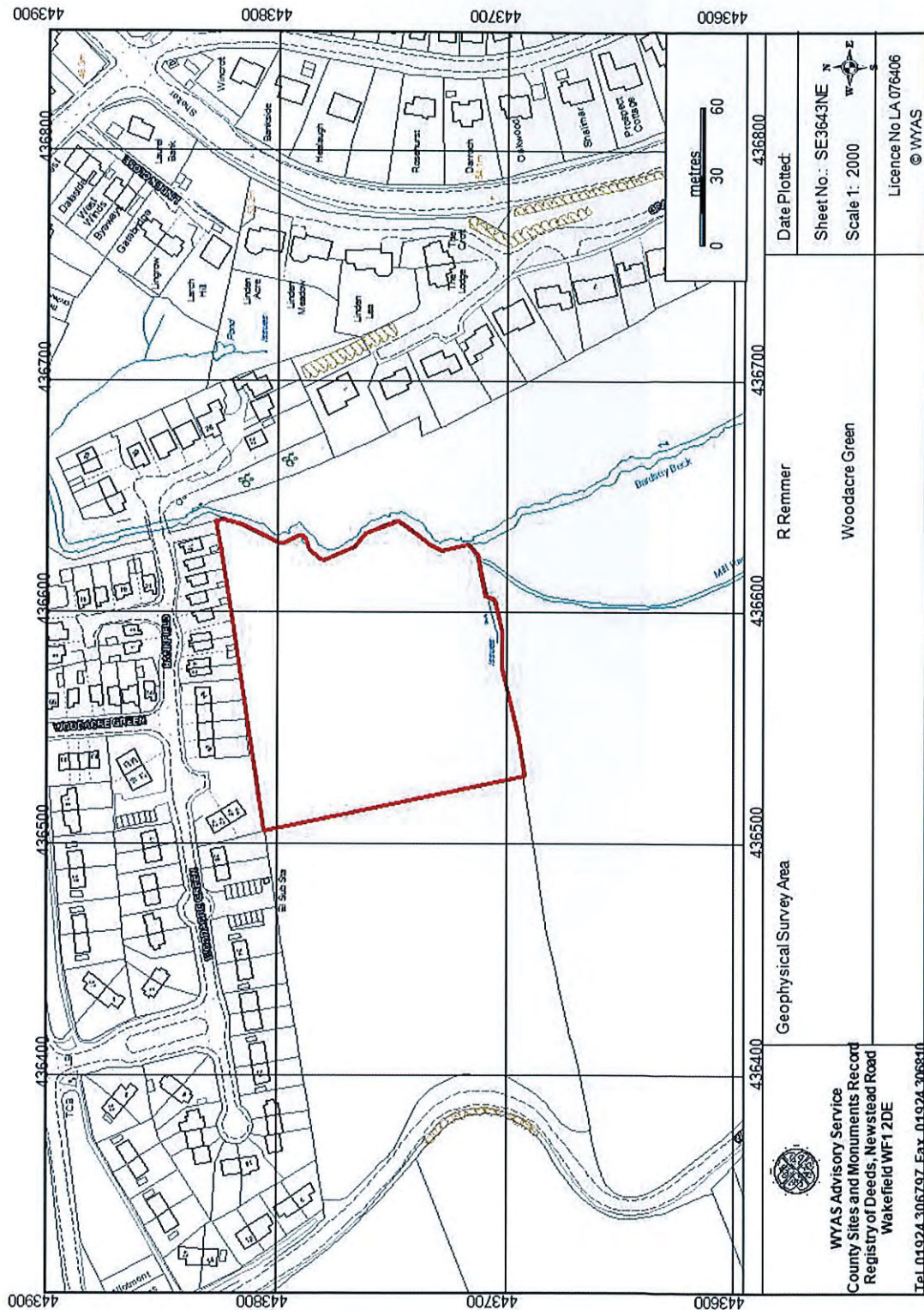
This specification is valid for a period of one year from date of issue. After that time it may need to be revised to take into account new discoveries, changes in policy or the introduction of new working practices or techniques.

West Yorkshire Archaeology Advisory Service
Rebecca Remmer

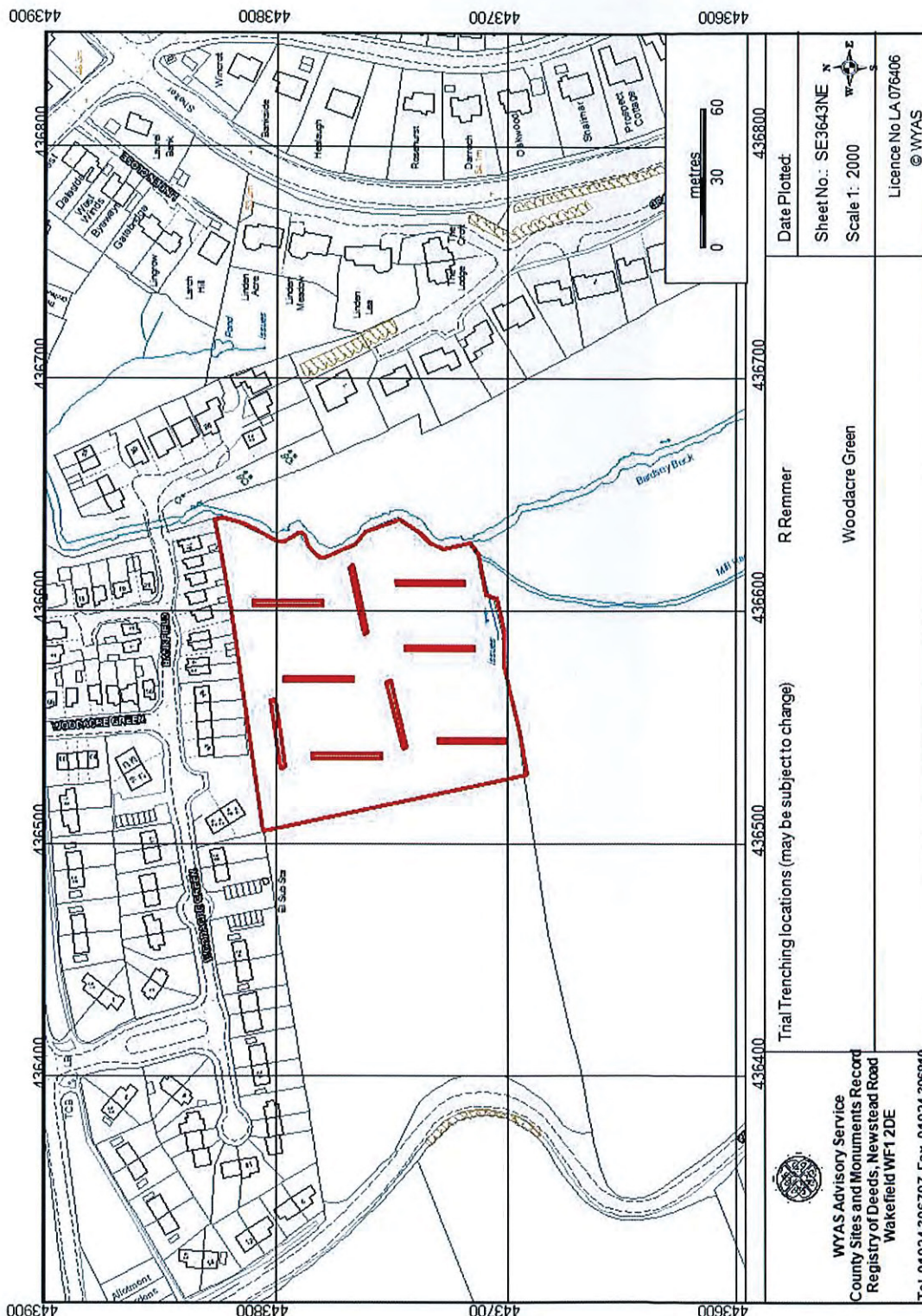
May 2013


Historic Environment Record
West Yorkshire Archaeology Advisory Service
Registry of Deeds
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WF1 2DE

Telephone: (01924) 305992
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<p>WYAS Advisory Service County Sites and Monuments Record Registry of Deeds, Newstead Road Wakefield WF1 2DE Tel: 01924 306797 Fax: 01924 306810</p>	<p>Geophysical Survey Area</p>	<p>R Remmer</p>	<p>Date Plotted:</p>
<p>Sheet No.: SE3643NE</p>	<p>Woodacre Green</p>	<p>Woodacre Green</p>	<p>Scale 1: 2000</p>
<p>Licence No LA 076406 © WYAS</p>	<p>WYAS Advisory Service County Sites and Monuments Record Registry of Deeds, Newstead Road Wakefield WF1 2DE Tel: 01924 306797 Fax: 01924 306810</p>	<p>Woodacre Green</p>	<p>Scale 1: 2000</p>



Date Plotted:	Sheet No.: SE3643NE Scale 1: 2000 Licence No LA 076406 © WYAS
Trial Trenching locations (may be subject to change)	R Remmer Woodacre Green
 WYAS Advisory Service County Sites and Monuments Record Registry of Deeds, Newstead Road Wakefield WF1 2DE Tel. 01924 306797 Fax 01924 306800	

Appendix 3: Magnetic survey - technical information

Magnetic Susceptibility and Soil Magnetism

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough. An advantage of magnetic susceptibility over magnetometry is that a certain amount of occupational activity will cause the same proportional change in susceptibility, however weakly magnetic is the soil, and so does not depend on the magnetic contrast between the topsoil and deeper layers. Susceptibility survey is therefore able to detect areas of occupation even in the absence of cut features. On the other hand susceptibility survey is more vulnerable to the masking effects of layers of colluvium and alluvium as the technique, using the Bartington system, can generally only measure variation in the first 0.15m of ploughsoil.

Types of Magnetic Anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

Methodology: Magnetic Susceptibility Survey

There are two methods of measuring the magnetic susceptibility of a soil sample. The first involves the measurement of a given volume of soil, which will include any air and moisture that lies within the sample, and is termed volume specific susceptibility. This method results in a bulk value that is not necessarily fully representative of the constituent components of the sample. For field surveys a Bartington MS2 meter with MS2D field loop is used due to its speed and simplicity. The second technique overcomes this potential problem by taking into account both the volume and mass of a sample and is termed mass specific susceptibility. However, mass specific readings cannot be taken in the field where the bulk properties of a soil are usually unknown and so volume specific readings must be taken. Whilst these values are not fully representative they do allow general comparisons across a site and give a broad indication of susceptibility changes. This is usually enough to assess the susceptibility of a site and evaluate whether enhancement has occurred.

Methodology: Gradiometer Survey

There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as *magnetic scanning* and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey.

The disadvantages of magnetic scanning are that features that produce weak anomalies (less than 2nT) are unlikely to stand out from the magnetic background and so will be difficult to detect. The coarse sampling interval means that discrete features or linear features that are parallel or broadly oblique to the direction of traverse may not be detected. If linear features are suspected in a site then the traverse direction should be perpendicular (or as close as is possible within the physical constraints of the site) to the orientation of the suspected features. The possible drawbacks mentioned above mean that a 'negative' scanning result should be validated by sample detailed magnetic survey (see below).

The second method is referred to as *detailed survey* and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.25m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation. Detailed survey allows the visualisation of weaker anomalies that may not have been detected by magnetic scanning.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 30m by 30m square

grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

Data Processing and Presentation

The detailed gradiometer data has been presented in this report in XY trace and greyscale formats. In the former format the data shown is 'raw' with no processing other than grid biasing having been done. The data in the greyscale images has been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

An XY plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the data has been clipped. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the 'shape' of individual anomalies can be discerned and potentially archaeological anomalies differentiated from 'iron spikes'. Geoplot 3 software was used to create the XY trace plots.

Geoplot 3 software was used to interpolate the data so that 3600 readings were obtained for each 30m by 30m grid. The same program was used to produce the greyscale images. All greyscale plots are displayed using a linear incremental scale.

Appendix 4: Survey location information

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). The accuracy of this equipment is better than 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party or for the removal of any of the survey reference points.

Appendix 5: Geophysical archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the West Yorkshire Historic Environment Record).

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