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Fairfield Park, Stotfold, Bedfordshire

Archaeological Evaluation Report

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Summary

Between 10th and 13th December 2018, Oxford Archaeology East (OA East) conducted an archaeological investigation at land off Hitchin Road, Fairfield Park, Stotfold, Bedfordshire (TL 20606 35428) ahead of an application for residential development at the site. A geophysical survey was carried out by Magnitude Survey prior to the evaluation works (Swinbank, 2018).

No evidence related to the Bronze Age/ Iron Age settlement located directly to the west of current works was recognised during this evaluation. The evaluation revealed a small number of undated features, comprised of few linear ditches and three pits. These remains, located in the eastern part of the site, possibly represent a continuation of the post-medieval agricultural cultivation ditches recorded directly to the south of the site. However, no datable material was recovered from these features. The western half of the proposed development area was largely devoid of archaeology, with a single undated discrete feature uncovered by Trench 2.

Findings of the evaluation confirmed the geophysical survey results that the area was largely devoid of archaeology and the linear feature targeted by Trenches 7 and 8 was not present.

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Oxford Archaeology would like to thank AECOM for commissioning this project on behalf of Homes England. Thanks are also extended to Hannah Firth who monitored the work on behalf of Central Bedfordshire Council for her advice and guidance. The project was managed for Oxford Archaeology East by Liz Muldowney. The fieldwork was directed by Malgorzata Kwiatkowska, who was supported by Thomas Houghton and Katherine Whitehouse. Survey and digitizing was carried out by Emily Abrehart and Gareth Rees. Thank you to the teams of OA East staff that cleaned and packaged the finds under the management of Natasha Dodwell, and prepared the archive under the supervision of Kat Hamilton.

1 INTRODUCTION

1.1 Scope of work

- 1.1.1 Oxford Archaeology East (OA East) was commissioned by AECOM on behalf of Homes England to undertake a trial trench evaluation at the residential development site off Hitchin Road, Fairfield Park. OA East commissioned a geophysical survey of the site by Magnitude Surveys in November 2018 that identified anomalies of mostly natural origin (Swinbank 2018; Appendix E).
- 1.1.2 The work was carried out as a requirement for the submission of an outline planning application, further to application requirements identified at pre-application discussions (planning ref. CB/17/05863/PAPC). A brief was set by Hannah Firth on behalf of Central Bedfordshire Council (CBC) outlining the Local Authority's requirements for work necessary to inform the planning process. A written scheme of investigation (WSI) was produced by OA East (Muldowney 2018) detailing the methods by which OA East proposed to meet the requirements of the brief. This document outlines how OA East implemented the Local Planning Authority's requirements in line with the approved WSI.

1.2 Location, topography and geology

- 1.2.1 The site is located to the west of Hitchin Road, to the north of the current village of Fairfield Park, Stotfold, Bedfordshire (centred TL 20606 35428; Fig. 1). The site is bounded by an arable field to the north, Hitchin Road to the east, and residential developments to the south and west. The investigated area comprised 1.35ha of dense scrubland, the majority of which was cleared prior to the evaluation.
- 1.2.2 The bedrock geology is recorded as West Melbury Marly Chalk Formation with overlying superficial deposits of Letchworth Gravels Formation – Sand and gravel. (<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> accessed 07.11.2018).
- 1.2.3 The site is situated on the northernmost point of a north-south orientated ridge extending from the Chiltern Hills, shaped by Pix Brook to the east and north and the River Hiz to the west. The local topography offers commanding views of both valleys as well as that of the River Ivel to the north into which both the River Hiz and Pix Brook flow. The site itself slopes gently down from the high point in the southwest (74 m OD) towards lowest point in the northeast (66 m OD).

1.3 Archaeological and historical background

- 1.3.1 This section comprises a brief summary of the relevant known heritage assets close to the proposed development area, it has been drawn from the draft Heritage Statement compiled by AECOM (Boscher 2018), supplemented by information provided by Hannah Firth (CBC Planning Delivery Archaeologist).

Bronze Age

- 1.3.2 Bronze Age remains have been encountered close to the proposed development area during archaeological fieldwork in advance of housing development and road upgrade

works at two sites; Fairfield Hospital former Nurses home (HER 19621, Fig. 1), and land south of the Hospital main building (HER 16801; Fig 1). Two cremation burials, located 150 m west of the current development area, were radiocarbon dated to 920-970 cal. BC (HER 19621, Fig. 1). More substantial Bronze Age occupation was recorded 500 m to the south where an enclosure associated with a cluster of pits and a cremation burial was identified (HER 16801, Fig. 1).

- 1.3.3 A Bronze Age ring ditch was identified in aerial photographs 150 m to the north-east, on the opposite side of Hitchin Road (HER 16817; Fig. 1).
- 1.3.4 Residual Bronze Age/Early Iron Age pottery was recovered from later features 300m to the south-east of the development area during an evaluation in advance of the construction of a primary school on land to the south of the former Pig Development Unit (Gregson 2016). No definite features of this date were identified.

Iron Age and Roman

- 1.3.5 Iron Age activity has been recorded at these three previously excavated sites as well as on land to adjacent to the sports pitches south-west of the Fairfield Hospital buildings (HER 19622; Fig. 1). The closest comprised an enclosure with associated structures and pits, located 150m to the west and dated to the earlier Iron Age (HER 19621; Fig. 1). Similar, although less dense remains were encountered during the excavations 350m to the south-west (HER 19622; Fig. 1). The largest settlement site was recorded 500m to the south and comprised multiphase activity including enclosures, structures and pit complexes spanning the Early to Middle Iron Age (HER 16801; Fig. 1).
- 1.3.6 All three excavation sites had evidence for continued, although less extensive, use into the Romano-British period. A trackway was identified 150m to the west (HER 19621), and ditches/pits and postholes were recorded at the further two hospital sites (HER 19622 and 16801). A well preserved early Roman cremation was also recorded at HER 19622.
- 1.3.7 The evaluation to the east of Hitchin Road at the school site identified two areas of Romano-British cultivation trenches aligned north by north-west to south by south-east spaced approximately 10m apart (Gregson 2016). Few finds were associated with these features indicating that settlement was not in the immediate vicinity.

Anglo-Saxon, medieval and post-medieval

- 1.3.8 Storage pits, a possible post-built structure and ditches dating from the mid 7th to 9th century were recorded at the school site, east of Hitchin Road (Gregson 2016), but the sites associated with the former hospital contained no evidence for Saxon or medieval activity. Remains of this date have also been identified to the north in Stotfold village.
- 1.3.9 The proposed development area was agricultural land during the post-medieval period. In 1856-7, the Stotfold Three Counties Asylum (Fairfield Hospital) was constructed to the south with a cemetery added to the west shortly thereafter. The isolation hospital (now residential properties) immediately to the south of the development area was constructed in 1878. The 1882 Ordnance Survey (OS) map shows a large gravel pit just to the south of the site, close to the Hitchin Road.

1.4 Previous work

- 1.4.1 Magnitude Surveys completed a geophysical survey at the site prior to the evaluation phase of the project (Swinbank 2018). The results of the survey are included in Appendix E.
- 1.4.2 The magnetometer survey was successfully undertaken across the survey area. Most of the anomalies identified were natural in origin. Modern, ferrous, responses were also present within the data due to extant objects within and adjacent to the survey area. A trend with undetermined origins was also detected, this may be agricultural in origin or be a continuation of the natural responses.

2 EVALUATION AIMS AND METHODOLOGY

2.1 Aims

2.1.1 The project aims and objectives were as follows:

- i. ground truth geophysical results, by testing a range of anomalies of likely archaeological origin, and areas where no anomalies registered;
- ii. establish the presence or absence of archaeological remains on the site, characterise where they are found (location, depth and extent), and establish the quality of preservation of any archaeology and environmental remains;
- iii. provide sufficient coverage to establish the character, condition, date and purpose of any archaeological deposits;
- iv. provide sufficient coverage to evaluate the likely impact of past land uses, and the possible presence of masking deposits; and
- v. provide – in the event that archaeological remains are found – sufficient information to construct an archaeological mitigation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables, and orders of cost.

2.2 Methodology

2.2.1 A total of 8 trenches were excavated representing a 5% sample of the 1.35ha development area. Six of these trenches measure 50m x 1.8m, however Trench 1 and Trench 2 had to be shortened to 21m and 45m respectively due to obstruction by a line of trees and shrubs surrounding the site. During machine stripping, the location of Trenches 3 and 6 was altered due to the same site obstructions.

2.2.2 Service plans were checked before trenching work commenced with the footprint of each trench scanned by a qualified and experienced operator using a CAT with a valid calibration certificate.

2.2.3 All machine excavation took place under the supervision of a suitably qualified and experienced archaeologist.

2.2.4 Trial trenches were excavated by a mechanical excavator to the depth of the upper geological horizon using a toothless ditching bucket. Overburden was excavated in spits not greater than 0.1m thick.

2.2.5 The resultant topsoil and subsoil spoil was stored separately alongside trenches to allow for sequential backfilling of excavations. Trenches were not backfilled without the approval of the Central Bedfordshire Archaeologist.

2.2.6 All features were investigated and recorded to provide an accurate evaluation of archaeological potential, whilst at the same time minimising disturbance to archaeological structures, features, and deposits. Excavation characterised the full archaeological sequence down to undisturbed natural deposits. Natural features (such as tree throws) were sampled sufficiently to establish their character.

2.2.7 All excavation of archaeological deposits was carried out by hand.

- 2.2.8 There was sufficient excavation to provide clear evidence for the period, depth, and nature of any archaeological deposit. Investigation slots through all linear features were a minimum of 1m in width. Discrete features were half-sectioned.
- 2.2.9 Surveying was conducted using a survey-grade differential GPS (Leica GS08plus) fitted with "smartnet" technology with an accuracy of 5mm horizontal and 10mm vertical.
- 2.2.10 A register of all trenches, features, photographs and small finds was maintained during site works.
- 2.2.11 The photographic record comprised high resolution digital images along with 35mm black and white photographs.
- 2.2.12 Metal detector searches took place at all stages of the excavation by an experienced metal detectorist. Trenches and associated spoil were scanned immediately before and after mechanical stripping. To prevent losses from 'night-hawking,' individual features were also scanned immediately after stripping.
- 2.2.13 The metal detector was not set to discriminate against iron.

3 RESULTS

3.1 Introduction and presentation of results

- 3.1.1 The results of the evaluation are presented below, and include a stratigraphic description of the archaeological remains uncovered by the evaluation trenches. Three trenches (1, 3 and 4) were devoid of archaeology and are not discussed further. The depth of topsoil and subsoil observed within each trench is tabulated in Appendix A. An inventory of all contexts recorded during this evaluation is presented as Appendix B. Finds reports are given in Appendix C. The geophysical report is provided by Appendix E.
- 3.1.2 Archaeological remains present within trenches are discussed in order of their location within the trench, from north to south and west to east. Evaluation plan is presented in Figure 2. Evaluation plan with the geophysical results is provided by Figure 3. Section drawings of investigated features are presented as Figure 4.

3.2 General soils and ground conditions

- 3.2.1 The soil sequence between all trenches was fairly uniform. The natural geology of mid brownish red silty sand with frequent gravels was overlain by a mid reddish brown clayey silt subsoil (29), which in turn was overlain by dark grey clayey silt topsoil (28).
- 3.2.2 Ground conditions throughout the evaluation were generally good, and the trenches remained dry throughout the investigation. Archaeological features, where present, were easy to identify against the underlying natural geology. The quality of site photography was compromised by bright, sunny conditions. The area of the proposed development area was previously covered by high trees and shrubs that resulted in root disturbance observed across the site.

3.3 General distribution of archaeological deposits

- 3.3.1 Archaeological features were distributed across five trenches. They were concentrated in the eastern half of the evaluated area.

3.4 Trench 2 (Fig. 2)

- 3.4.1 Trench 2 was located towards the north-western corner of the site on a north-west to south-east alignment. A single possible pit (26) was partially exposed at its south-eastern end. It measured 0.8m in length, 1.21m in width and 0.22m deep, with gentle sides and a concave base. It was filled by a single deposit (27) of mid greyish brown sandy silt. No artefacts were recovered from this feature.

3.5 Trench 5 (Fig. 2, Plate 1)

- 3.5.1 Trench 5 was located in the centre of the site, on a north-west to south-east alignment. Three features were uncovered towards its south-eastern end.
- 3.5.2 Pit 4 (Fig. 4, Section 2; Plate 2) was sub-circular in plan with gently sloping sides and a concave base, that measured up to 1.02m in diameter and 0.27m deep. It was filled by a single deposit (5) of mid brownish grey sandy silt. No artefacts were recovered from this feature.

3.5.3 Ditch **1** (Fig. 4, Section 1; Plate 2) was located immediately to the south-east of pit **4** on a north-east to south-west alignment. It measured 1.61m in width and 0.67m in depth with steep sides and a concave base. It was filled by two deposits. The basal fill (2) of mid brownish grey sandy silt was overlain by mid greyish brown sandy silt (3). No artefacts were recovered from this feature.

3.5.4 Ditch **6** lay to the south-east of ditch **1** on a north-east to south-west alignment measuring 0.99 wide and 0.36m deep, this ditch had steep sides and a concave base, and contained a single deposit (7) of mid brown sandy silt. No finds were recovered from this feature.

3.6 Trench 6 (Fig. 2, Plate 3)

3.6.1 Trench 6 was located towards the northern limit of the evaluated area. It revealed a linear gully and a pit.

3.6.2 The gully (comprising cuts **8**, **10** and **14**) (Fig. 4, Section 5) spanned across the entire length of the trench on a west north-west to east south-east alignment. It measured up to 0.36m wide and 0.13m deep, with steep sides and a concave base. It was filled by a single deposit (9, 11, 15) of mid greyish brown sandy silt. No artefacts were recovered from this feature. This gully was found to be truncated by pit **12**.

3.6.3 Pit **12** (Fig. 4, Section 5) truncated gully **8** towards the middle of the trench. It was circular in plan, with gently sloping sides and a concave base, that measured 0.42m in diameter, and 0.09m deep. It contained a single deposit (13) of mid brownish grey sandy silt. A single fragment of ceramic building material (36g, Appendix C2) was recovered from this fill.

3.7 Trench 7 (Fig. 2, Plate 4)

3.7.1 Trench 7 was located to the east of Trench 6 on a north-east to south-west alignment. It met Trench 8 at a right-angle at its eastern end. Trench 7 was placed to target a geophysical anomaly of undetermined origin. A total of four features were recorded in this trench.

3.7.2 A linear feature of geological origin (**18**) was located in the north-eastern half of this trench. Aligned from west north-west to east south-east, it measured 0.45m wide and 0.12m deep, with gently sloping sides and a concave base. It was filled by a single deposit (19) of mid greyish brown silty clay. No finds were recovered from this feature.

3.7.3 A further feature of geological origin (**20**; Fig. 4, Section 9) was located to the south-west of geological feature **18**. It was orientated on a west north-west to east south-east axis. It measured 0.80m in width and 0.21m in depth with steep sides and a concave base. It was filled by a single deposit (21) of mid greyish brown silty clay. Rare, small fragments of coal were encountered in this fill. No finds were recovered from this feature.

3.7.4 Another linear feature of geological origin (**22**) was located to the south-west of geological feature **20** and on the same alignment. It measured 0.50m wide and 0.12m deep with gently sloping sides and a concave base. It was filled by a single deposit (23) of mid greyish brown silty clay. No finds were recovered from this feature.

3.7.5 A linear feature of geological origin (**24**) was located towards the south-western end of Trench 7. It was orientated from north-west to south-east and measured 0.50m in width and 0.14m in depth. It had steep sides and a concave base. It was filled by a single deposit (**25**) of mid brownish grey sandy silt, that did not produce any artefacts.

3.8 Trench 8 (Fig. 2)

3.8.1 Extending south-eastwards from the eastern end of Trench 7, Trench 8 targeted geophysical anomaly. This trench was orientated from north-east to south-west and encountered a single feature of undetermined origin.

3.8.2 Geological feature **16** was located within the northern half of this trench on a west to east alignment. It measured 0.70m in width and up to 0.16m in depth with steep sides and a concave, but irregular base. It was filled by a single fill (**17**) of mid reddish brown clayey silt. This deposit was sterile to further suggest its natural origin. No artefacts were recovered from this feature.

3.9 Finds summary

3.9.1 A single fragment of ceramic building material was recovered from pit **12** in Trench 6 and three metal objects were found during metal detecting of the site. All these items dated to the post-medieval to modern periods.

3.9.2 No environmental samples were taken from the site due to the low potential for environmental remains to be present in the sterile feature fills observed.

4 DISCUSSION

4.1 Evaluation objectives and results

- 4.1.1 The evaluation aimed to establish the character, date and state of preservation of archaeological remains within the proposed development area at Fairfield Park, Stotfold, Bedfordshire. This evaluation targeted anomalies observed by the geophysical survey of the site (Fig. 3) as well as testing 'blank areas', where no anomalies were detected.
- 4.1.2 The geophysical anomaly targeted by Trenches 7 and 8 was not observed during this evaluation (Fig.3). The trenching uncovered very little archaeology, with the majority of features present in the eastern half of the site. The vast majority of features excavated during this evaluation were devoid of finds with only a single fragment of ceramic building material was recovered from pit **12**, Trench 6. Metal detecting at the site recovered three artefacts from the topsoil and subsoil of Trenches 4, 5 and 7; all attributed to the modern period.
- 4.1.3 Previous archaeological works in the immediate vicinity of the site identified evidence for Bronze Age and Iron Age occupation directly to the west of the site (HER 19621) and to the south of the site (HER 19622 and 16801). In addition, a possible Bronze Age ring ditch (HER 16817) is located c.350m to the north-east of the proposed development area.
- 4.1.4 The current evaluation did not identify any Bronze Age or Iron Age activity on the site, with trenches in the western half of the evaluated area being almost devoid of features – with only a single, undated possible pit (**26**) recognised in Trench 2.
- 4.1.5 The majority of archaeological features were uncovered in the eastern part of the proposed development area. Trench 5 uncovered two ditches and a pit that may possibly be related to the post-medieval cultivation activity recorded by the previous archaeological work directly to the south of the proposed development area (HER 19622 and 16801). In addition, the fill of a single feature in Trench 7 (ditch **20**) contained a small amount of coal fragments to suggest a more recent origin. However, no further dateable evidence was recovered from any of these features.
- 4.1.6 A total of six features of geological origin were investigated. These features were located in the eastern half of the site, in Trenches 7 and 8.

4.2 Significance

- 4.2.1 This project was quite limited in area with a line of trees and shrubs further restricting the space available for evaluation. Nonetheless all eight trenches were excavated.
- 4.2.2 The current evaluation uncovered a very limited amount of archaeological remains, comprising two undated ditches and two similarly undated pits. All were filled with material derived from gradual weathering of the surrounding geology with little or no modification, indicating limited activity in the vicinity during their lifespan. Excavated features were found devoid of finds. The site appears to be located beyond the area of Bronze Age and Iron Age settlement located to the west, as well as beyond the limits

of post-medieval agricultural activity to the south. Therefore, the potential for any further archaeological remains on the site is considered to be low.

APPENDIX A TOPSOIL AND SUBSOIL DIMENSIONS

Trench number	Max. Topsoil depth (m)	Max. Subsoil depth (m)
1	0.28	0.15
2	0.36	0.19
3	0.45	0.15
4	0.31	0.16
5	0.39	0.19
6	0.31	0.28
7	0.30	0.28
8	0.29	0.24

APPENDIX B CONTEXT INVENTORY

Context	Trench	Cut	Category	Feature Type	Length	Breadth	Depth	Colour	Fine component	Compaction
1	5	1	cut	ditch	0	1.61	0.67			
2	5	1	fill	ditch	0	0.99	0.28	mid brownish grey	sandy silt	soft
3	5	1	fill	ditch	0	1.61	0.42	mid greyish brown	sandy silt	soft
4	5	4	cut	pit	0.93	1.02	0.27			
5	5	4	fill	pit	0.93	1.02	0.27	mid brownish grey	sandy silt	soft
6	5	6	cut	ditch	0	0.99	0.36			
7	5	6	fill	ditch	0	0.99	0.36	mid brown	sandy silt	plastic
8	6	8	cut	gully	0	0.31	0.13			
9	6	8	fill	gully	0	0.31	0.13	mid greyish brown	sandy silt	plastic
10	6	10	cut	gully	0	0.36	0.13			
11	6	10	fill	gully	0	0.36	0.13	mid greyish brown	sandy silt	plastic
12	6	12	cut	pit	0	0.42	0.09			
13	6	12	fill	pit	0	0.42	0.09	mid brownish grey	sandy silt	plastic
14	6	14	cut	gully	0	0.24	0.09			
15	6	14	fill	gully	0	0.24	0.09	mid greyish brown	sandy silt	plastic
16	8	16	cut	natural	0	0.7	0.16			
17	8	16	fill	natural	0	0.7	0.16	mid reddish brown	clayey silt	soft
18	7	18	cut	natural	0	0.45	0.12			
19	7	18	fill	natural	0	0.45	0.12	mid greyish brown	silty clay	plastic

Context	Trench	Cut	Category	Feature Type	Length	Breadth	Depth	Colour	Fine component	Compaction
20	7	20	cut	natural	0	0.8	0.21			
21	7	20	fill	natural	0	0.8	0.21	mid greyish brown	silty clay	plastic
22	7	22	cut	natural	0	0.5	0.12			
23	7	22	fill	natural	0	0.5	0.12	mid greyish brown	silty clay	plastic
24	7	24	cut	natural	0	0.5	0.14			
25	7	24	fill	natural	0	0.5	0.14	mid brownish grey	sandy silt	friable
26	2	26	cut	pit/ natural	0.8	1.21	0.22			
27	2	26	fill	pit/ natural	0.8	1.21	0.22	mid greyish brown	sandy silt	friable
28		0	layer	topsoil	0		0.45	dark grey	clayey silt	soft
29		0	layer	subsoil	0		0.28	mid reddish brown	clayey silt	friable

APPENDIX C FINDS REPORTS

C.1 Metalwork

By Denis Sami

Factual data

- C.1.1 A total of three iron artefacts were metal-detected from three evaluation trenches (Trenches 4, 5 and 7). These finds were recovered from topsoil and subsoil (28 and 29) and are most likely the result of agricultural work of modern date.
- C.1.2 These finds are incomplete and poorly preserved, showing signs of corrosion and thick encrustation.
- C.1.3 In the absence of any associated datable ceramic, it is difficult to give a precise chronology to the metalwork assemblage, but the items are probably of modern origin.

Statement of potential

- C.1.4 The assemblage has little archaeological significance and simply prove a general working activity took place in the area.

Method statement

- C.1.5 The catalogue is organised by SF number. Measurements such as length, width and thickness, are in millimetres and weight (Wg) in grams. A description of the objects, and a suggested chronology is given in the catalogue provided below.

Catalogue

SF	Context	Trench	Artefact	Condition	Description	Length (mm)	Width (mm)	Thickness	Spot date
1	28	4	Tool?	Incomplete	Possibly a small wedge formed by a sub-triangular body with slightly sharp edge base thickening on one angle. The apex of the body develops into a slightly conical sloppy base	6	43	26	MO?
2	29	7	Artefact	Incomplete	Originally this object had a S shape but one extreme is missing. It is formed by rod with rectangular cross-section metal expanding and thickening on one end	97	21	23	MO?
3	29	5	Stud	Incomplete	A short tapering stem with square cross-section (4 x4 mm). The head is made of a sub-spherical lump of lead	42	19		MO?

Table 1 Catalogue of iron artefacts. Abbreviation: MO = modern.

C.2 Ceramic Building Material

By Ted Levermore

Factual data

C.2.1 A severely abraded amorphous fragment of CBM (36g) was recovered from fill (13), pit **12** in Trench 6. It was made in a mid orange, compacted, fine sandy fabric with few to no visible inclusions. It is likely to be of post-medieval date; however, this conclusion is uncertain. It offers little to no archaeological information and has been discarded.

APPENDIX D BIBLIOGRAPHY

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Swinbank, L., 2018, *Geophysical Survey Report of Land at Farifield Park, Stotfold*. Magnitude Survey (Unpublished)

APPENDIX E GEOPHYSICAL SURVEY REPORT



magnitude
surveys

**Geophysical Survey Report
of
Land at Fairfield Park,
Stotfold**

**For
Oxford Archaeology**

**On Behalf Of
AECOM**

Magnitude Surveys Ref: MSTL410

HER Event Number: TBC

November 2018



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Version	Purpose/Revision	Author	Interpretation/Figures	Approved By	Date Issued
Draft 1.0	Initial draft to client	Leanne Swinbank BA ACIFA	Marta Fortuny BA MA	Dr Kayt Armstrong, BA (hons) MSc PhD	28 November 2018

Abstract

Magnitude Surveys was commissioned to assess the subsurface archaeological potential of a c. 1.75ha area of land at Fairfield Park, Stotfold. A fluxgate magnetometer survey was successfully completed and no anomalies of probable or possible archaeological origin have been identified. The geophysical results primarily reflect small natural variations in the soils of the site. Large ferrous responses have also been detected, caused by adjacent fencing and a landscaping vehicle parked on site.

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1. Introduction

- 1.1. Magnitude Surveys Ltd (MS) was commissioned by Oxford Archaeology on behalf of AECOM to undertake a geophysical survey on a c.1.75ha area of land of at Fairfield Park, Stotfold (TL 2061 3542).
- 1.2. The geophysical survey comprised hand-carried GNSS-positioned fluxgate magnetometer survey.
- 1.3. The survey was conducted in line with the current best practice guidelines produced by Historic England (David et al., 2008), the Chartered Institute for Archaeologists (CIfA, 2014) and the European Archaeological Council (Schmidt et al., 2015).
- 1.4. The survey commenced on 19 November 2018 and was completed on the same day.

2. Quality Assurance

- 2.1. Magnitude Surveys is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA), the chartered UK body for archaeologists, and a corporate member of ISAP (International Society of Archaeological Prospection).
- 2.2. Director Graeme Attwood is a Member of CIfA, as well as the Secretary of GeoSIG, the CIfA Geophysics Special Interest Group. Director Finnegan Pope-Carter is a Fellow of the London Geological Society, the chartered UK body for geophysicists and geologists, as well as a member of GeoSIG, the CIfA Geophysics Special Interest Group. Director Chrys Harris has a PhD in archaeological geophysics from the University of Bradford and is the Vice-Chair of the International Society for Archaeological Prospection.
- 2.3. All MS managers have relevant degree qualifications to archaeology or geophysics. All MS field and office staff have relevant archaeology or geophysics degrees and/or field experience.

3. Objectives

- 3.1. The geophysical survey aimed to assess the subsurface archaeological potential of the survey area.

4. Geographic Background

4.1. The site is located 1.74km south of Stotfold and 2.85km northwest of Letchworth (Figure 1). Survey was undertaken over a single area of cleared ground, with overgrown vegetation around the perimeter. The site is bounded by Hitchin Road to the east, housing off Shafesbury Drive to the west, a field to the north and housing and a building site to the south (Figure 2).

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	Flat, mostly cleared land. Overgrown vegetation around the perimeter area, particularly in the south.	Bounded by a wooden fence to the north, metal fence in the east and southeast, hedgerow and metal fence in the southwest, and trees in the west. A landscaping vehicle was parked in the western half of site.

4.3. The underlying geology comprises chalk of the West Melbury Marly formation over most of the site, the southwest corner comprises chalk of the Totterhoe stone member. Superficial deposits across the site are sand and gravel from the Letchworth gravels formation (British Geological Survey, 2018).

4.4. In the eastern half of the site soils consist of shallow lime-rich soils over chalk or limestone, in the west soils are lime-rich loamy and clayey soils with impeded drainage (Soilscapes, 2018).

5. Archaeological Background

5.1. The following section summaries the archaeological background of the survey area and the immediate vicinity, taken from a Heritage Statement produced by AECOM (2018).

5.2. Evidence for early prehistoric activity in the region of the survey area is scarce and limited to lithic blades dated to the Mesolithic located 150m west and 350m southwest of the survey area. Neolithic tools and flakes have been recovered from the same locations. Evidence of Bronze Age activity is more significant; 150m west of the site two cremation burials are located, 500m south a large enclosure with a cluster of pits and a further cremation burial, 150m northeast a ring ditch has been identified, and a number of flint tools have been recovered through trenching 350m southwest of the survey area.

5.3. Iron Age occupation has been detected 150m west of the survey area in the form of a large enclosure, three roundhouse structures, post-structures and pit features. The Iron Age occupation is also present 350m southwest of the survey area, and 500m south of the survey area, the relation between the three occupation sites is currently unknown. Roman archaeological remains have also been identified at the three Iron Age areas of occupation, however it is more limited than the earlier activity.

5.4. A potential Medieval trackway has been identified within the survey boundary, this is recorded on historic mapping, a further Anglo-Saxon ditch is noted 700m south of the survey area. Later Medieval activity is recorded at Stotfold including settlements and burial grounds.

6. Methodology

6.1. Data Collection

6.1.1. Geophysical prospection comprised the magnetic method as described in the following table.

6.1.2. Table of survey strategies:

Method	Instrument	Traverse Interval	Sample Interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer	1m	200Hz reprojected to 0.125m

6.1.3. The magnetic data were collected using MS' bespoke hand-carried GNSS-positioned system.

6.1.3.1. MS' hand-carried system was comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a multi-channel, multi-constellation GNSS Smart Antenna RTK GPS outputting in NMEA mode to ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

6.1.3.2. Magnetic and GPS data were stored on an SD card within MS' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.

6.1.3.3. A navigation system was integrated with the RTK GPS, which was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

6.2. Data Processing

6.2.1. Magnetic data were processed in bespoke in-house software produced by MS. Processing steps conform to Historic England's standards for "raw or minimally processed data" (see sect 4.2 in David et al., 2008: 11).

Sensor Calibration – The sensors were calibrated using a bespoke in-house algorithm, which conforms to Olsen et al. (2003).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

6.3.Data Visualisation and Interpretation

6.3.1. This report presents the gradient of the sensors' total field data as greyscale images, as well as the total field data from the upper and/or lower sensors. The gradient of the sensors minimises external interferences and reduces the blown-out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features can be clearer in the respective gradient or total field datasets. Multiple greyscale images at different plotting ranges have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot (Figure 8). XY trace plots visualise the magnitude and form of the geophysical response, aiding in anomaly interpretation.

6.3.2. Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historic maps, LiDAR data, and soil and geology maps. Google Earth (2018) was consulted as well, to compare the results with recent land usages.

7. Results

7.1. Qualification

7.1.1. Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources. Where possible an anomaly source will be identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports. MS actively seek feedback on their reports as well as reports of further work in order to constantly improve our knowledge and service.

7.2. Discussion

7.2.1. The geophysical results are presented in consideration with satellite imagery (Figure 6) and historic maps (Figure 7), and an XY trace plot of the data is provided (Figure 8).

7.2.2. The results of fluxgate magnetometer survey have been impacted by the presence of modern activity on, and adjacent, to the site; Strong responses with large magnetic haloes have been detected in the east and west related to adjacent fencing and a third-party vehicle parked on the site. Despite this, weak anomalies have been detected between the areas of high field intensity. These are amorphous in shape, and non-ferrous in form, and likely relate to changes in the composition and texture of the soils across the site. An linear positive trend has also been detected in the eastern half of the survey running approximately east-west. It is marked as 'undetermined' in the interpretation plot as both natural and agricultural origins are equally likely and difficult to distinguish (Figure 5). Although no anomalies interpreted as having definite archaeological interest has been identified, the detection of a range of anomalies, from strong to weak in magnitude demonstrates that the magnetic survey has been effective in this instance.

7.3. Interpretation

7.3.1. General Statements

7.3.1.1. Geophysical anomalies will be discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual will be discussed individually.

7.3.1.2. **Undetermined** – Anomalies are classified as Undetermined when the anomaly origin is ambiguous through the geophysical results and there is no supporting or correlative evidence to warrant a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally not ferrous in nature.

7.3.1.3. **Ferrous (Discrete/Spread)** – Discrete ferrous-like, dipolar anomalies are likely to be the result of modern metallic disturbance on or near the ground surface. A ferrous spread refers to a concentrated deposition of these discrete, dipolar anomalies. Broad dipolar ferrous responses from modern metallic features, such as fences, gates, neighbouring buildings and services, may mask any weaker underlying archaeological anomalies should they be present.

7.3.2. Magnetic Results - Specific Anomalies

7.3.2.1. **Ferrous** – A broad, dipolar, ferrous response in the west of the survey was caused by a vehicle parked within the survey area. In the east of the survey area ferrous responses have been produced by the adjacent metal fencing.

7.3.2.2. **Natural** – Ephemeral anomalies have been detected across the survey; the shape and form of these is typical of small changes in the composition of the soil.

8. Conclusions

8.1. The magnetometer survey has been successfully undertaken across the survey area. Most of the anomalies identified are natural in origin. Modern, ferrous, responses are also present within the data due to extant objects within and adjacent to the survey area. A trend with undetermined origins has also been detected, this may be agricultural in origin or be a continuation of the natural responses.

9. Archiving

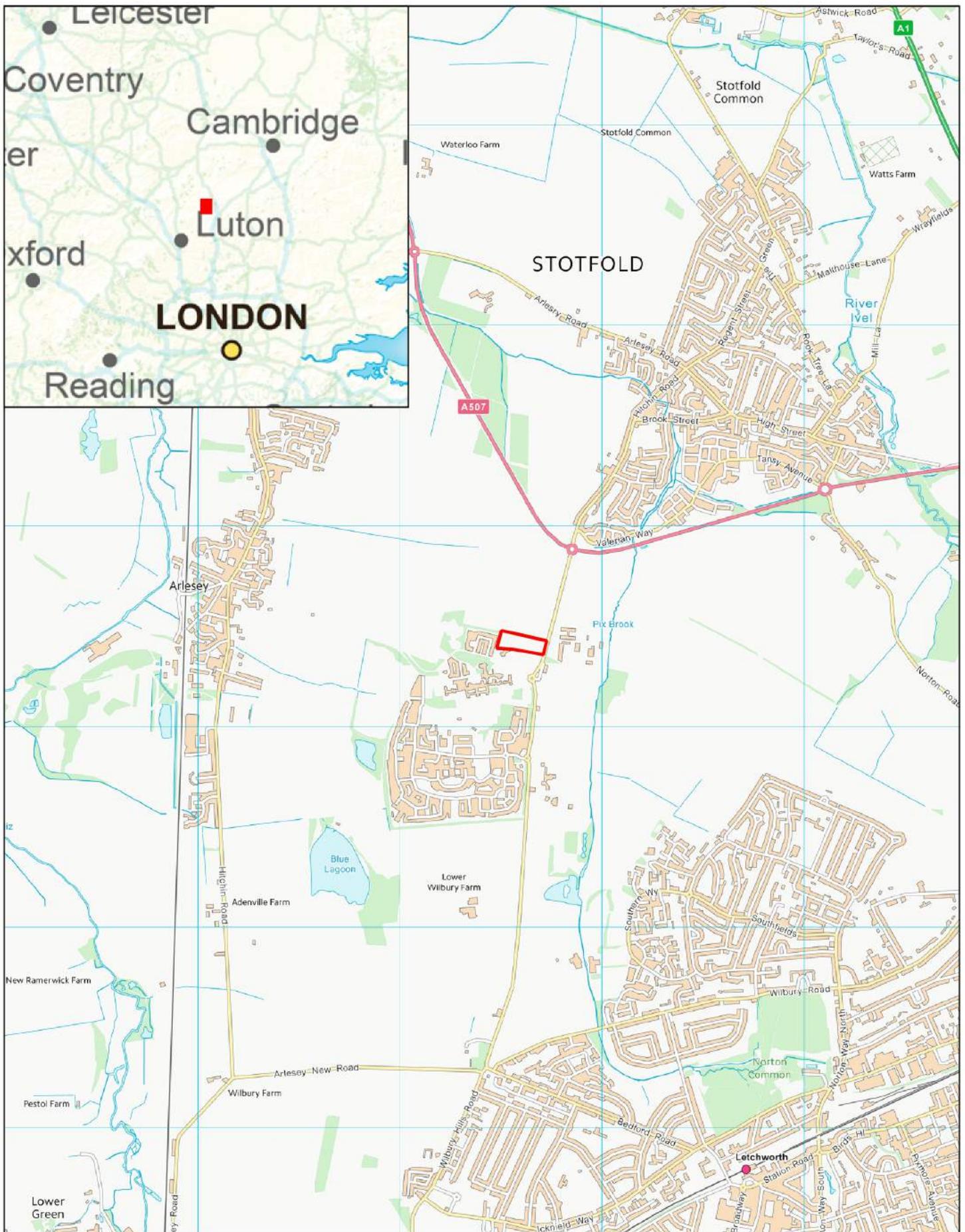
- 9.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.
- 9.2. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to the any dictated time embargoes.

10. Copyright

- 10.1. Copyright and the intellectual property pertaining to all reports, figures, and datasets produced by Magnitude Services Ltd. is retained by MS. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by MS.

11. References

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MSTL410 - Land at Fairfield Park, Stotfold

Figure 1 - Site Location

1:25,000 @ A4

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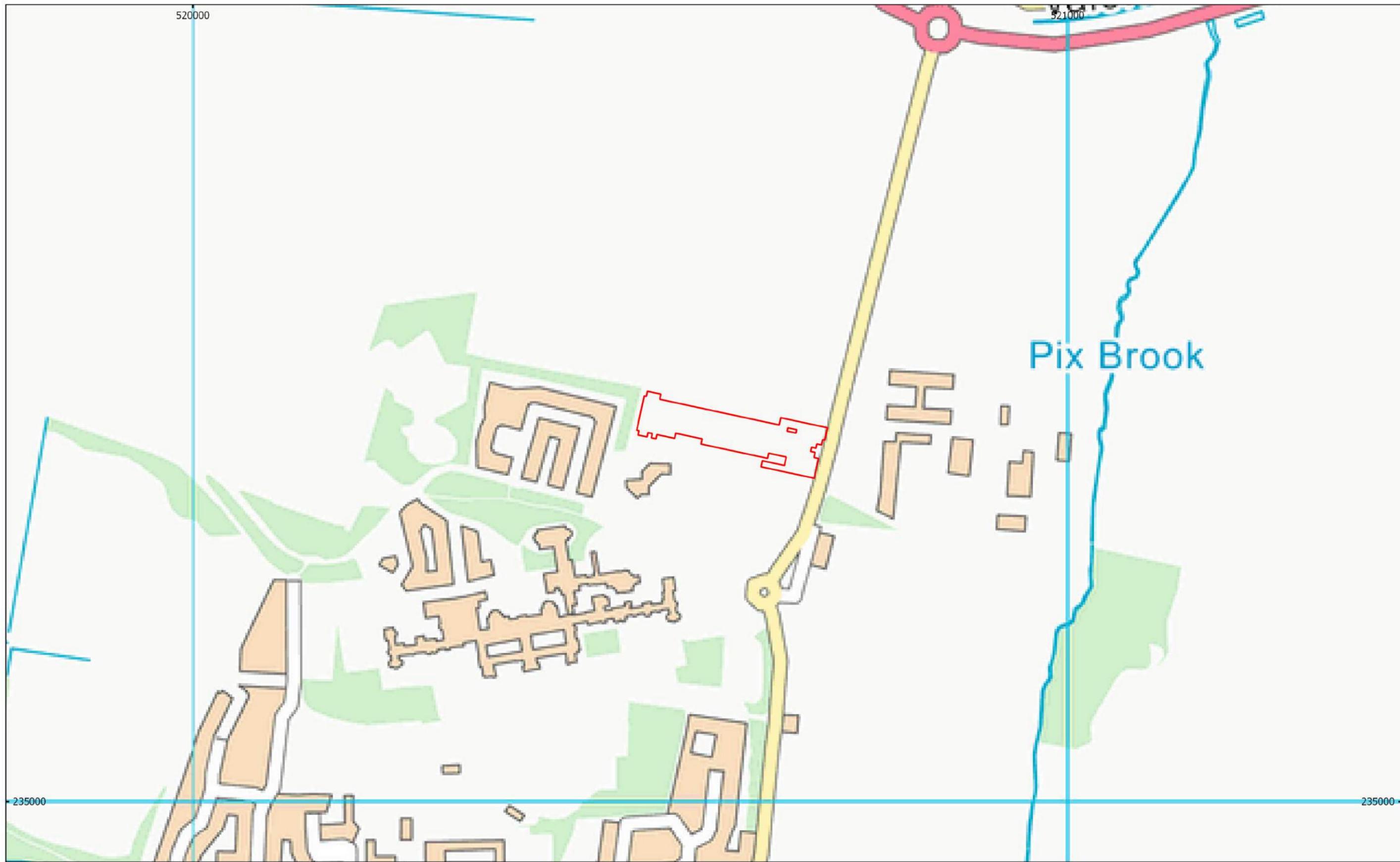
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 Site Boundary

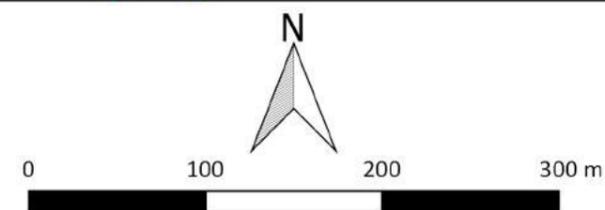


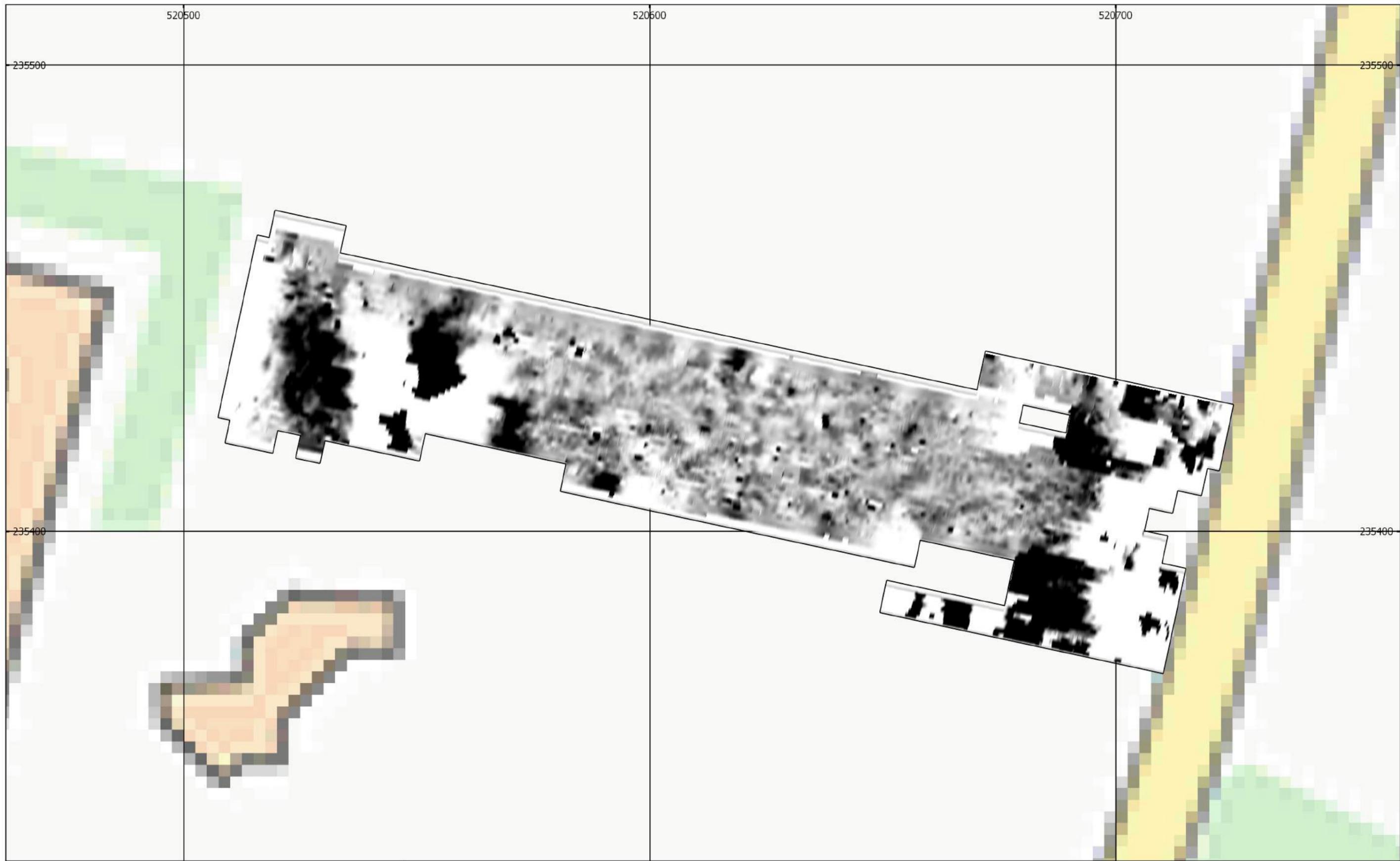
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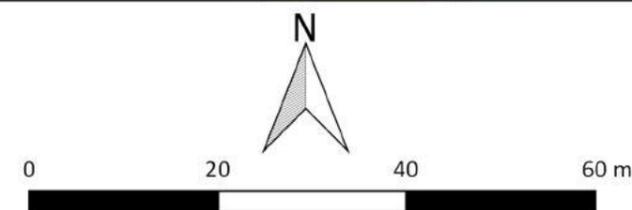
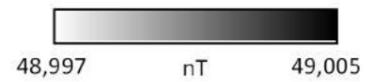
MSTL410 - Land at Fairfield Park, Stotfold
Figure 2 - Location of Survey Area
1:4,000 @ A3
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 Survey Extent

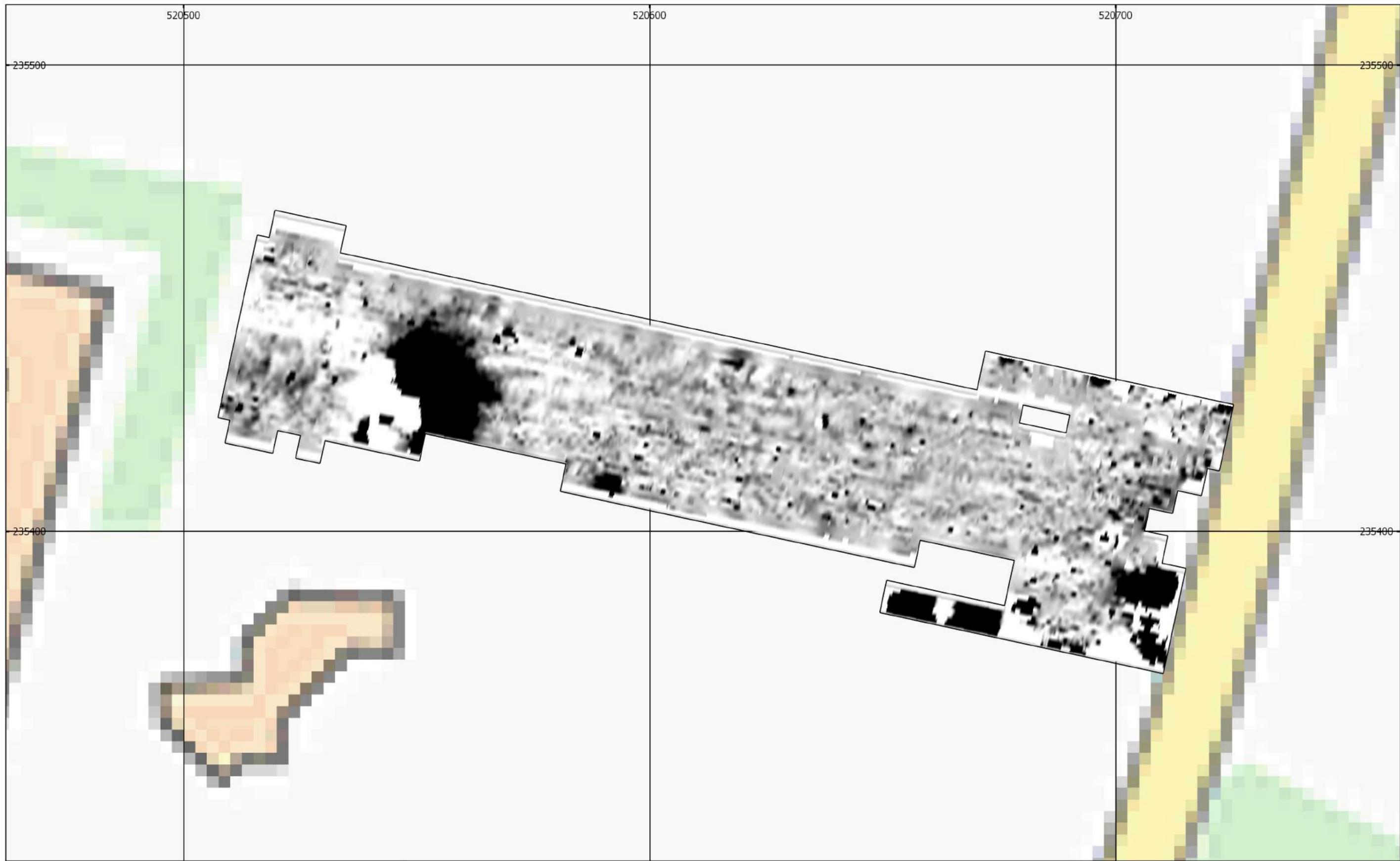




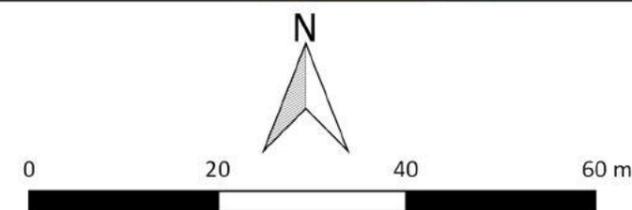
MSTL410 - Land at Fairfield Park, Stotfold
Figure 3 - Magnetic Total Field (Lower Sensor)
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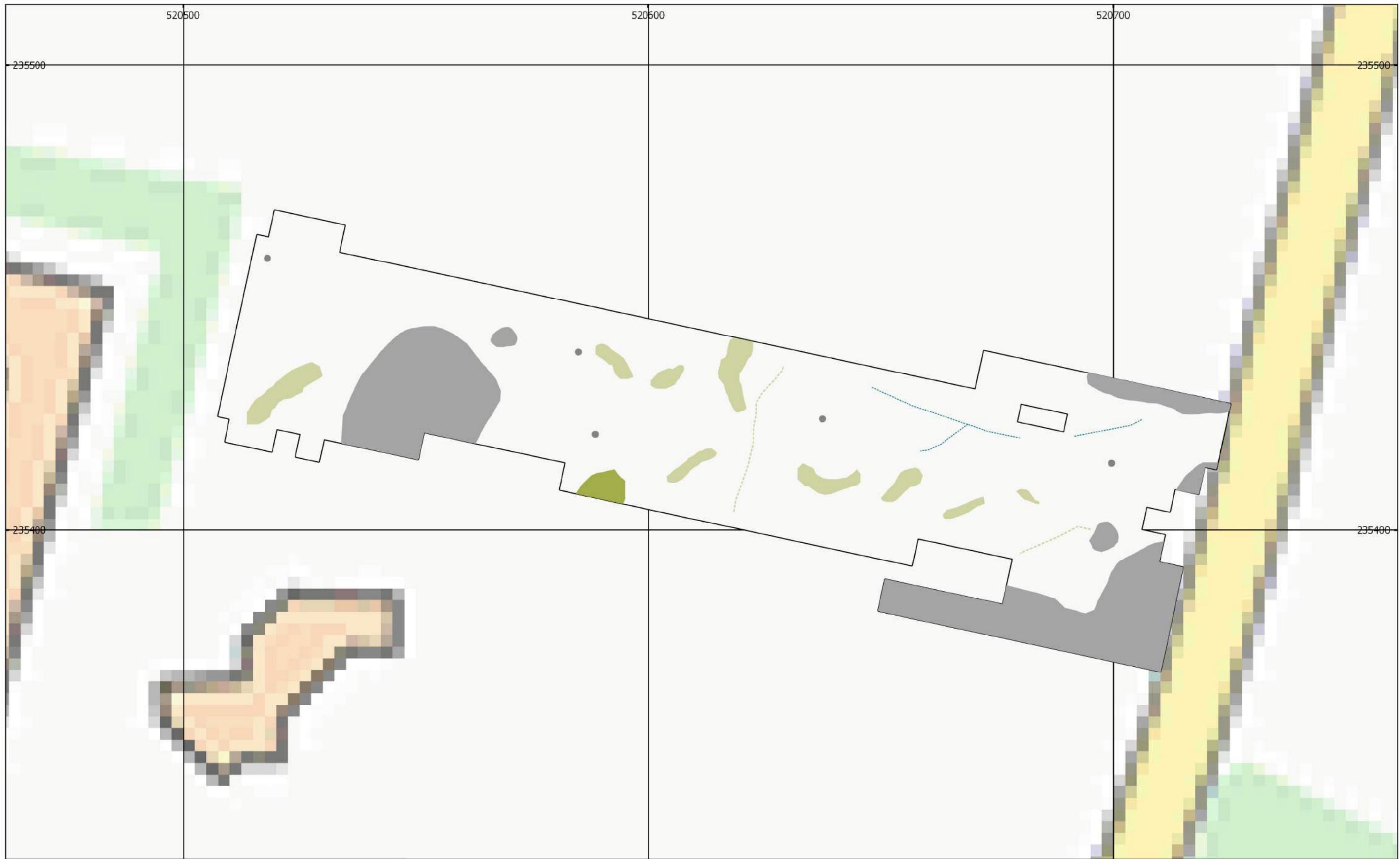
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MSTL410 - Fairfield Park, Letchworth
Figure 4 - Magnetic Gradient
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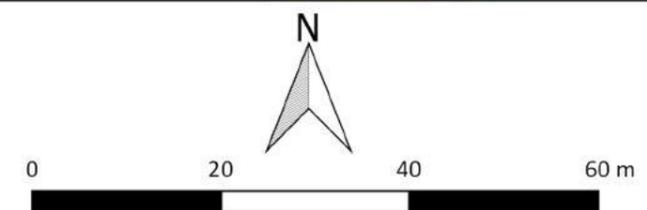


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MSTL410 - Land at Fairfield Park, Stotfold
 Figure 5 - Magnetic Interpretation
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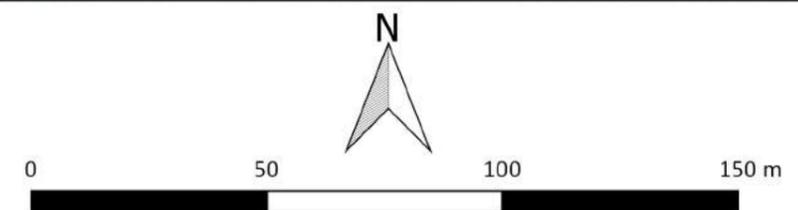
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- Natural (Strong)
- Natural (Weak)
- Natural (Trend)
- Undetermined (Trend)

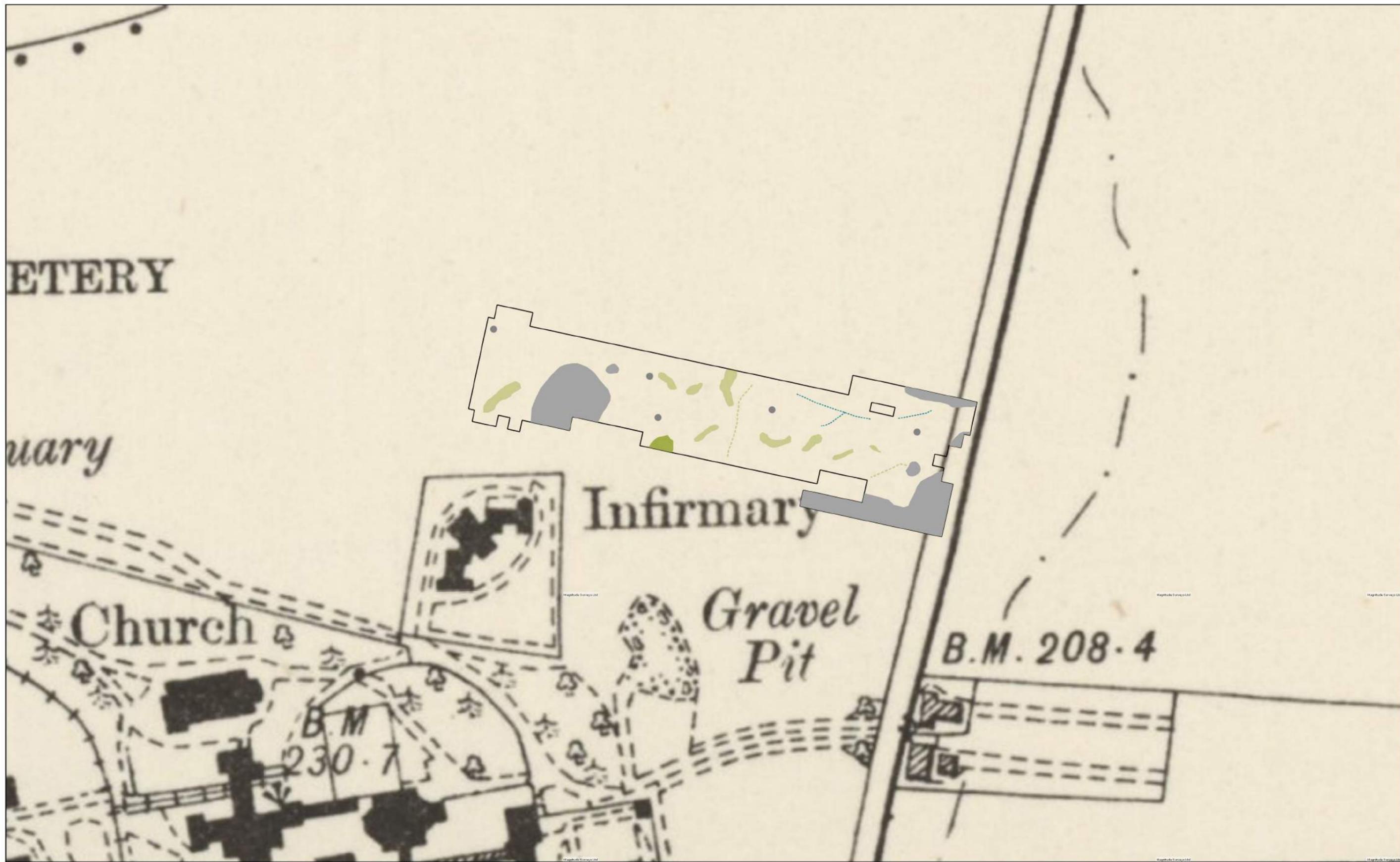




MSTL410 - Land at Fairfield Park, Stotfold
Figure 6 - Magnetic Interpretation Over Satellite Imagery
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-  Natural (Strong)
-  Natural (Weak)
-  Natural (Trend)
-  Undetermined (Trend)





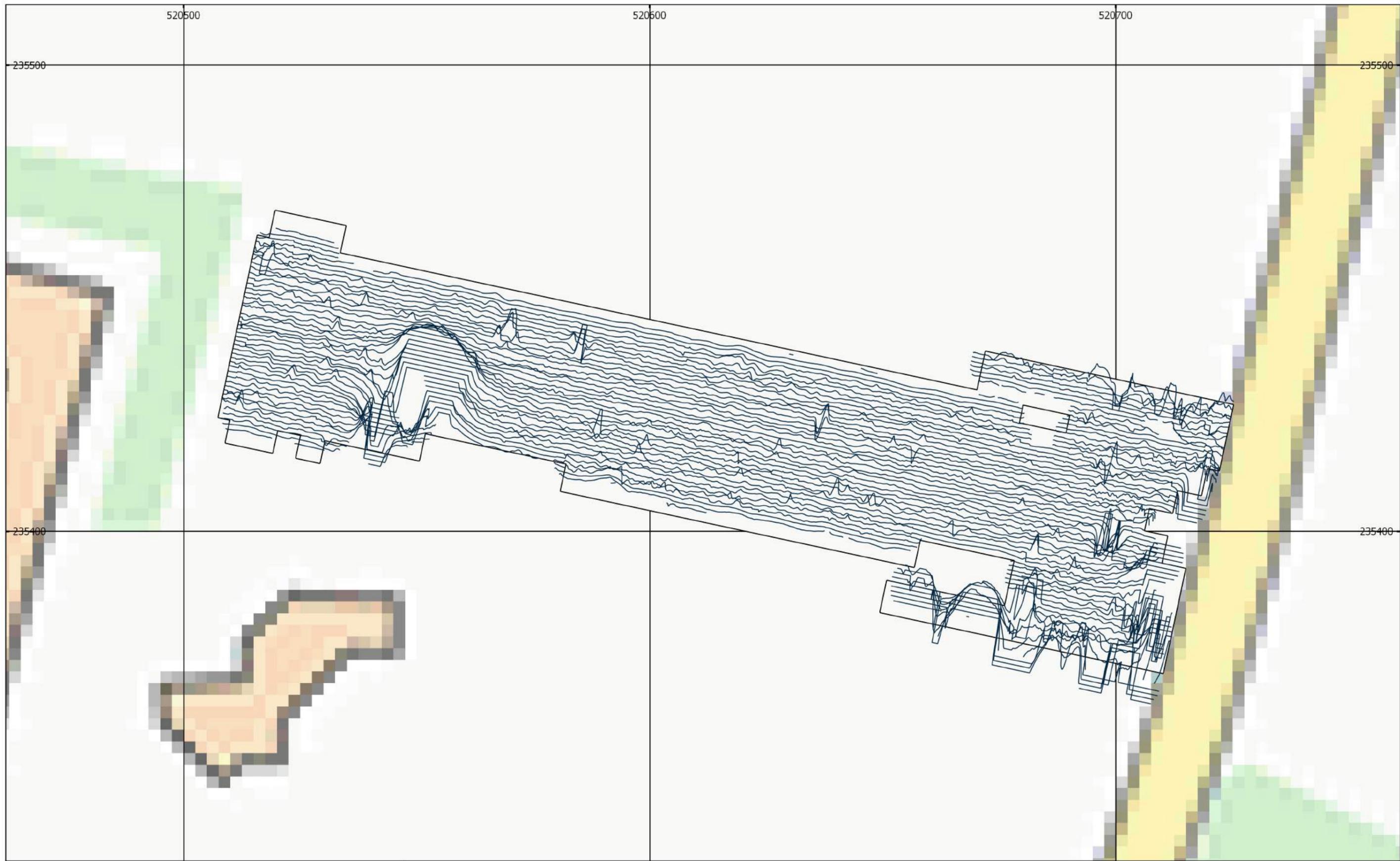
MSTL410 - Land at Fairfield Park, Stotfold
 Figure 7 - Magnetic Interpretation Over Historic Maps
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- Ferrous (Dipolar)
- Natural (Strong)
- Natural (Weak)
- Natural (Trend)
- Undetermined (Trend)

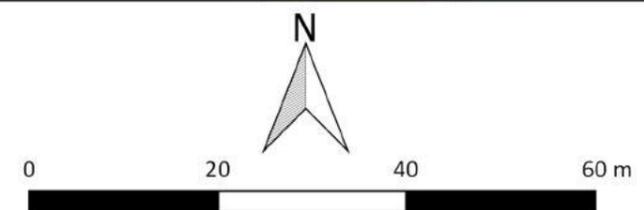
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MSTL410 - Land at Fairfield Park, Stotfold
Figure 8 - XY Trace Plot
15nT/cm at 1:750 @ A3
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APPENDIX F OASIS REPORT FORM

Project Details

OASIS Number	oxfordar3-337142		
Project Name	Fairfield Park, Stotfold		
Start of Fieldwork	10/12/2018	End of Fieldwork	13/12/2018
Previous Work	None	Future Work	No

Project Reference Codes

Site Code	BEDFM2018.83	Planning App. No.	CB/17/05863/PAPC
HER Number		Related Numbers	

Prompt	Request form the local planning authority
Development Type	Rural residential
Place in Planning Process	Not known/Not recorded

Techniques used (tick all that apply)

- | | | |
|--|---|--|
| <input type="checkbox"/> Aerial Photography – interpretation | <input type="checkbox"/> Grab-sampling | <input type="checkbox"/> Remote Operated Vehicle Survey |
| <input type="checkbox"/> Aerial Photography - new | <input type="checkbox"/> Gravity-core | <input checked="" type="checkbox"/> Sample Trenches |
| <input type="checkbox"/> Annotated Sketch | <input type="checkbox"/> Laser Scanning | <input checked="" type="checkbox"/> Survey/Recording of Fabric/Structure |
| <input type="checkbox"/> Augering | <input type="checkbox"/> Measured Survey | <input checked="" type="checkbox"/> Targeted Trenches |
| <input type="checkbox"/> Dendrochronological Survey | <input checked="" type="checkbox"/> Metal Detectors | <input type="checkbox"/> Test Pits |
| <input type="checkbox"/> Documentary Search | <input type="checkbox"/> Phosphate Survey | <input checked="" type="checkbox"/> Topographic Survey |
| <input type="checkbox"/> Environmental Sampling | <input type="checkbox"/> Photogrammetric Survey | <input type="checkbox"/> Vibro-core |
| <input type="checkbox"/> Fieldwalking | <input type="checkbox"/> Photographic Survey | <input type="checkbox"/> Visual Inspection (Initial Site Visit) |
| <input checked="" type="checkbox"/> Geophysical Survey | <input type="checkbox"/> Rectified Photography | |

Monument	Period	Object	Period
ditch	Uncertain	Metal artefact	Modern (1901 to present)
pit	Uncertain	Ceramic Building Material	Post Medieval (1540 to 1901)
	Choose an item.		Choose an item.

Insert more lines as appropriate.

Project Location

County	Bedfordshire	Address (including Postcode) Fairfield Park, Hitchin Road, Stotfold, Bedfordshire SG5 4SF
District	Central Bedfordshire	
Parish	Stotfold	
HER office	Central Bedfordshire	
Size of Study Area	1.35 ha	
National Grid Ref	TL 20606 35428	

Project Originators

Organisation	OA East
Project Brief Originator	Hannah Firth
Project Design Originator	Liz Muldowney
Project Manager	Liz Muldowney
Project Supervisor	Malgorzata Kwiatkowska

Project Archives

	Location	ID
Physical Archive (Finds)	The Higgins, Bedford	BEDFM2018:83
Digital Archive	OA East	XBDFAP18
Paper Archive	The Higgins, Bedford	BEDFM2018.83

Physical Contents

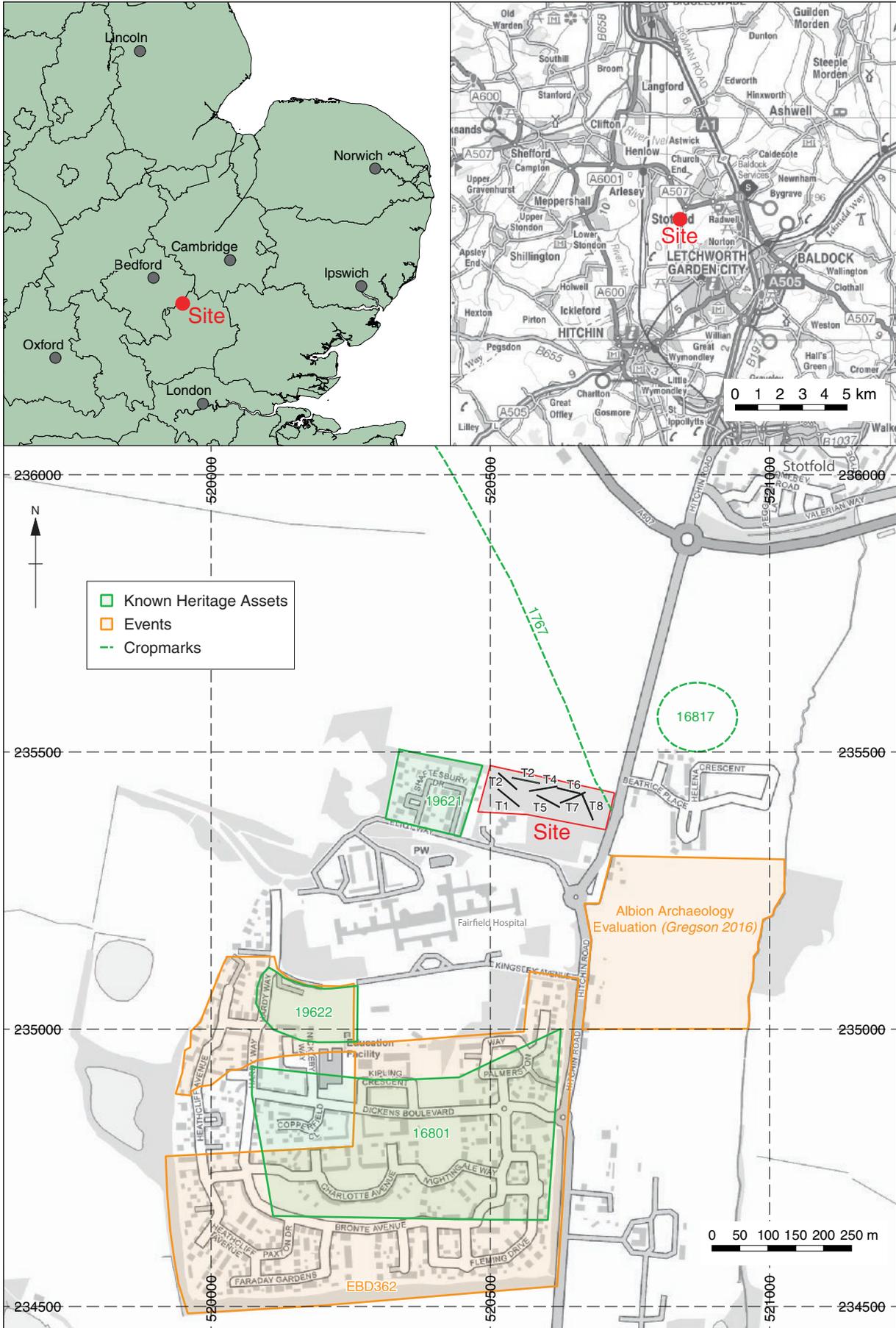
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Ceramics	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Human Remains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industrial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Geophysics	<input checked="" type="checkbox"/>
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Illustrations (Figures/Plates)	<input checked="" type="checkbox"/>
Moving Image	<input type="checkbox"/>
Spreadsheets	<input type="checkbox"/>
Survey	<input checked="" type="checkbox"/>
Text	<input checked="" type="checkbox"/>
Virtual Reality	<input type="checkbox"/>

Paper Media

Aerial Photos	<input type="checkbox"/>
Context Sheets	<input checked="" type="checkbox"/>
Correspondence	<input type="checkbox"/>
Diary	<input type="checkbox"/>
Drawing	<input type="checkbox"/>
Manuscript	<input type="checkbox"/>
Map	<input type="checkbox"/>
Matrices	<input type="checkbox"/>
Microfiche	<input type="checkbox"/>
Miscellaneous	<input type="checkbox"/>
Research/Notes	<input type="checkbox"/>
Photos (negatives/prints/slides)	<input checked="" type="checkbox"/>
Plans	<input type="checkbox"/>
Report	<input checked="" type="checkbox"/>
Sections	<input checked="" type="checkbox"/>
Survey	<input type="checkbox"/>



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Figure 1: Site location showing archaeological trenches (black) in development area (red), overlain with HER entries mentioned in the text. Scale 1:10000

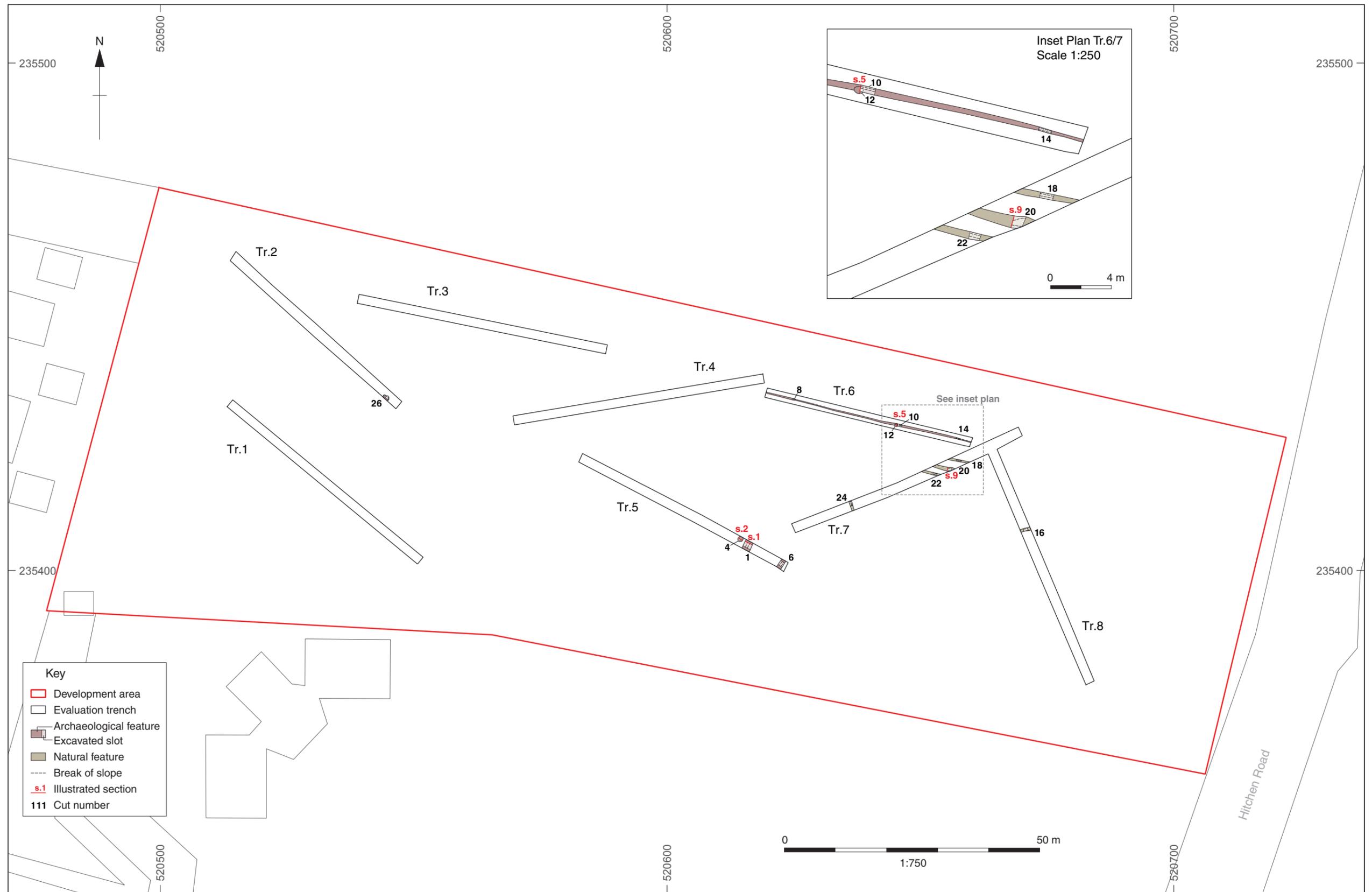


Figure 2: Evaluation plan

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Figure 3: Evaluation plan overlaid on geophysical survey interpretation (after Swinbank 2018)

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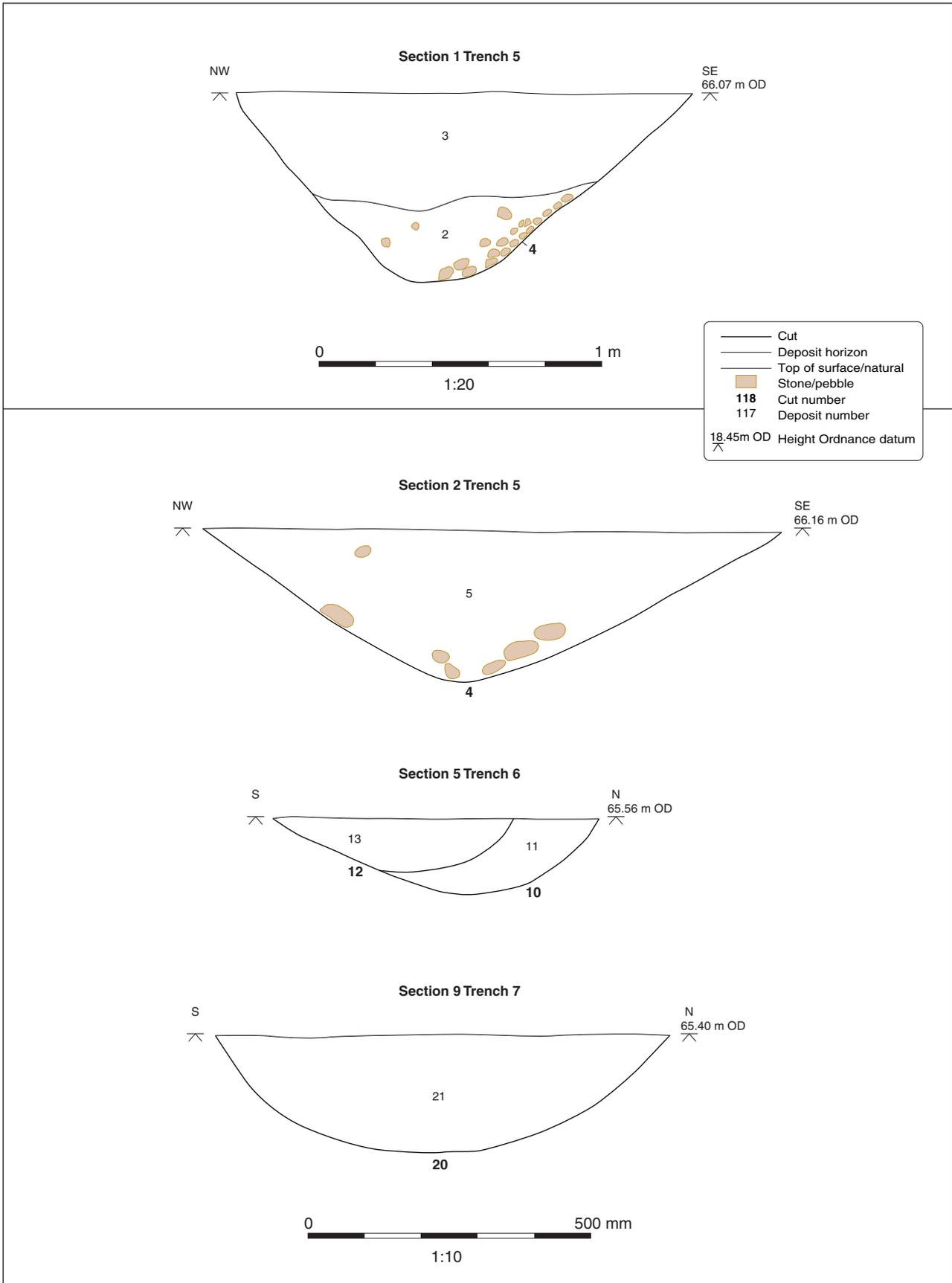


Figure 4: Selected sections



Plate 1: Trench 5, looking north-west



Plate 2: Trench 5, pit 4 and ditch 1, looking north-east



Plate 3: Trench 6, looking north-west



Plate 4: Trench 7, looking south-west



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