

ROIE/01



# ROYAL OAK INDUSTRIAL ESTATE, DAVENTRY, NORTHAMPTONSHIRE

Archaeological Evaluation and Gradiometer Survey

for Ford Motor Company

September 2014



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## Archaeological Evaluation and Gradiometer Survey

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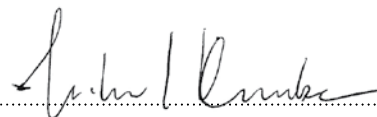
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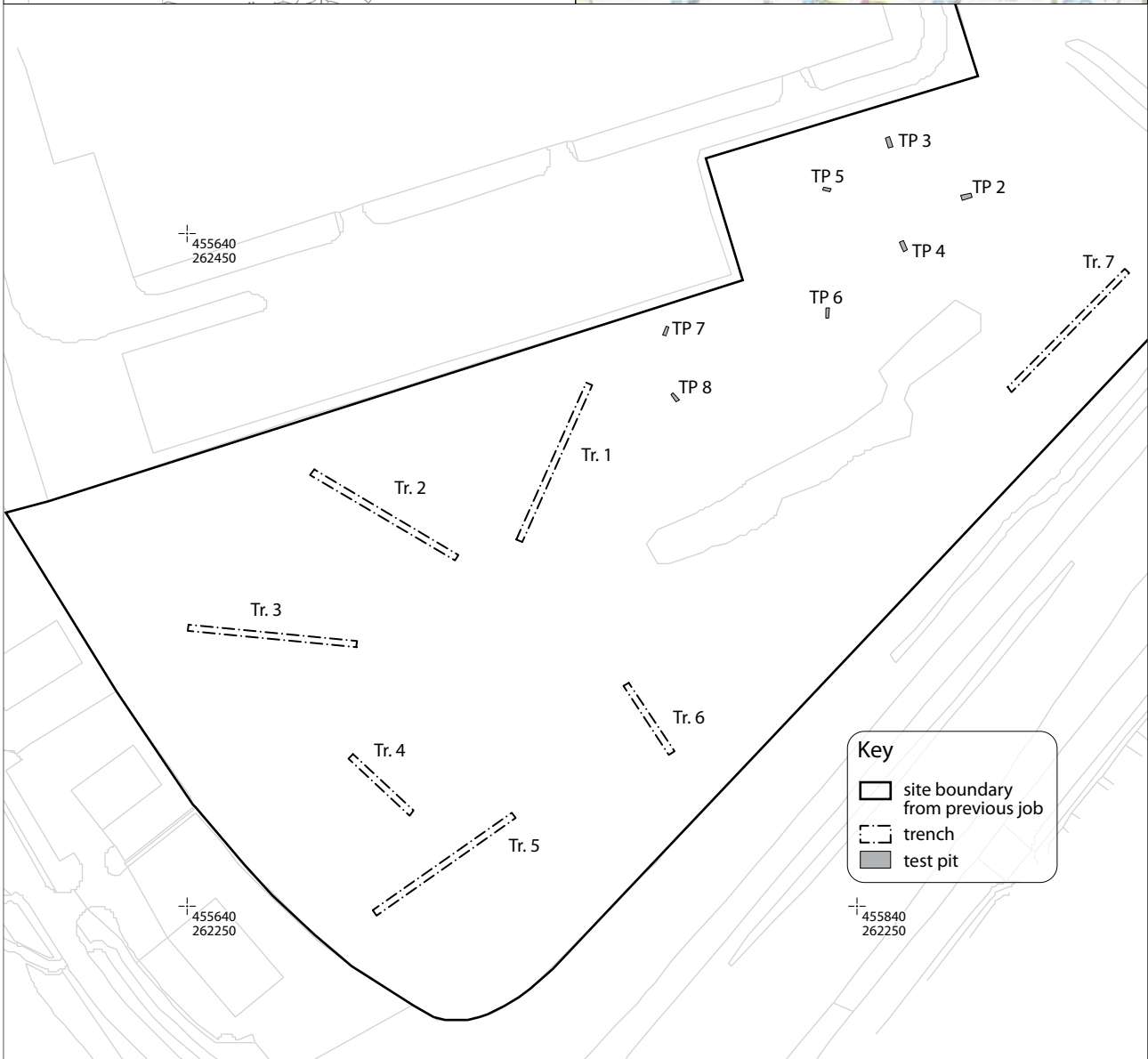
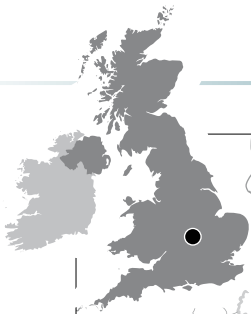
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Scale 1:2,000 @ A4



0 100m

ILLUS 1

Site location



# ROYAL OAK INDUSTRIAL ESTATE, DAVENTRY, NORTHAMPTONSHIRE

## Archaeological Evaluation and Gradiometer Survey

Headland Archaeology (UK) Ltd conducted a predetermination evaluation on land at the Royal Oak Industrial Estate, Daventry, Northamptonshire (Illus 1). The evaluation comprised seven trenches, five of 50m in length and two each of 25m in length. Eight test pits were excavated to natural deposits. No archaeological finds or features were encountered during the evaluation.

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### 1 INTRODUCTION

An archaeological evaluation was carried out on land at the Royal Oak Industrial Estate, Daventry on behalf of the Ford Motor Company, through their agent Halcrow. The client is applying for permission to develop the site. It was considered that there was a high potential for prehistoric and Roman activity within the area of the proposed development with Romano British pottery scatters and prehistoric flint scatters identified during field walking in the surrounding area. Daventry itself, however, was originally an Anglo-Saxon settlement.

The planning authority has requested information on the impact of the proposed development on the significance of any heritage assets. The information was provided by means of a geophysical survey and trial trenching.

The geophysical survey undertaken by Headland Archaeology in February 2011 was inhibited by the limestone geology crossing part of the site (See Appendix 2). In addition to this, shallow valleys in the limestone had been levelled in a number of places, to a depth of up to 3m. A ground investigation undertaken by the client had established that deep made ground deposits were present over much of the site.

All works were undertaken in line with a Brief issued by Lesley-Ann Mather, the archaeological advisor to the Planning Authority. A specification for the work was prepared in line with the Brief in line with IfA standards (Kimber 2011).

### 2 METHOD

Excavation was undertaken using a mechanical excavator with the use of a toothless bucket. The trenches were positioned to investigate a wide sample of the development area. All mechanical excavation took place under archaeological supervision. The trenches were excavated to naturally occurring deposits where possible, otherwise to a maximum depth of 1.2m. The eight test pits, excavated in an area identified by the ground survey as being in an area of made up ground, were excavated to natural deposits.

All recording followed standard archaeological guidelines as set out by the Institute for Archaeologists. All contexts were given unique numbers and recording was undertaken on pro forma record cards that conform to accepted archaeological norms. Trench plans and sections were produced at a scale of 1:100. Photographs were taken throughout using 35mm monochrome and colour slide film while digital photographs were taken on a 7.2mp camera for illustrative purposes. Registers were kept for context records, photographs and drawings. Trench positions were surveyed using a Trimble RTK GPS.

### 3 RESULTS

Trench 1 (Illus 2) measured 50m in length and was aligned northeast/southwest. The topsoil was a mid brown silt loam, probably imported. It overlay a mixed subsoil, containing modern rubble. At the north-eastern end of the trench, cutting the natural yellow stony natural



**ILLUS 2**  
Trench 1, facing SE. Modern rubble (102) in foreground



**ILLUS 5**  
Trench 4, facing S



**ILLUS 3**  
Trench 2, facing SE



**ILLUS 6**  
Trench 5, facing SW



**ILLUS 4**  
Rubble (302) in Trench 3, facing W



**ILLUS 7**  
Trench 6, facing SE

**ILLUS 8**

Trench 7, facing NW

deposit was a substantial feature, greater than 4.9m in length and containing modern rubble including scrap iron and kerbstones. The deposit was greater than 0.8m deep.

The second trench, Trench 2 (**Illus 3**) was aligned northwest/southeast and also measured 50m in length. It was excavated to 1.2m in depth at the northwestern end of the trench without natural deposits being encountered. The only deposit present was a brown clay which contained modern pottery, including blue and white transfer printed ware dating to the very end of the 18th century and later and scrap iron. The deposit smelled of oil or grease. It was investigated along the length of the trench using machine cut sondages and found to be present along the full length of the trench.

Trench 3 (**Illus 4**) was aligned northwest/southeast and was 50m long. It was excavated to a depth of 0.25m at which point the natural limestone was apparent. The only feature in the trench was a 6.5m long hollow containing scrap iron and other modern rubble, including plastic, in a white sandy plaster or mortar.

Trenches 4, 5 and 6 were excavated in order to identify features encountered during the geophysical survey.

Trench 4 (**Illus 5**) was 25m long and was aligned north/south. Excavation took place to natural deposits throughout (0.3m). Beneath the topsoil and subsoil the only deposits present were natural orange clays.

Trench 5 (**Illus 6**) was 50m in length and was aligned approximately east/west. It was excavated to a depth of 1.0m. The topsoil was approximately 0.5m deep above a mixed subsoil. The single feature identified in the trench was a linear feature (501) 1.8m wide filled with a dark reddish brown clay which contained occasional charcoal flecks. Pottery seen in the feature included transfer printed ware, the presence of which was noted, but it was not retained. The natural deposit in the trench was a bright orange brown clay.

Trench 6 (**Illus 7**) measured 25m in length and was aligned north/south. It was excavated to a depth of 0.3m at which depth the natural clay was encountered. At the northern end of the trench



was a cut (601) extending outside the trench, filled by 602, a mixed rubble including brick and concrete. Natural deposits in the trench were bright orange brown clay.

Trench 7 (**Illus 8**) was 50m in length and was the easternmost trench to be excavated. It was aligned more or less east/west and was dug to a maximum depth of 0.6m. Beneath the topsoil was a layer of disturbed, redeposited natural clay, containing modern rubble. The natural orange brown clay was present beneath this deposit.

### 3.1 THE TEST PITS

Eight small test pits were excavated in the north-eastern part of the site, an area previously identified as being made up ground. Although made up ground was identified in the ground investigation this was not found to be present in the test pits excavated as part of the archaeological work. A 0.2m deep layer of topsoil was present in the entire area of the test pits. The layer of modern rubble beneath this varied to a maximum of 1m deep. Beneath it the natural clay or limestone was identified in all the pits (**Illus 9**).



ILLUS 9

Test Pit 1, facing N

## 4 DISCUSSION

No significant archaeological remains were located. The only features encountered corresponded to those anomalies detected by the geophysical survey and contained 19th century pottery. In general the entire area appears to be heavily disturbed by modern dumping and landscaping. The impact of the proposed development upon the significance of any heritage assets within the development area is predicted to be negligible.

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## 5 ARCHIVE

The project archive will be retained by Headland Archaeology until suitable archive facilities are available in the Daventry area.

## 6 REFERENCES

Kimber, M 2011 *Royal Oak Industrial Estate, Daventry: Specification for Archaeological Evaluation*, unpublished specification.

Harrison, S 2011 *Phase I, Magnetic Gradiometer Survey: Royal Oak Industrial Estate, Daventry, Northamptonshire*, unpublished client report.

## 7 APPENDICES

### APPENDIX 1 SITE REGISTERS

#### Trench register

Trench	Dimensions (m)	Description	Contexts
1	1.8 x 50	The northeasternmost trench to be excavated Trench 1 lay at the rear of the Ford compound and was excavated to a depth of 1.8 m. At the southeastern end of the trench was a cut containing modern rubbish, including building debris, kerbstones and wire. Possibility of oil contamination. Natural deposits were yellow brown bedrock	100 101 102 103
2	1.8 x 50	To the west of trench 1 and aligned northwest/southeast. Beneath the topsoil was a layer of mixed modern rubble, heavily compacted. It overlay a thick layer of grey clay, containing modern rubble including brick. Pottery seen but not retained included transfer printed wares and modern whitewares. Its full depth was not established but the excavation of sondages established that it was greater than 1 m.	200 201 202
3	1.8 x 50	The trench was aligned approximately east/west and lay at the western side of the site. The natural bedrock lay some 0.1m beneath the existing ground surface. A natural hollow or disturbance was filled with modern material including plaster, timber and concrete.	300 301 302 303
4	1.8 x 25	The trench was aligned north northwest/south southeast. Only two deposits were present beneath the topsoil. They were natural in origin.	400 401 402
5	1.8 x 50	Adjacent to trench 4 trench 5 was aligned southwest/northeast. It was positioned to encounter anomalies detected on the geophysical survey. A ditch crossing the trench contained modern pottery. A further feature appeared to have resulted from waterlogging. The trench was excavated to a depth of 1.2m beneath the existing surface.	500 501 502 504 505
6	1.8 x 25	The trench was aligned approximately north/south. The only feature in the trench was a cut into natural at the northern end, filled with compacted modern dumping material including brick and concrete.	600 601 602 603
7	2 x 50	The easternmost trench to be excavated, it was aligned northeast/southwest. Beneath the topsoil was a layer of redeposited natural clay with frequent modern rubble. It lay above the natural clay.	700 701 702 703

#### Context register

Context	Trench	Description	Dimensions (m)
100	1	Existing topsoil; mid yellow brown clay silt.	L:50+ W:1.8+ D:0.2 [max]
101	1	Cut containing modern debris 102	L: 4.9+ W: 1.8+ D: 0.8+
102	1	Modern rubble including kerbstones and plastic	L: 4.9+ W: 1.8+ D: 0.8+
103	1	Yellow brown stony natural.	L: 4.5+ W: 3+ D: 0.2+
200	2	Topsoil as in Trench 1	L: 50+ W: 2+ D: 0.2 (max)
201	2	Heavily disturbed mixed layer containing rubble	L: 50+ W: 2.+ D: 0.25
202	2	Blue grey clay present for the full length of the trench. Smelled of grease or diesel. Contained modern pottery, scrap iron etc. Investigated to 1m depth. Present for 17m but sondages cut through 201 suggested it continued for full length of trench.	L: 50+? W: 1.8+ D: 1+
300	3	Topsoil as in Trench 1.	L: 50+ W: 1.8+ D: 0.2 [max]+
301	3	Cut filled with modern rubble 302	L: 6.5 W: 1.8+ D: 0.3+
302	3	Modern rubble including concrete, scrap iron, railway sleepers and plastic.	L: 6.5 W: 1.8+ D: 0.3+
303	3	Natural bedrock	L: 43.5+ W: 1.8+ D:
400	4	Topsoil as in Trench 1	L: 25+ W: 1.8 D: 0.2 [max]
401	4	Natural orange clay in Trench 4. Very hard.	L: 25+ W: 1.8+2.5+ D:
402	4	Orange bedrock in Trench 4.	L: 25+ W: 1.8+ D:



Context	Trench	Description	Dimensions (m)
500	5	Topsoil as in Trench 1.	L: 50+ W: 1.8+ D: 0.2 [max]
501	5	Cut running east – west across the trench	L: 3+ W: 1.8 D: not exc
502	5	Fill of 501. Mid brown clay containing modern building rubble and pottery.	L: 3+ W: 1.8 D: not exc
503	5	Dark blue grey clay at the southern end of Trench 5. Contains modern pottery. Similar to 202.	L: 5.5 W: 1.8+ D: 0.7+
504	5	Mixed red clay with patches of gleying. Similar to 503.	L: 24+ W: 1.8+ D: 0.2+
505	5	Natural bedrock encountered at the northeastern end of Trench 5.	L: 2+ W: 1.8+ D: 0.2+
600	6	Topsoil as in Trench 1.	L: 25+ W: 1.8+ D: 0.2 [max]
601	6	Cut for rubbish pit at northwest end of trench.	L: 3.5+ W: 1.8+ D: 0.2+
602	6	Fill of 601. Contains concrete, ash, scrap etc.	L: 3.5+ W: 1.8+ D: 0.2+
700	7	Topsoil as in Trench 1.	L: 50+ W: 1.8+ D: 0.2 [max]
701	7	Layer of made up ground containing concrete, reinforcing rods, modern pottery. removed using machine along majority of trench.	L: 50+ W: 1.8 D: 0.3
702	7	Natural orange brown clay in Trench 7.	L: 50+ W: 1.8 D:
1000	TP1	Topsoil. Mid yellow brown silt clay	L: 3+ W: 1.2+ D: 0.2

Context	Trench	Description	Dimensions (m)
1001	TP1	Made up ground. Modern rubble.	L: 3+ W: 1.2+ D: 0.4
1002	TP1	Natural orange clay with bands of gleying.	L: 3+ W: 1.2+ D: 1.8+
2000	TP2	Topsoil as TP1	L: 2.9+ W: 1.2+ D: 0.2
2001	TP2	Made up ground as TP1	L: 2.9+ W: 1.2+ D: 0.8
2002	TP2	Natural bedrock.	L: 2.9+ W: 1.2+ D: 0.2+
2003	TP2	Natural orange clay.	L: 2.9+ W: 1.2+ D: 0.2+
3000	TP3	Topsoil as TP1	L: 3.2+ W: 1.2+ D: 0.1
3001	TP3	Made up ground as TP1	L: 3.2+ W: 1.2+ D: 0.1
3002	TP3	Natural orange clay with gleying	L: 3.2+ W: 1.2+ D: 0.5+
4000	TP4	Topsoil as TP1	L: 2.8+ W: 1.2+ D: 0.2
4001	TP4	Made up ground as TP1	L: 2.8+ W: 1.2+ D: 0.7
4002	TP4	Natural orange brown clay	L: 2.8+ W: 1.2+ D: 0.3+
5000	TP5	Topsoil as TP1	L: 2.3+ W: 0.8+ D: 0.1

Context	Trench	Description	Dimensions (m)	Photographic register					
				Photo	BW	C/S	Digital	Direction	Description
5001	TP5	Natural orange brown clay	L: 2.3+						
			W 0.8+	1	Y	Y	Y	NW	General, trench 1
			D: 0.7	2	Y	Y	Y	SE	General, trench 1
5002	TP5	Bedrock	L: 2.3+	3	Y	Y	Y	NE	Trench 1 section
			W 0.8+	4	Y	Y	Y	NW	Trench 2, general shot
			D: In base	5	Y	Y	Y	SE	Trench 2, general shot
6000	TP6	Topsoil as TP1	L: 3+	6	Y	Y	Y	NE	Trench 2, section
			W 0.8+	7	Y	Y	Y	W	Trench 3, general shot
			D: 0.2	8	Y	Y	Y	E	Trench 3, general shot
6001	TP6	Made up ground as TP1	L: 3+	9	Y	Y	Y	W	Detail of modern rubble 302
			W 0.8+	10	Y	Y	Y	S	Section Trench 3
			D: 1.0	11	Y	Y	Y	S	Trench 4, general
6002	TP6	Natural clay with gleying	L: 3+	12	Y	Y	Y	N	Trench 4, general
			W 0.8+	13	Y	Y	Y	E	Trench 4, section
			D: 0.2+	14	Y	Y	Y	SW	Trench 5, general shot
7000	TP7	Topsoil as TP1	L: 3.4+	15	Y	Y	Y	NE	Trench 5, general shot
			W 0.8+	16	—	—	Y	SW	Trench 5, feature 503
			D: 0.2	17	—	—	Y	SW	Trench 5, feature 501
7001	TP7	Made up ground as TP1	L: 3.4+	18	Y	Y	Y	SW	Trench 5, section
			W 0.8+	19	Y	Y	Y	N	Test Pit 1, section
			D: 0.7	20	Y	Y	Y	NW	Trench 6, general
7002	TP7	Unmortared brick structure. Modern machine made bricks.	L: 3.4+	21	Y	Y	Y	N	Trench 6, general
			W 0.8+	22	Y	Y	Y	NE	Trench 6, section
			D: 0.5	23	Y	Y	Y	SE	Trench 7, general
8000	TP8	Topsoil as TP1	L: 2.5+	24	Y	Y	Y	NW	Trench 7, general
			W 0.8+	25	Y	Y	Y	SW	Trench 7, section
			D: 0.2	26	Y	Y	Y	S	Test pit 2, section
8001	TP8	Made up ground as TP1	L: 2.5+	27	Y	Y	Y	E	Test pit 3, section
			W 0.8+	28	Y	Y	Y	SE	Test pit 7, section
			D: 0.4	29	Y	Y	Y	E	Test pit 4, section
8002	TP8	Grey clay/gleying	L: 2.5+	30	Y	Y	Y	NE	Test pit 5, section
			W 0.8+	31	Y	Y	Y	SW	Test pit 6, section
			D: 0.8+	32	Y	Y	Y	E	Test pit 8, section



## APPENDIX 2 PHASE 1 – MAGNETIC GRADIOMETER SURVEY

This report details the results of a magnetic gradiometer survey conducted on four areas adjacent to the Ford Plant, Daventry, Northamptonshire.

The aims of the proposed archaeological geophysical survey were to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey areas
- accurately locate these anomalies and present the findings in map form
- describe the anomalies and discuss their likely provenance in a written report
- recommend any further work (including other forms of geophysical survey if appropriate) likely to contribute to the mitigation of the impacts of the development on these features
- incorporate all of the above in a report to the Client

Generally, there are no significant anomalies throughout Areas A, B and D, due to large scale landscaping and a geology that is not amenable to magnetic gradiometer survey.

In Area C there is a large amount of material that gives a similar magnetic response to the material in Area B. However, in the south-west, the topography suggests that it is generally unlandscaped and this is borne out by the results. There are several anomalies within this area that may be agricultural in nature, however, it cannot be discounted that they are constructed topographical features created during the construction of the Ford Plant.

### Site information

#### Introduction

This report details the results of a magnetic gradiometer survey conducted on four areas adjacent to the Ford Plant, Daventry, Northamptonshire. The three sites in the south are referred to as Area A (455927, 262544), Area B (455849, 262463) and Area C (455823, 262361), and the site in the north is referred to as Area D (455515, 263337).

The survey areas are bordered in the south and east by the Royal Oak Way South and Leamington Way, respectively and in the north by a large industrial estate. Topologically, the site is on a pronounced north-south orientated slope that extends from 170m OD in the north, to approximately 155m OD in the south. The site overlooks a glacially derived valley to the west, through which, a tributary of the River Leam flows.

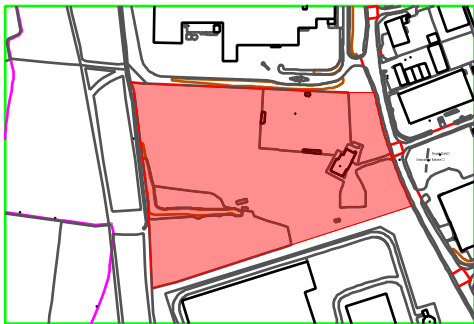
The survey was conducted between 28th February 2011 and 8th March 2011 by Scott Harrison of Headland Archaeology Ltd.

Magnetic Gradiometry was used because it is the best method to assess a large site such as this, for the presence of archaeological features that may impact upon any proposed development.

#### Development background

The site is currently being considered by its owners (Ford Motor Company) for development. Following consultation between the Client's representative Simon Griffin (Halcrow) and the archaeological advisor to the Planning Authority, Lesley Anne Mathers (Northamptonshire Archaeology) the applicant was requested to provide additional information on the potential impacts of the proposed scheme upon the significance of previously unknown heritage assets within the site boundary in line with PPS5: Planning for the Historic Environment.

The geophysical survey was intended as the first stage of works in a field evaluation to establish



survey area north



ILLUS A2.1  
Site location

0 250m  
1:10,000 @ A4



the character, quality, extent and significance of any heritage assets within the development area, the results of which would aid in the design of a programme of trial trenching.

### *Archaeological background*

The northern and southern sites are within potentially archaeologically sensitive areas. The HER records a number of events adjacent to the site although no major investigation was undertaken in advance of the construction of the existing building within the site. The HER identifies a number of areas of potential activity within the landscape surrounding the study areas.

The HER identifies that the study areas have a high potential for prehistoric and Roman activity. A number of Romano British pottery scatters have been identified by field walking in the vicinity and these may represent possible settlement activity.

A number of prehistoric flint scatters have also been recorded within the landscape adjacent to the study area although whether these maybe indicative of the presence of subsurface remains is currently unclear.

### *Site geology and topography*

At the time of survey the areas were grassland throughout. All land was owned by Ford and was part of the Ford Plant; however, it was located outside of the perimeter fence of the Ford Plant with open access for dog walking and amenity purposes. The northern area is part of the old Daventry Football Club ground and the Ford Social Club.

One notable area that was unsurveyed for topological reasons is the motocross track in the south-west of the northern area, immediately adjacent to the northern perimeter fence of the Ford Plant itself. This area was extremely rutted and had undergone considerable landscaping in creation of jumps and other motocross track features. It was overgrown at the time of the survey.

The bedrock geology typically consists of the Dyrum Formation of interbedded mudstone and siltstone, with a band of ferruginous limestone of the Marlstone Rock Formation, running east/west across the survey area. This is overlaid by superficial deposits of Mid-Pleistocene Diamicton, or glacially derived till ([http://maps.bgs.ac.uk/geologyviewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)).

## Description of the proposed works

The scope of the works included the detailed magnetometry of all areas, using the methodology described below (Section 4). The exact size of the areas was to be determined by ground conditions, but was proposed to be in the region of 13 Ha.

Once the survey had begun, it became apparent that the geology and topography were unsuitable for the application of magnetometry. The geology is very iron rich which creates large anomalies of high enough magnitude to obscure any archaeological anomalies. This iron rich material forms a percentage of the material used to create the built up areas. This is visible in the magnetometry results.

After consultation with the Northamptonshire County Archaeologist and the Consultant, it was agreed that the survey of the area adjacent

to the Ford College in the east of Area B, the low lying area in the south of Area B between the road and the slope described above and a small test area immediately south-west of the Ford plant itself was acceptable. This excluded the area immediately south of the Ford Plant, which the test area indicated was likely to be made ground and not amenable to survey.

The entirety of the Area A appeared to be made ground. This was backed up by the results of the test survey conducted in this area. The remainder was omitted on the back of a walkover and the results of the test survey.

## Aims and objectives

The aims of the proposed archaeological geophysical survey were to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey areas
- accurately locate these anomalies and present the findings in map form
- describe the anomalies and discuss their likely provenance in a written report
- recommend any further work (including other forms of geophysical survey if appropriate) likely to contribute to the mitigation of the impacts of the development on these features
- incorporate all of the above in a report to the Client

## Results

- L1 Negatively magnetic, bi-linear anomaly
- L2 Negatively magnetic, bi-linear anomaly
- L3 Positively magnetic linear anomaly
- L4 Irregular, positively magnetic sub-ovoid anomaly
- L5 Feint, irregular, positively magnetic linear anomaly
- L6 Very feint, diffuse, irregular, negatively magnetic linear anomaly
- L7 Very feint, diffuse, irregular, negatively magnetic linear
- L8 Very feint, diffuse, irregular, negatively magnetic linear
- L9 Very feint, diffuse, irregular, positively magnetic linear
- L10 Negatively magnetic, bi-linear anomaly
- L11 Irregular, positively magnetic curvilinear anomaly

### *Area A 1*

The results from Area A1 depict numerous ferrous anomalies. There are spreads of numerous ferrous items in some area of Area A1, but there is nothing visible on the ground in this area. It is unclear if these anomalies area caused by ferrous material or stones/boulders composed of the iron rich ferruginous limestone.

### *Area B1*

The results from Area B1 are variable throughout, depicting numerous ferrous anomalies. It is unclear whether these anomalies



are caused by ferrous material, or by stones/boulders that are derived from the ferruginous limestone bedrock. The results in the northwest of the survey area are particularly variable and show a concentration of the material described above. There is a ferrous pipeline running almost straight east/west, entering and exiting the survey area in the north-eastern corner.

### *Area B2*

The results from Area B2 are extremely variable throughout, depicting numerous ferrous anomalies. It is unclear whether these anomalies are caused by ferrous material or a spread of stones/boulders derived from the underlying ferruginous limestone. The concentration is sufficient to render no 'quiet' areas, thereby completely obscuring any archaeological remains that may be present. This survey area is located on the flat plateau and is located on the same elevation as the factory itself. It is therefore likely that this area is entirely made ground, devoid of any archaeological features; intrusive investigation would be required to ascertain the depth of this material and whether it masks deposits of archaeological potential.

### *Area C*

The results from the north of Area C seem to reflect the results from Area B2, possibly indicating slippage of the material that caused the high variability in that area. Immediately south of this there is a small band of clear readings, which is too small to say anything meaningful, before again giving way to variability cognate with the extent of the survey area to the south.

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In the south-west and west of the survey area, there is a large area of 'clear' readings, where several features are visible. There is a south-west / north-east orientated, positively magnetic bi-linear anomaly (L3). This is cognate with a large negative feature that is visible on the site. The topography suggests that there may be an associated ridge, but this is not certain. The cause of this is not clear from either the geophysics or the topography, but it is likely to be either agricultural, or a modern vestige of the construction of the Ford Plant.

There are several similarly orientated, negatively magnetic linear anomalies (L2, L4, L5, L7 and L9-L11). These are concentrated in the eastern side, south of the linear anomaly described above. These are not visible on the site and their provenance is unknown.

South of this linear anomaly there are several diffuse, negatively magnetic linear anomalies (L1, L6 and L8). They have no obvious interpretation. These are concentrated in the western area, south of the linear anomaly described above and are generally orientated similarly, or perpendicular to this anomaly. These are visible topographically as slight ridges throughout the area.

## Conclusions and recommendations

Generally, there are no significant anomalies throughout Areas A, B and D, due to large scale landscaping and a geology that is not amenable to magnetic gradiometer survey.

In Area C there is a large amount of material that gives a similar magnetic response to the material in Area B. However, in the south-west, the topography suggests that it is generally unlandscaped and

this is borne out by the results. There are several anomalies within this area that may be agricultural in nature, however, it cannot be discounted that they are constructed topographical features created during the construction of the Ford Plant.

The areas that are likely to have been landscaped (Areas A, B and D) may contain a considerable depth of made ground. No ground investigation (such as boreholing) has yet been undertaken in these areas; therefore it is not known to what extent these deposits may or may not mask areas of archaeological potential. Deep made ground in this area could complicate further field evaluation by trial trenching.

The presence of deep made ground seems less likely in the vicinity of Area C, because this is likely to represent the natural, or near natural, elevation in this area. A program of specific test trenching could be employed here to specifically investigate the geophysical anomalies identified.

## Technical information

### *Methodology*

#### **Legislative framework and guidelines**

Headland Archaeology (Ireland) Ltd. conduct geophysical surveys to the highest professional standards as detailed in Geophysical Survey in Archaeological Field Evaluation, English Heritage Research and Professional Services Guideline No. 1, 2nd ed (English Heritage 2008), The Use of Geophysical Techniques in Archaeological Evaluations, Institute of Field Archaeologists Paper, No. 6 (IfA 2002) and the DRAFT Standards and Guidance for Geophysical Survey, IfA Technical Paper (IfA, Pending Ratification).

All data provided by Headland Archaeology (Ireland) Ltd., will be treated in accordance with the guidelines laid out in Geophysical Data in Archaeology: A Guide to Good Practice (AHDS Guides to Good Practice; Schmidt 2001).

A site specific Health and Safety Risk Assessment and Method Statement was produced and circulated to all relevant parties for approval. All survey personnel were required to familiarize themselves this document before the commencement of any works.

Copies of this report and the data archive created during the course of the survey have been made available to the Curator, English Heritage and OASIS.

#### **Phase I: Magnetometry**

To conduct the survey we used a cart-mounted Bartington Grad 601-2 dual magnetic gradiometer. The cart-mounting reduced the incidence of operator induced errors by ensuring the regular positioning of the instrument, and removing the effect of the 'beat' that all operators, to some degree, have to their walk.

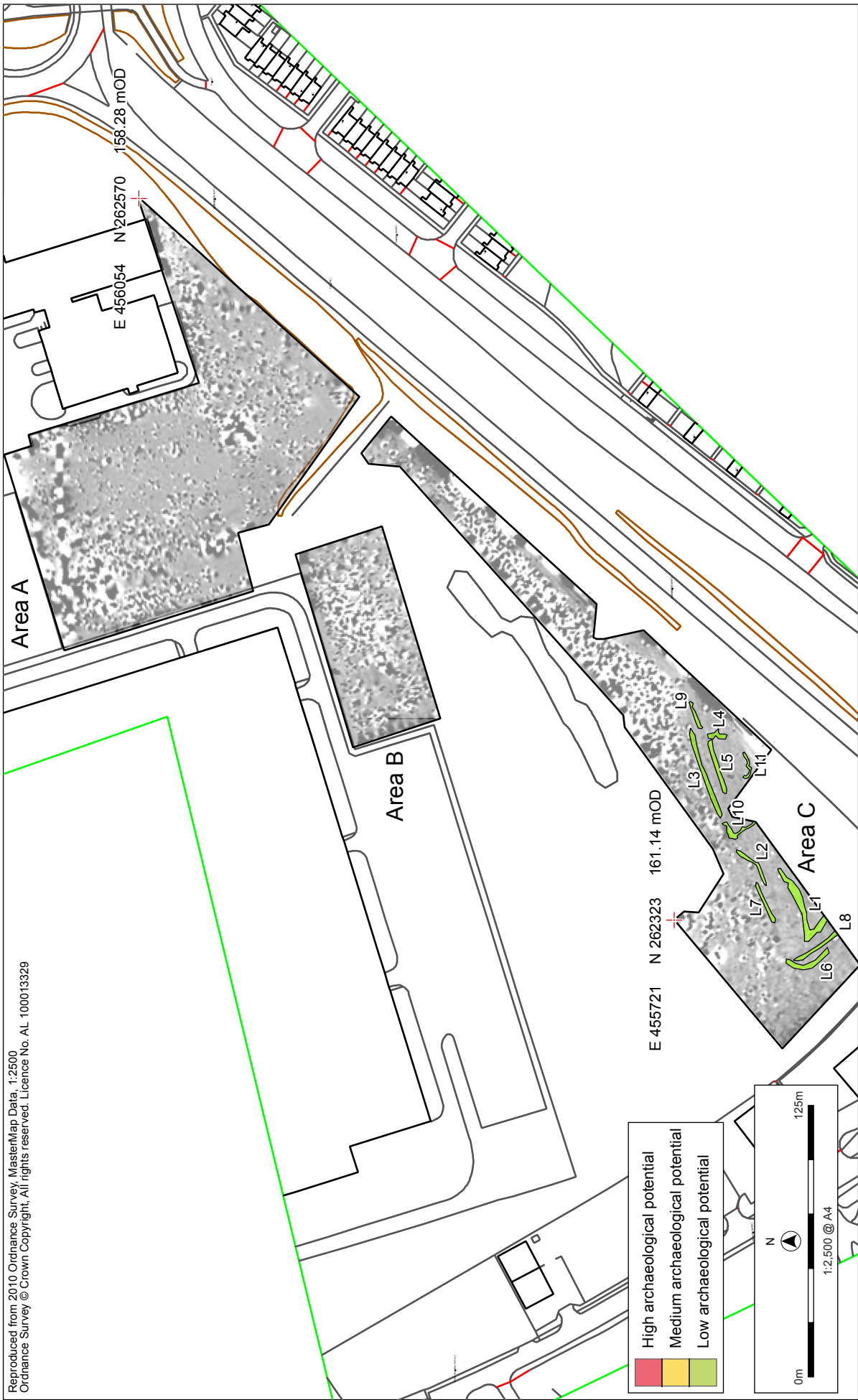
A Differential Global Positioning System (dGPS), capable of Real Time Kinematic (RTK) navigation, was fixed to the cart and allowed each data point to be collected with sub-cm accurate GPS coordinates. This negated the need to set out a nominal grid prior to the survey and therefore, increased the accuracy and efficiency of the survey.



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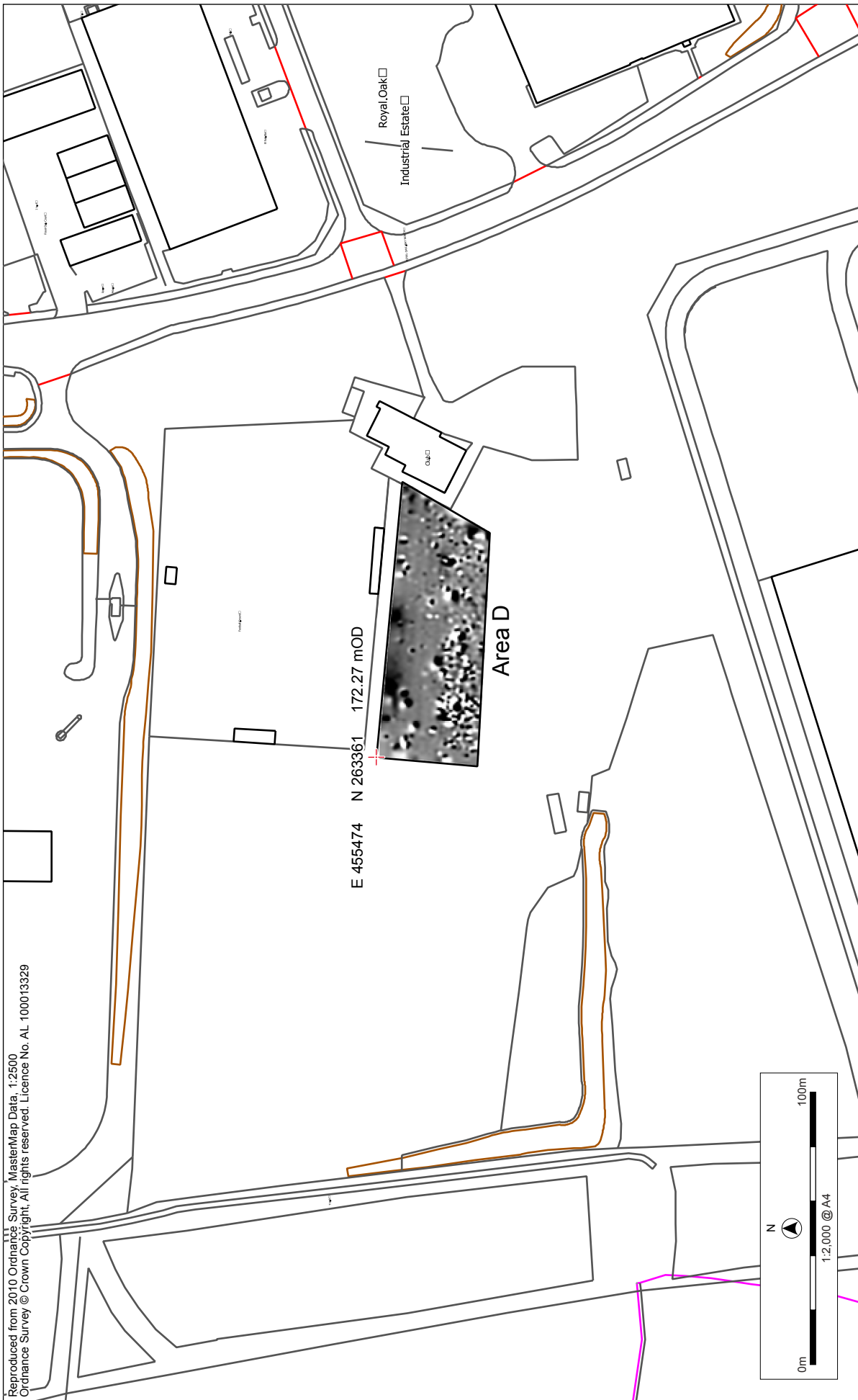
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ILLUS A2.2  
Processed data (Areas A, B and C)



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ILLUS A2.3  
Interpreted data (Areas A, B and C)



The magnetometer data and the GPS data was collected and combined using geophysical data collection software at a resolution of at least 1m x 0.125m. This sample density is acceptable, 'for evaluation surveys, where the primary goal is to establish the presence or absence of archaeological remains' (English Heritage 2008).

This 'irregular xy' data was then exported from the geophysical data collection software and imported in to Headland's geophysical data processing software where it was converted to 'regular xy' data at user defined sample intervals (1m x 0.125m in this case). From there it was processed as standard magnetometer data, similar to that collected from traditional pre-defined grid survey.

### Phase II: Reporting and Data Archive

Once the magnetometry data was processed in ArcheoSurveyor to highlight and clarify any anomalies that may be of archaeological derivation, the data was exported as ASCII grid files. This file type performs the dual function of fulfilling all archive requirements, as it can be opened and edited in any text editor, while at the same time, being inherently spatially aware and therefore being able to be opened directly in CAD/GIS software.

CAD and GIS software was used to create the illustrations. The interpretations were produced *in situ* and exported as both GIS shapefiles and CAD DXFs, so that the interpretations can be combined with any other spatially aware data that may be produced during the scheme.

### Data processing and presentation

Each data set was downloaded as an irregular xyz file, which was then converted in to OSTN02 before being imported into ArcheoSurveyor for processing. During the import process the irregular xyz data was converted into a regular grid file at defined intervals (in this case, 1m x 0.125). This data was destriped to remove any differences created by collecting the data bi-directionally (*ie* zig-zag traverses), despiked to remove isolated ferrous spikes caused by surface iron debris and then usually clipped to enhance the contrasts in the archeologically significant mid-range (*ie* 0nT  $\pm$ 5nT) of the data.

On this occasion this was not possible due to the unusually high data range within the dataset. Because of this, the data was clipped appropriately for the range of the data. This obscured any features within the usual range for archaeological features.

### Archival process

The archive contains (as a minimum standard):

- full report text and accompanying illustrations (pdf)
- raw trace data plots (pdf)
- raw data files (CAD/GIS compatible)
- processed composite files (CAD/GIS compatible)
- geophysical anomaly interpretations (CAD/GIS compatible)

### References

English Heritage 2008 *Geophysical Survey in Archaeological Field Evaluation*, English Heritage Research and Professional Services Guideline No. 1 (2nd ed). English Heritage, London.

IfA, (Pending DRAFT) *Standards and Guidance for Geophysical Survey*, IfA Technical Paper (IfA, Pending).

IfA, 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, Institute of Field Archaeologists Paper, No. 6.

Schmidt, A 2001 *Geophysical Data in Archaeology: A Guide to Good Practice*, AHDS Guides to Good Practice, Oxbow Books, Oxford.

British Geological Survey 1:50000 *Bedrock and Superficial Geologies Maps* ([http://maps.bgs.ac.uk/geologyviewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html))





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