ARCHAEOLOGICAL EVALUATION ON LAND AT CREETON QUARRY EXTENSION, CREETON, LINCOLNSHIRE (CRQE 12)

Work undertaken for
Archaeologica acting on behalf of
the Johnston Quarry Group

October 2012

Report Compiled by
Mark Peachey BA (Hons)

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APS Report No. **74/12**

ARCHAEOLOGICAL PROJECT SERVICES

Quality Control
Creeton Quarry Extension,
Creeton, Lincolnshire
(CRQE12)

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Date: 15th October 2012	Date: 15th October 2012

CONTENTS

Appendices

List of Figures

List of Plates

1. SUMMARY

The results of an archaeological evaluation were required prior to the determination of a planning application to extend Creeton Quarry, Creeton Lincolnshire. The evaluation comprised a geophysical survey followed by a programme of trial trenching. Three trenches were excavated, their locations determined by the results of the geophysical survey.

Previous interventions at the quarry had identified evidence for iron working dating to the Romano-British period.

The geophysical survey identified an anomaly towards the north end of the site which may have represented archaeological remains. However, the trial trenching identified no archaeological features, the iron working clearly not extending into the investigation area.

No finds were retrieved.

2. INTRODUCTION

2.1 Definition of an Evaluation

An archaeological evaluation is defined as *'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate'* (IfA 2008).

2.2 Planning Background

The Lincolnshire County Council (LCC) Historic Environment Team has advised that the results of an archaeological evaluation should be submitted prior to the determination of planning application S24/1741/11 to extend the existing quarry. Archaeological Project Services was commissioned by Archaeologica, acting on behalf of the Johnston Quarry Group, to undertake this evaluation. The geophysical survey was carried out on 7th September 2012, and the trial trenching on 20th September 2012, in accordance with a written scheme of investigation prepared by Archaeological Project Services and approved by the Historic Environment Manager of the LCC Historic Environment Team.

2.3 Topography and Geology

The site lies within the parish of Counthorpe and Creeton, approximately 9km west of Bourne and approximately 14km north of Stamford, Lincolnshire and lies in the administrative district of South Kesteven, Lincolnshire. Castle Bytham village lies 1.5km to the southwest and the village of Creeton 1km to the southeast. The proposed quarry extension is centred on National Grid Reference TF 001 208.

The site lies at around 75m OD on soils of the Elmton 3 Association, comprising shallow well drained brashy calcareous fine loamy soils over limestone (Hodge *et al*. 1984, 181). Surrounding topography is formed by the undulating limestone upland of South Kesteven; the southern section of the escarpment which continues northwards as the Lincoln Edge.

2.4 Archaeological Setting

Iron Age and Roman finds have been identified in the surrounding area and during previous quarrying operations in 1954. Concentrations of metalworking slags are also known from the vicinity (Trimble, 1995)

During excavations on the site of the existing quarry in 1994 evidence for iron working was identified. Six possible furnaces were recorded and 400kg of slag, charcoal, fired clay, smelting debris and 22 sherds of Roman pottery of mid to late 2nd century date were also recovered. It is thought that both iron smithing and smelting were carried out at the site (Trimble, 1995); (Cowgill, 2002).

An archaeological desktop assessment of the impact of the proposed extension concluded that, given the finding and excavation of Roman iron smelting kilns in the quarry area, southeast of the application site, the potential for further such works in the application area could not be discounted (Lisboa, 2010).

3. AIMS AND OBJECTIVES

The aim of the work was to gather sufficient information for the archaeological curator to be able to formulate a policy for the management of the archaeological resources present on the site.

The objectives of the work were to establish the type of archaeological activity that may be present within the site, determine its likely extent and the date and function of the archaeological features present on the site; to determine the state of preservation of the archaeological features present on the site, their spatial arrangement and the extent to which the surrounding archaeological features extend into the application area and to establish the way in which the archaeological features identified fit into the pattern of occupation and land-use in the surrounding landscape.

4. METHODS

Three trenches (Fig. 3) were excavated to the surface of the underlying natural geology, their positions determined by the results of the geophysical survey (Appendix 1) which had identified an anomaly of possible archaeological origin at the north end of the area of investigation.

Removal of topsoil and other overburden was undertaken by mechanical excavator using a toothless ditching bucket working under archaeological supervision. The exposed surfaces of the trenches were then cleaned by hand and inspected for archaeological remains.

Each deposit exposed during the evaluation was allocated a unique reference number (context number) with an individual written description. A list of all contexts and their interpretations appears as Appendix 2. A photographic record was also compiled and sections and plans were drawn at a scale of 1:10 and 1:20 respectively. Recording of deposits encountered was undertaken according to standard Archaeological Project Services practice.

The location of the trenches was surveyed using a Thales Global Positioning System (GPS).

5. RESULTS

The results of the archaeological evaluation are discussed in trench order. Archaeological contexts are described below. The numbers in brackets are the context numbers assigned in the field (full descriptions of the individual deposits can be found in Appendix 2).

Trench 1 (Fig 3, Plate 2)
This trench was located to investigate a linear geophysical anomaly.

The natural deposit exposed at the south end was at least 1m thick bluish grey clay (104). This was overlain, in the northern, downward sloping, part of the trench, by at least 0.3m thick light brown clay (103), the relationship between them being confirmed in a machine sondage (Fig 4, Section 1, Plate 3).

A patchy shallow greyish brown clay subsoil (102) occurred intermittently throughout the trench.

A single, southwest-northeast aligned land drain was exposed in the southern part of the trench. This was in close alignment with the geophysical anomaly. It was sealed by 0.25m thick ploughsoil (101).

Trench 2 (Fig 3, Plate 4)
Natural mid grey clay (203) was overlain by a 0.1m thick band of natural mid brown clay (202). This was sealed by 0.3m thick ploughsoil (201) (Fig 4, Section 2).

Trench 3 (Fig 3, Plate 6)
In this trench natural bluish grey clay (302) was directly overlain by 0.3m thick ploughsoil (301) (Fig 4, Section 3).

6. DISCUSSION

Natural deposits comprised thick bluish grey clay overlain, in places, particularly on the hill slope, by a brown clay layer.

No archaeological features were identified, the linear positive geophysical anomaly closely matching a land drain in Trench 1.

7. CONCLUSIONS

An archaeological evaluation, comprising three trial trenches following a geophysical survey, was undertaken on land at Creeton Quarry extension, Lincolnshire. Previous interventions at the quarry had identified evidence for iron working dating to the Romano-British period.

However, the evaluation found no archaeological features, the iron working clearly not extending into the investigation area.

No finds were retrieved.

8. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge the assistance of Archaeologica who commissioned the fieldwork and post-excavation analysis on behalf of the Johnston Quarry Group. The work was coordinated by Dale Trimble who edited this report along with Gary Taylor.

9. PERSONNEL

Project Coordinator: Dale Trimble
Site Supervisor: Mark Peachey
Site Assistant: Jonathon Smith
Surveying: Andy Failes
Photographic reproduction: Mark Peachey
CAD Illustration: Mark Peachey
Post-excavation Analyst: Mark Peachey

10. BIBLIOGRAPHY

Cowgill, J. 2002 The iron production industry and its extensive demand upon woodland resources: A case study from Creeton Quarry, Lincolnshire, in: Peter Murphy and Patricia E. J., Wiltshire (eds.) *The Environmental Archaeology of Industry.*

Hodge, CAH, Burton, RGO, Corbett, WM, Evans, R, and Seale, RS, 1984 *Soils and their use in Eastern England,* Soil Survey of England and Wales **13**

IfA, 2008 *Standard and Guidance for Archaeological Evaluation*

Lisboa, I., 2010 *An archaeological desktop assessment at Creeton Quarry, Creeton, Lincolnshire*

Trimble, R., 1995 *Creeton Quarry,* 7th Annual report of the City of Lincoln Archaeological Unit, 1994 - 1995

11. ABBREVIATIONS

APS Archaeological Project Services

IfA Institute of Field Archaeologists

LCC Lincolnshire County Council

OD Ordnance Datum (height above sea level)

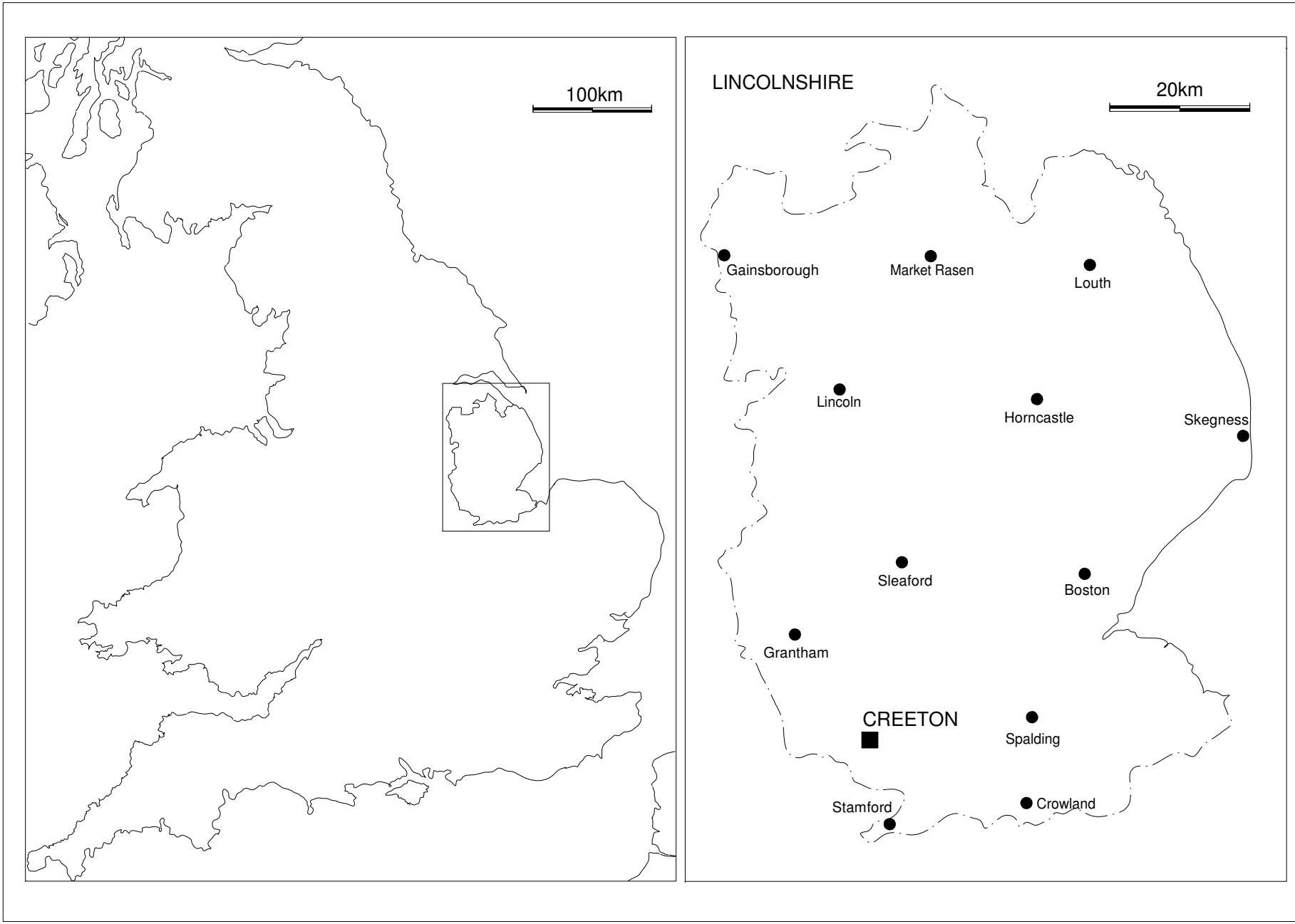


Figure 1: General Location Plan

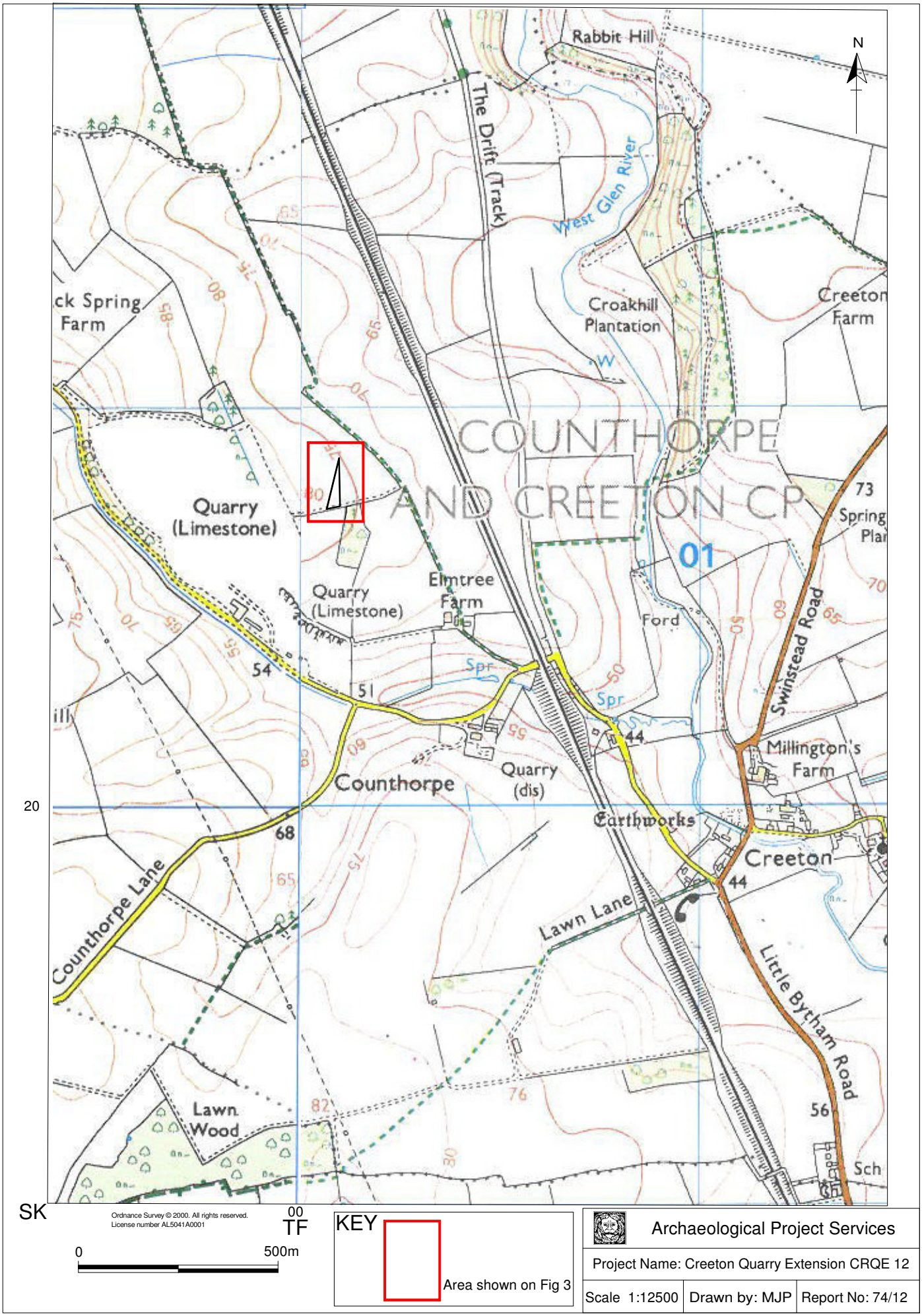


Figure 2. Site Location Plan

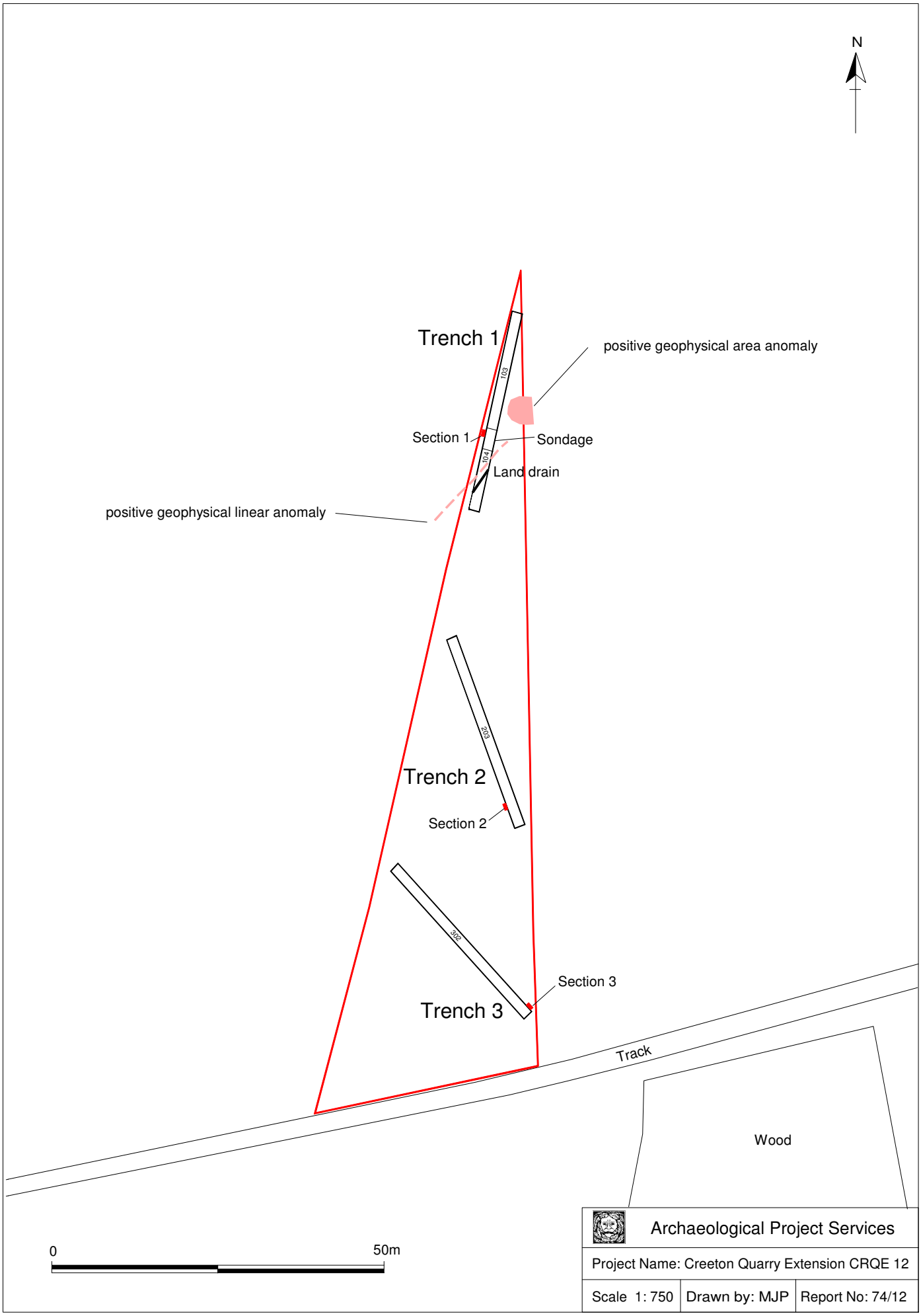
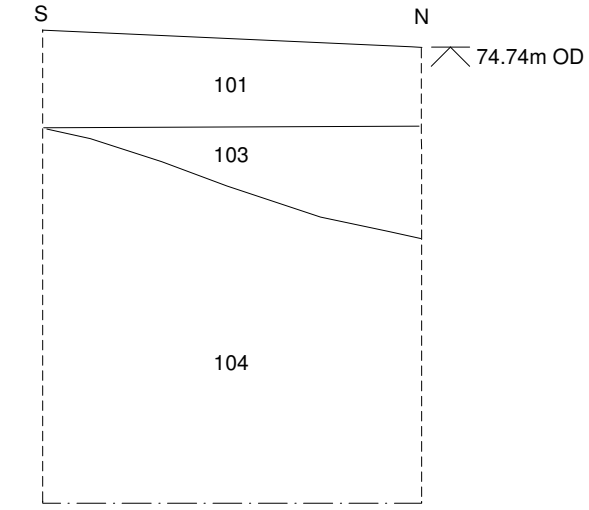
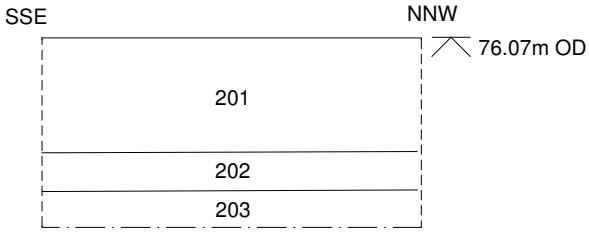


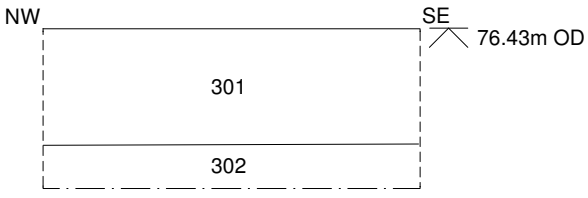
Figure 3. Trench Location Plan



Section 1



Section 2



Section 3

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Scale 1: 20	Drawn by: MJP	Report No: 74/12

Figure 4. Representative sections

Plate 1. Pre-machining view of site looking north

Plate 2. Trench 1 looking north

Plate 3. Trench 1 machine sondage, Section 1 showing interface between clays (103) and (104)

Plate 4. Trench 2 looking NNW

Plate 5. Machining Trench 3 looking southeast

Plate 6. Trench 3 looking northwest

Appendix 1
Geophysical Survey

1. SUMMARY

Detailed magnetic gradiometer survey was undertaken at Creeton, Lincolnshire over the area of a small extension to Creeton Quarry. The survey totalled some 2500m^2.

Few anomalies of potential archaeological interest were identified within the geophysical survey comprising only a single linear and possible pit feature. Modern disturbance was confined to the southeastern corner adjacent to the access track.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation. Evaluation is defined as *'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate'* (IFA 2008).

2.2 Topography and Geology

Creeton is located 9km west of Bourne in the South Kesteven District of Lincolnshire. The site lies northwest of the village on the eastern edge of the existing limestone quarry at NGR 5001 3208.

The site is situated at c. 75m AOD on rising ground to the west of the West Glen River. The bedrock geology comprises cyclic clays and shelly beds of the Rutland Formation which overlie the Lincolnshire Limestone. The site is currently arable agricultural land.

3. AIMS AND OBJECTIVES

The aims and objectives of the survey were:

Aims

- to contribute to establishing the extent and significance of any archaeological remains which may exist within the Site.

Objectives

- to establish the location, and extent of any archaeological features which provide suitable magnetic responses; and

- to identify the extent of any areas devoid of archaeological features.

4. GEOPHYSICAL SURVEY

4.1 Methods

Location and layout of the survey area is shown in Figure A1. Weather and ground conditions during the survey were dry. The field had previously been under arable cultivation but had been left as stubble with only low vegetation.

Survey was undertaken in accordance with English Heritage (2008) and IfA (2010) guidelines and codes of conduct.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity.

The mapping of anomalies in a systematic manner allows an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies representing pits and ditches can be seen where they contain more topsoil which is normally richer in magnetic iron oxides and provides a contrast with the natural subsoil (but this can vary depending on the nature of the underlying deposits). Wall foundations can show as negative anomalies where the stone is less magnetic than the surrounding soil, or as stronger positive and negative anomalies if of brick, but are not always responsive to the technique. It should be noted that not all features will be responsive and absence of anomalies does not necessarily indicate absence of archaeological features.

Magnetometers measure changes in the Earth's magnetic field. With two sensors configured as a gradiometer the recorded values indicate the difference between two magnetic measurements separated by a fixed distance. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame with a 1m separation between the sensing elements giving a strong response to deep anomalies.

Sampling interval and data capture
Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid. The Grad 601 has a typical depth of penetration of 0.5m to 1.0m although a greater range is possible where strongly magnetic objects have been buried in the site.

Readings are logged consecutively into the data logger which is downloaded daily either into a portable computer whilst on site or directly to the office computer. At the end of each job, data is transferred to the office for processing and presentation.

Processing and presentation of results
Processing is performed using specialist ArchaeoSurveyor software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following shows the processing techniques carried out on the processed gradiometer data used in this report:

1. DeStripe (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

2. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)
Parameters: X radius = 1; Y radius = 1; Threshold = 3SD; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -2.5 to 2.5nT.

4.2 Results

The presentation of the data for the site involves a print-out of the raw or minimally processed data as greyscale and trace plots (Figs 2, 3; clipped for display but otherwise unprocessed), together with greyscale plots of the processed data (Figs 4, 5). Magnetic anomalies have been identified and plotted onto interpretative drawings (Fig. 6) and are described below.

Positive linear anomalies
A single positive anomaly is highlighted as of possible archaeological origin. However, this is rather weak and ill-defined and remains difficult to interpret with confidence.

Area positive anomalies
A single area positive anomaly is highlighted against the eastern boundary. This may represent a pit feature, however overall responses are weak and although this stands out against the background, it is not a very strong response in absolute terms.

Geological responses
Faint, roughly parallel, linear responses running roughly northwest-southeast may result from changes to geological background response or reflect more recent land use (they are more or less parallel to the former western boundary of the field).

Modern/magnetic disturbance
A strong bipolar response occurs alongside the track at the southern boundary probably reflecting modern material in this corner of the field.

Iron spikes (discrete bipolar anomalies)
Iron items within the topsoil give a distinctive localised bipolar (strong positive with associated strong negative) response. Such items usually derive from relatively recent management or agricultural use of the land – broken or discarded pieces of agricultural machinery or other modern debris. These are fairly widely scattered with no particular concentration.

5. DISCUSSION

Few anomalies of potential archaeological interest have been identified within the geophysical survey comprising only a single linear and possible pit feature. Modern disturbance is confined to the southeastern corner adjacent to the access track.

6. PERSONNEL

Project coordinator: Steve Malone
Geophysical Survey: Andy Failes, Jonathon Smith
Survey processing and reporting: Steve Malone

8. BIBLIOGRAPHY

Clark, A., 1996 *Seeing Beneath the Soil*, London, 2nd edn.

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation.*

IfA, 2011 *Standard and Guidance for Geophysical Survey.*

SLR 2011, *Barnburgh Lane, Goldthorpe, South Yorkshire. Archaeological Assessment*, SLR Ref : 403.03044.00001.

9. ABBREVIATIONS

APS Archaeological Project Services

BGS British Geological Survey

EH English Heritage

IfA Institute for Archaeologists

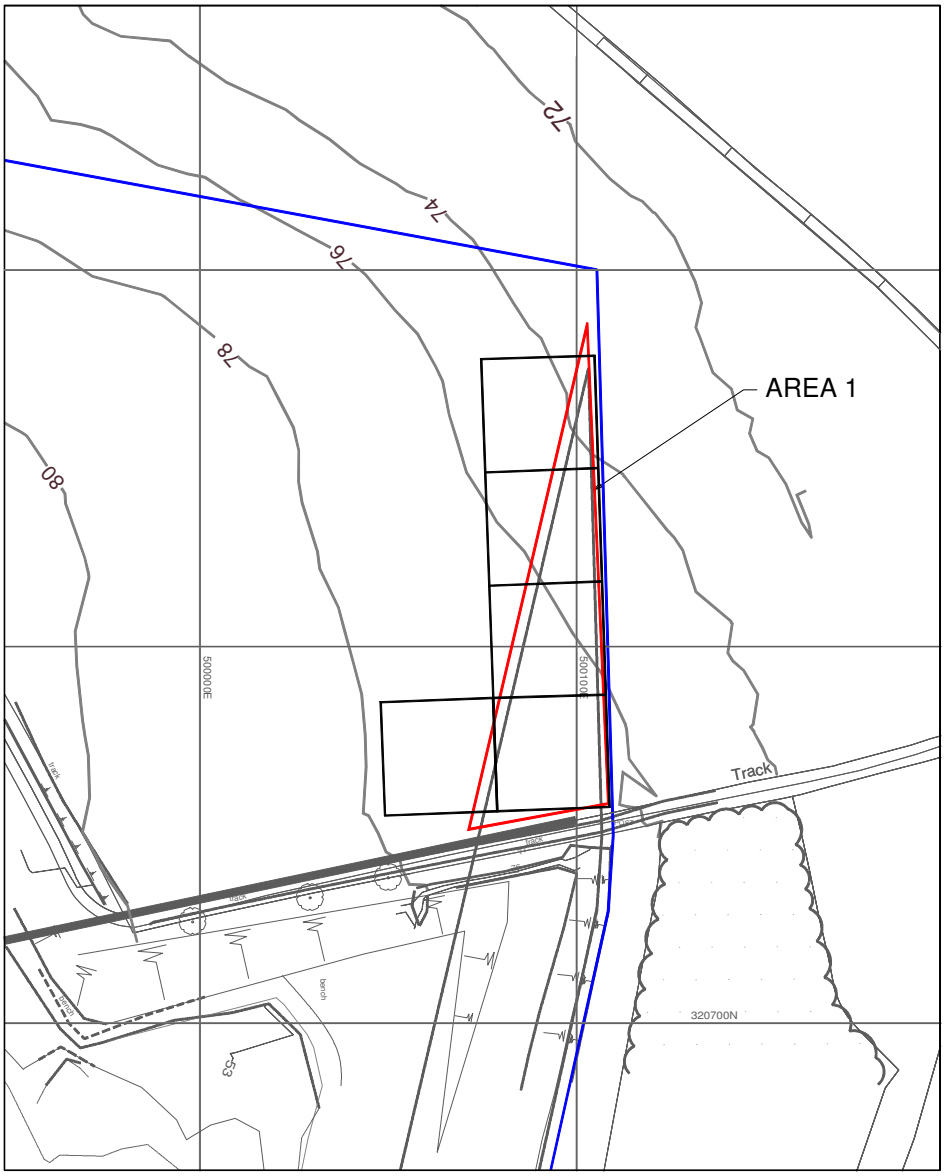

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Figure A1 Location and layout of survey area

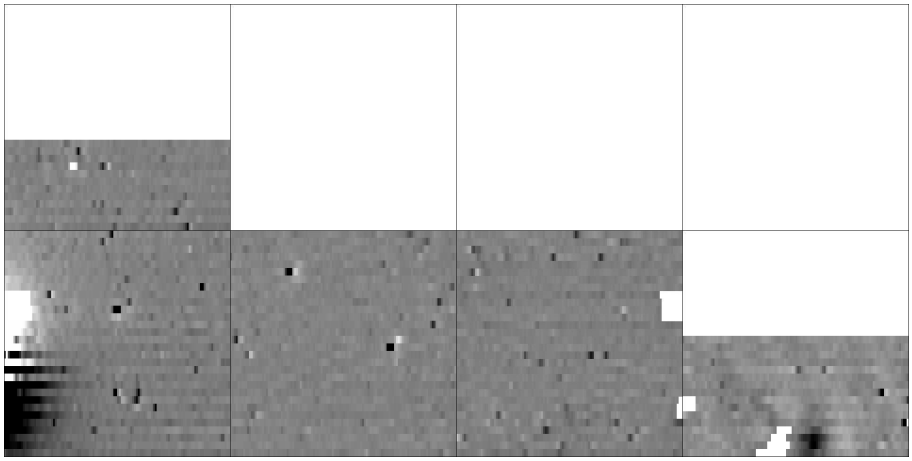


Figure A2 Minimally processed data greyscale plot

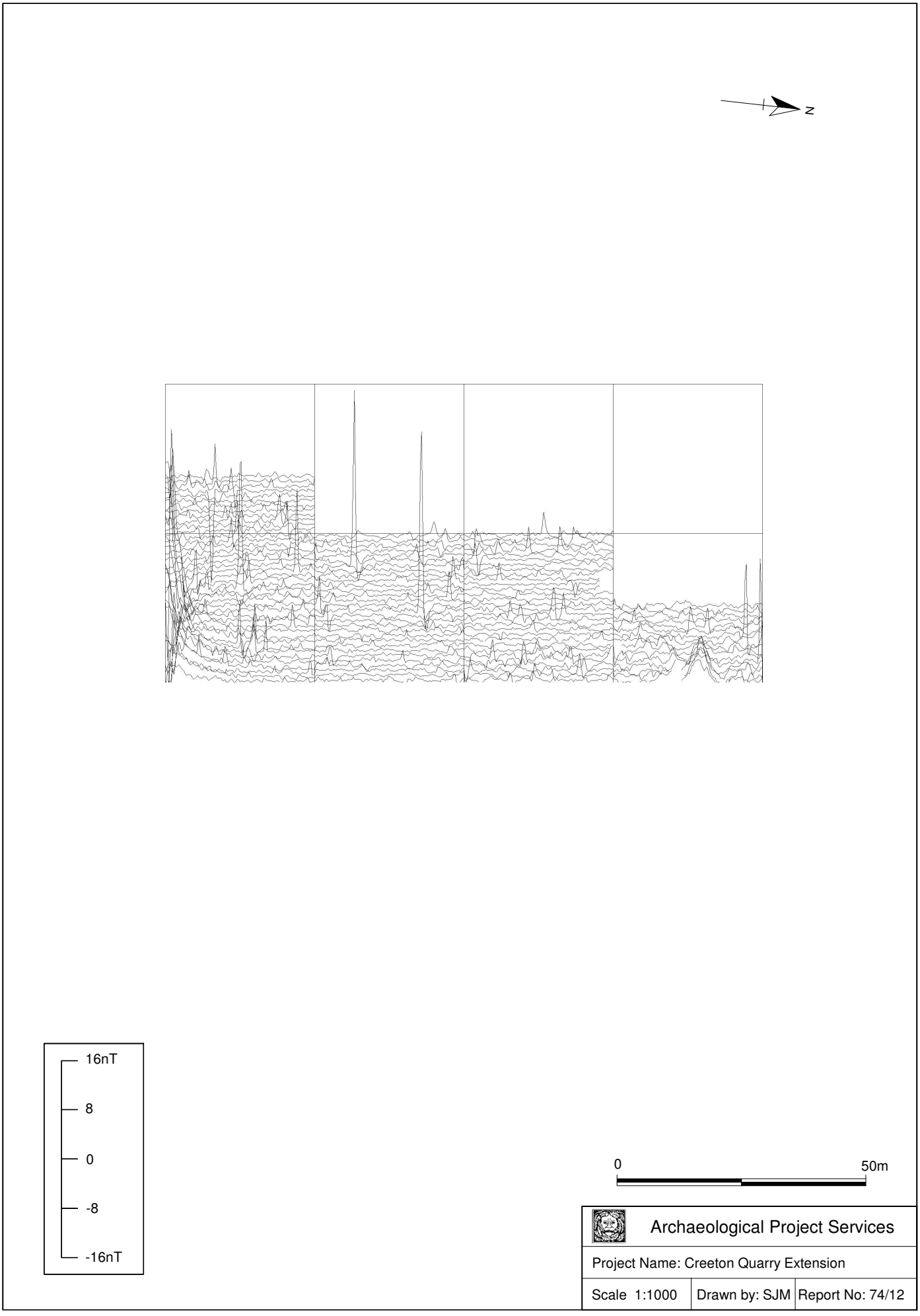
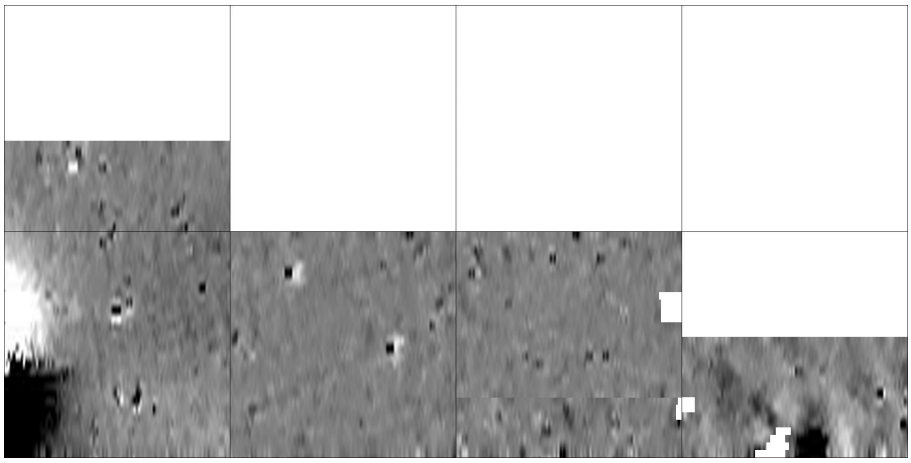
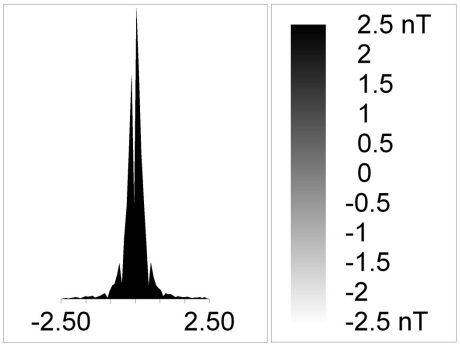


Figure A3 Minimally processed data trace plot





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Project Name: Creeton Quarry Extension		
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Figure A4 Processed data greyscale plot

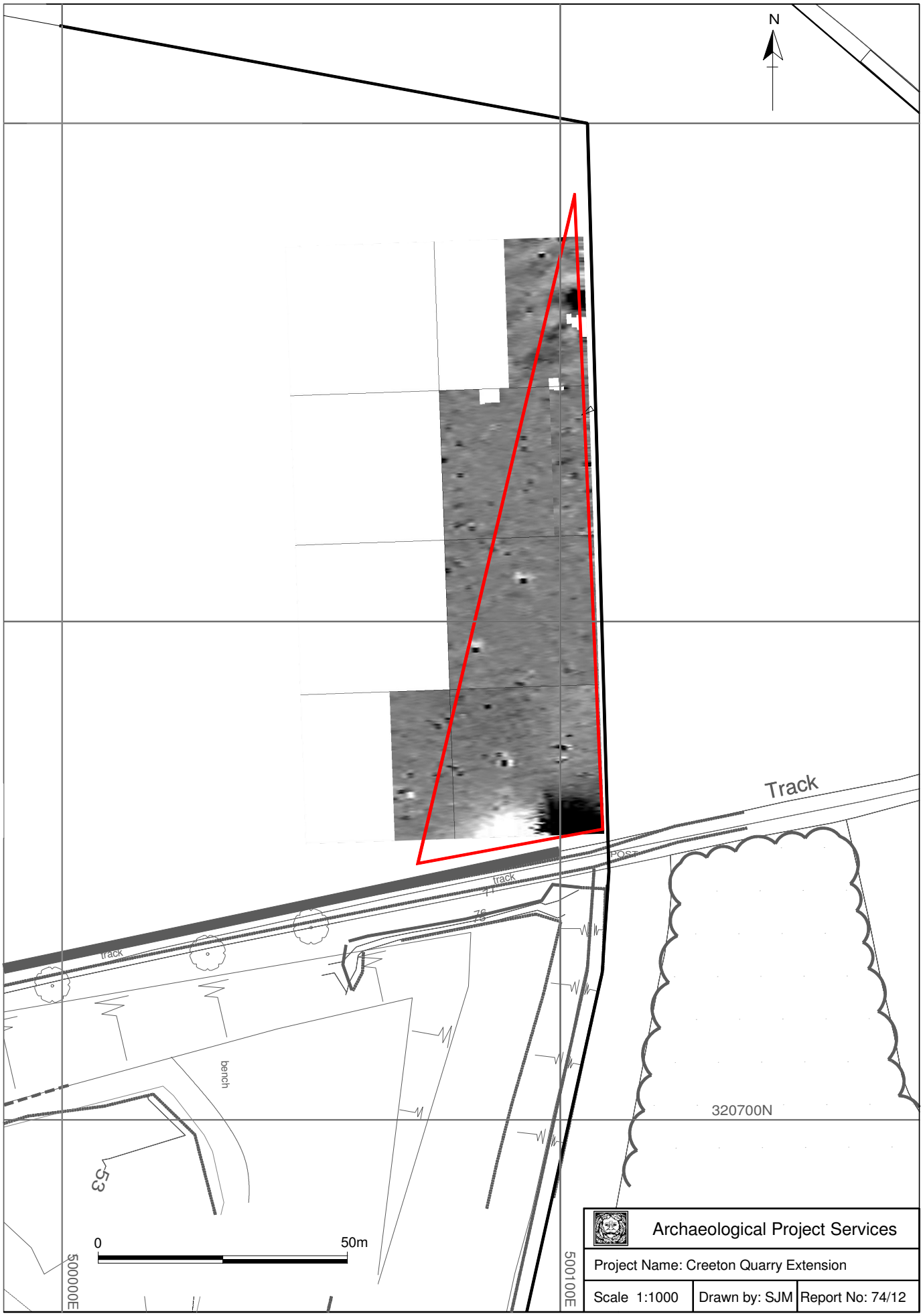

Figure A5 Processed data overlaid on base map

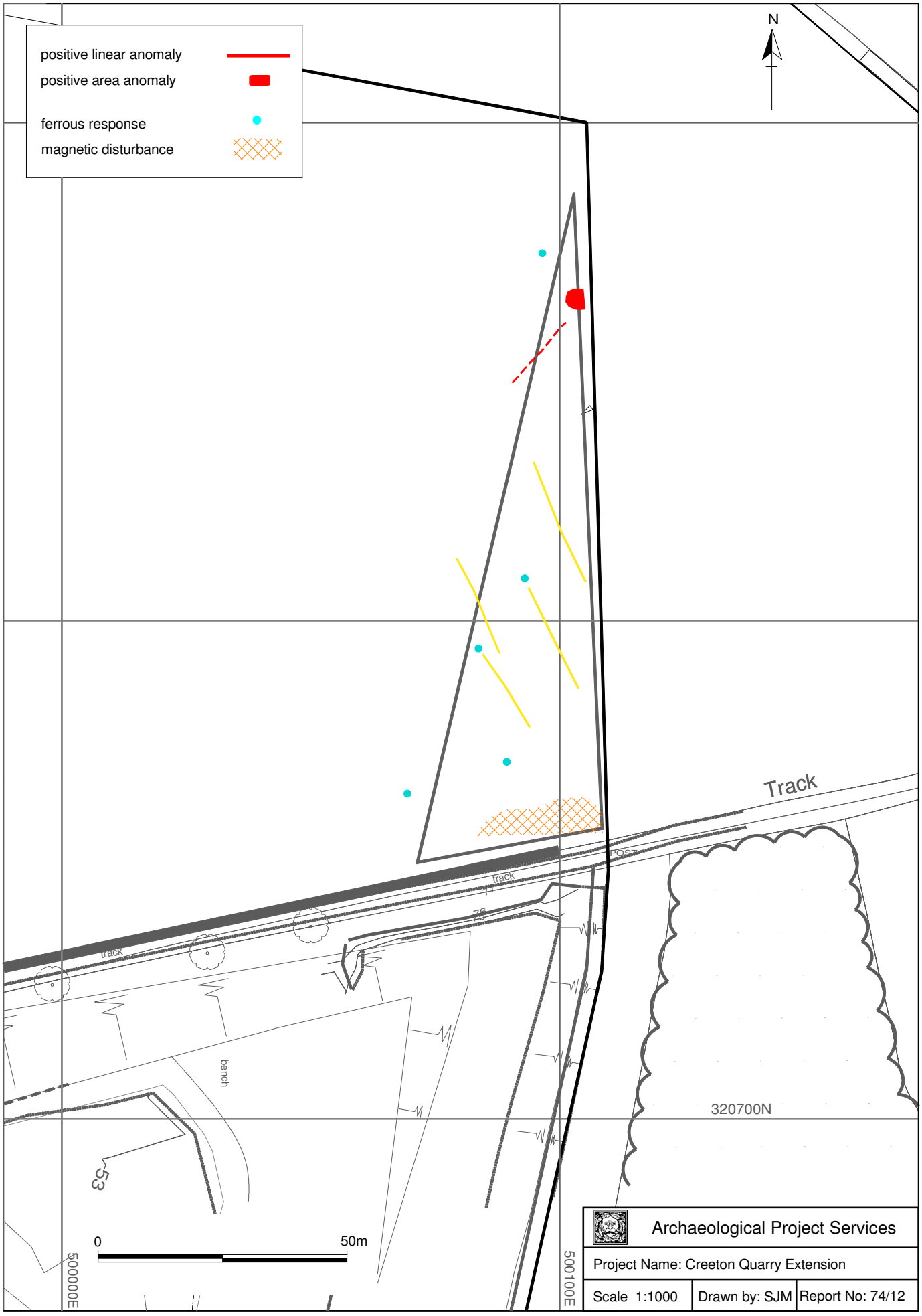

Figure A6 Interpretative plot

APPENDIX 2

Context Summary

Context	Trench	Description	Interpretation	Date
101	1	Friable dark greyish brown silty clay, 0.25m thick	Ploughsoil	
102	1	Soft dark grey with light brown mottles, clay. Only apparent in diffuse patches, up to 0.1m thick, between the ploughsoil and natural. Either a subsoil or where plough went deeper in patches	Subsoil	
103	1	Firm light brown clay, up to 0.3m thick seen	Natural	
104	1	Soft bluish grey clay, at least 1m thick	Natural	
201	2	Friable dark greyish brown silty clay, 0.3m thick	Ploughsoil	
202	2	Firm mid brown clay, 0.1m thick	Natural	
203	2	Soft mid grey clay, at least 0.1m thick	Natural	
301	3	Fairly firm mid greyish brown silty clay, 0.3m thick	Ploughsoil	
302	3	Stiff blue/grey clay with frequent patches of orangey brown sandy gravelly clay, at least 0.12m thick	Natural	

Appendix 3

GLOSSARY

Context	An archaeological context represents a distinct archaeological event or process. For example, the action of digging a pit creates a context (the cut) as does the process of its subsequent backfill (the fill). Each context encountered during an archaeological investigation is allocated a unique number by the archaeologist and a record sheet detailing the description and interpretation of the context (the context sheet) is created and placed in the site archive. Context numbers are identified within the report text by brackets, e.g. [004].
Geophysical Survey	Essentially non-invasive methods of examining below the ground surface by measuring deviations in the physical properties and characteristics of the earth. Techniques include magnetometry and resistivity survey.
Iron Age	A period characterised by the introduction of Iron into the country for tools, between 800 BC and AD 50.
Iron Smelting	The process of obtaining Iron from ore. In a bloomery furnace this is achieved by creating a reducing atmosphere of carbon monoxide in the furnace by the reaction of oxygen in the air with carbon in the fuel (charcoal). The carbon monoxide penetrates the ore particles and reacts with the iron oxide to form carbon dioxide, reducing the iron oxide sequentially to metal. In a bloomery furnace some of the iron oxide reacts with the other oxides present (e.g. silica and alumina) to form slag, the waste product of iron smelting. Bloomery furnaces were in use from the Iron Age to the Medieval period. Blast furnaces were introduced into Britain by at least 1496 and are used to make cast iron. The temperature in a blast furnace is much higher turning the metal in the ore into a molten liquid which is then poured into moulds. Cast Iron is brittle and not suitable for tools such as nails or knives
Layer	A layer is a term used to describe an accumulation of soil or other material that is not contained within a cut.
Natural	Undisturbed deposit(s) of soil or rock which have accumulated without the influence of human activity
Romano-British	Pertaining to the period dating from AD 43-410 when the Romans occupied Britain.

Appendix 4

THE ARCHIVE

The archive consists of:

3	Trench record sheets
1	Photographic record sheet
3	Daily record sheets

All primary records are currently kept at:

Archaeological Project Services
The Old School
Cameron Street
Heckington
Sleaford
Lincolnshire
NG34 9RW

The ultimate destination of the project archive is:

The Collection
Danes Terrace
Lincoln
LN2 1LP

Accession Number:	LCNCC: 2012.121
Archaeological Project Services Site Code:	CRQE 12
OASIS Record No:	archaeol1-135006

The discussion and comments provided in this report are based on the archaeology revealed during the site investigations. Other archaeological finds and features may exist on the development site but away from the areas exposed during the course of this fieldwork. *Archaeological Project Services* cannot confirm that those areas unexposed are free from archaeology nor that any archaeology present there is of a similar character to that revealed during the current investigation.