AN ARCHAEOLOGICAL EVALUATION AT HAGGERSTON CASTLE HOLIDAY PARK, ANCROFT, NORTHUMBERLAND

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PCA

PRE-CONSTRUCT ARCHAEOLOGY

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Task	*Name*	*Signature*	*Date*
Text prepared by:	Aaron Goode		January 2014
Text checked by:	Jenny Proctor	J Proctor	29 January-4 February 2014
Illustrations prepared by:	Mark Roughley		January 2014
Illustrations checked by:	Josephine Brown	Josephine Brown	3 February 2014
PCA Project Manager sign-off:	Robin Taylor-Wilson	R.H. Taylor-Wilson	6 February 2014

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Pre-Construct Archaeology Limited
North Regional Office
Unit N19a Tursdale Business Park
Durham
DH6 5PG

An Archaeological Evaluation at Haggerston Castle Holiday Park, Ancroft, Northumberland

Central National Grid Reference: NU 043 445

Site Code: HAN 13

Commissioned (on behalf of Bourne Leisure Limited) by:

Prospect Archaeology Limited
Prospect House
Garden Lane
Sherburn-in-Elmet
Leeds
North Yorkshire
LS25 6AT

Tel: 01977 681 885

Contractor:

Pre-Construct Archaeology Limited
Northern Office
Unit N19a Tursdale Business Park
Durham
DH6 5PG

Tel: 0191 377 1111

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1. NON-TECHNICAL SUMMARY

1.1 An archaeological evaluation by trial trenching was undertaken 28th November-13th December 2013 by Pre-Construct Archaeology on land immediately adjacent to and north of Haggerston Castle Holiday Park, Ancroft, Northumberland. The work was carried out as part of the planning process for a proposed extension of the holiday park and was commissioned by Prospect Archaeology on behalf of the developer, Bourne Leisure.

1.2 The site, central National Grid Reference NU 404610 644340, covers *c.* 10 ha. It lies *c.* 10 km to the south of Berwick-upon-Tweed, between the A1 and the East Coast mainline railway, which lie *c.* 1 km the west and east, respectively. The proposed development will take in the entirety of a large pasture field and part of the southern margin of an adjacent pasture field to the north, with access to be created through the western end of an existing golf course in the northern part of the holiday park. The site is bounded to the north, east and west by a combination of open pasture and arable fields and to the south by the grounds of Haggerston Castle Holiday Park.

1.3 A desk-based heritage assessment of the site undertaken in September 2013 concluded that, although there was limited evidence for pre-medieval period activity within the immediate vicinity, there was potential for archaeological features to survive at the site, despite it having been ploughed, as attested by the presence of ridge and furrow earthworks.

1.4 A geophysical survey of the site was undertaken in November 2013 as a preliminary, non-invasive phase of archaeological evaluation. The majority of the geophysical responses identified were thought to relate to geological or pedological variations as well as agricultural practice; broadly parallel linear anomalies, associated with ridge and furrow, were identified on various alignments. A number of discrete and linear anomalies of potential archaeological origin were also identified, particularly in the south-eastern part of the main field.

1.5 In broad terms, the trial trenching component of the overall programme of archaeological evaluation aimed to establish the archaeological potential of the proposed development site. Trenches were either sited to investigate geophysical anomalies which were potentially indicative of sub-surface archaeological remains or sited as 'judgement' trenches to evaluate parts of the site where no geophysical anomalies were detected.

1.6 The trial trenching evaluation comprised 24 machine-excavated trenches (Trenches 1-24), each measuring *c.* 50m x 1.70m, the majority located in the main field, with one (Trench 5) located in the field to the north. Trenches 2, 3, 11, 13, 14 and 19 were sited to test various geophysical anomalies and Trenches 1, 4-10, 12, 15-18 and 20-24 were 'judgement' trenches. No trenches were sited within the proposed access route across the golf course.

1.7 The natural clayey, sand and silt sub-stratum was the basal deposit encountered in all 24 trenches, representing the glacial drift geology of the area. In all but one trench it was overlain by a developed agricultural soil, up to 0.48m thick. The exception was Trench 13, where a substantial colluvial deposit overlay the sub-stratum, this present only within the western part of Trench 13, sited on sloping (down to the west) ground in the western part of the site.

1.8 In Trench 21, located in the south-west corner of the main field, two undated features were recorded. The southernmost of these probably represents a tree throw, while that immediately to the north may represent a pit, potentially of pre-medieval date.

1.9 Evidence of medieval agricultural activity, in the form of variously-aligned broad linear furrows and associated banks, was recorded in Trenches 2-10, 14-16, 19-21 and 23. These features are derived from the broad ridge and furrow agricultural system typical of the medieval period and survive as surface earthworks across the site. A single sherd of medieval pottery of 13th- to 14th-century date was recovered from one of these features.

1.10 Trenches 2, 3, 11 and 13 were sited to test various geophysical anomalies within the eastern portion of the site. To this end, no corresponding archaeological features were recorded and the geophysical anomalies are considered likely to be the result of geological or pedological variations.

1.11 Trench 19, located in the south-eastern part of the main field, was sited to test a group of geophysical anomalies. A stone surface and the southern end of a possible stone wall foundation were recorded to the east, these corresponding with geophysical anomalies, with two postholes recorded to the west of the foundation. Dating evidence indicates that the surface is of later 17th- to early 18th-century date. Two substantial features partially exposed within the eastern and central portions of Trench 19 may represent further surfaces or, alternatively, refuse pits, with the easternmost possibly representing a continuation of an extensive geophysical anomaly identified to the south of the trench. Dating evidence indicates that the easternmost feature was of a similar, post-medieval, date to the nearby surface. The features recorded in Trench 19 were likely associated with a small post-medieval farmstead.

1.12 In summary, no archaeological remains of importance were recorded in the majority of the trenches.

1.13 Although no artefactual material was recovered from two features recorded in Trench 21, in the south-western part of the site, both were overlain by a developed soil of probable medieval origin, and therefore pre-date that deposit. One feature may have been a tree throw, while the feature to the north may represent a pit of medieval or pre-medieval date, possibly prehistoric.

1.14 Archaeological remains recorded within the south-eastern portion of the site, specifically in Trench 19, are considered to be of importance at a local level, with the remains evidently associated with a small post-medieval farmstead. The recovered artefactual material indicates that occupation occurred throughout the 17th century and into the 18th century.

2. INTRODUCTION

2.1 General Background

2.1.1 This report details the methodology and results of an archaeological trial trenching evaluation undertaken by Pre-Construct Archaeology (PCA) 28th November-13th December 2013 on land immediately adjacent to and north of Haggerston Castle Holiday Park, Ancroft, Northumberland (Figure 1). The work was commissioned by Prospect Archaeology on behalf of the developer, Bourne Leisure (the Client).

2.1.2 The evaluation was undertaken pre-determination of a planning application for the proposed extension of the holiday park, with associated reconfiguration of existing elements. An area for further 122 holiday caravans is proposed, as well as reconfiguration of an existing golf course, the formation of new lakes, and the creation of several new leisure facilities.

2.1.3 A desk-based heritage assessment (DBA) was undertaken in 2013 to establish the archaeological potential of the site (Prospect Archaeology 2013a). This concluded that although there was no evidence for Roman or early medieval activity within the proposed development site, there was potential for archaeological remains to survive below ridge and furrow as earthworks, thought to be of medieval origin, noted across the large pasture field which comprised the majority of the site.

2.1.4 An initial non-invasive phase of archaeological evaluation, comprising geophysical survey, was undertaken in October 2013 by Phase Site Investigations (PSI), co-ordinated by PCA (PSI 2013; included herein as Appendix 6). This identified a series of broadly parallel linear anomalies, associated with the ridge and furrow earthworks, which ran across the site on various alignments. A number of discrete and linear anomalies of potential archaeological origin were also identified, particularly in the south-eastern part of the site.

2.1.5 The trial trenching component of the archaeological evaluation comprised 24 machine-excavated trial trenches, located either to target potential archaeological features identified by the geophysical survey or as 'judgement' trenches to assess the archaeological potential of areas where no geophysical anomalies had been identified (Figures 2 and 5). A written scheme of investigation (WSI) for the programme of work (Prospect Archaeology 2013b) was approved by the Assistant County Archaeologist at Northumberland County Council

2.1.6 The Site Archive (Site Code: HAM 13) is currently held at the Northern Office of PCA and the retained element, comprising the written, drawn and photographic records, as well the assemblage of artefactual material, will be deposited with the Great North Museum, Newcastle-upon-Tyne. The Online Access to the Index of Archaeological Investigations (OASIS) reference number for the project is: preconst1-170819.

2.2 Site Location and Description

2.2.1 The proposed development site is located immediately adjacent to and north of Haggerston Castle Holiday Park which lies near Ancroft, to the east of the A1, *c*. 10 km to the south of Berwick-upon-Tweed and *c.* 2 km from the coast. The villages of Scremerston and Belford lies to north and south, respectively. Covering an overall area of *c*. 10 ha, the site is centred at National Grid Reference NZ 404610 644340 (Figure 1).

27/01/14 MR

Figure 1
Site Location
1:50,000 at A4

Base map reproduced from data provided by the client (August 2013)

27/01/14 MR

Figure 2
Detailed Site and Trench Location
1:2,500 at A4

2.2.2 The proposed development site is bounded to the north, east and west by a combination of pasture and arable fields and to the south by Haggerston Castle Holiday Park, into which it extends (Figures 1 and 2). The main part of the site comprises an undulating rectangular pasture field, while its north-westernmost portion takes in the south-eastern margin of another pasture field, to the north. The fields were separated by a post-and-wire fence at the time of the work. In order to create access, the proposed development area extends to the south, taking in the western part of an existing golf course at the holiday park. However, the archaeological evaluation was restricted to the undeveloped pasture fields forming the majority of the site, an area measuring up to 380m west-east by up to 260m north-south (hereinafter 'the site' refers to the previously undeveloped fields comprising the majority of the proposed development area). A thin belt of woodland separates the site from the existing golf course in the holiday park.

2.2.3 Ridge and furrow earthworks at the site were, for the most part, fairly subtle, most evident on aerial photographs (*e.g.* Prospect Archaeology 2013a, Plate 1). Across the westernmost two-thirds of the the main field and the south-easternmost portion of the adjoining field to the north, the ridge and furrow runs approximately ENE-WSW. Across the easternmost portion of the main field, with the exception of its north-eastern corner, the alignment is approximate at right angles to this. The ridge and furrow runs NNE-SSW across the north-westernmost corner of the site, within the northern field. Other, subtle, earthworks were observed in the main field during a site walk-over undertaken as part of the DBA. These comprised two banks on an east-west alignment and a third on a north-south alignment in the eastern half of the site, probably indicating the positions of former field boundaries (Prospect Archaeology 2013a, 5).

2.3 Geology and Topography

2.3.1 The underlying geology of the site comprises limestone, sandstone, siltstone and mudstone of the Alston Formation, overlain by glacial debris, technically Devensian Till, which generally takes the form of 'boulder clay' (*British Geological Survey* website). Alluvial deposits are present to the west of the site and it is possible that these may extend into the western edge of the site.

2.3.2 The site lies on the Northumberland Coastal Plain, *c.* 2 km from the coast. In general, this is low-lying land, below the 10m contour, and, in overview, the proposed development area slopes down gradually from west to east. Within this broad topographic setting, the site has an undulating nature, with a roughly north-south aligned ridge along its western margin, from which the ground falls away westwards fairly steeply to lower-lying ground along the western edge of and beyond the site.

2.3.3 A watercourse runs from the north-eastern corner of the site roughly eastwards to join a northerly flowing stream which is a tributary of the North Low. The eastern limit of the site is bounded by a drain which ultimately flows into the tributary of the North Low.

2.4 Planning Background

2.4.1 The archaeological evaluation was carried out pre-determination of a planning application submitted by the Client for the proposed extension and reconfiguration of existing facilities at Haggerston Castle Holiday Park. The Local Planning Authority (LPA) is Northumberland County Council. The proposals comprise the addition of a further 122 holiday caravans, extension and reconfiguration of the existing golf course, the formation of three new lakes, along with the addition of other new leisure facilities or the extension of existing ones.

2.4.2 The Northumberland County Council Conservation Team (NCCCT) provides development control in relation to the historic environment throughout Northumberland. The archaeological potential of the site was established by the aforementioned DBA undertaken in September 2013 and further clarified by the aforementioned geophysical survey, undertaken in November 2013. The aforementioned WSI for the overall programme of archaeological evaluation (geophysical survey and trial trenching) was approved by the Assistant County Archaeologist, a member of the NCCCT, in advance of the work.

2.4.3 The programme of archaeological evaluation was required, as part of the planning process, to inform relevant parties, of the character, date, extent and degree of survival of archaeological remains at the site. The aim was to provide results which should inform a decision regarding further archaeological mitigation measures. A report (this document) detailing the results of the trail trenching component of the work evaluation is to be submitted with the planning application. Appendix 6 to this report contains the report on the geophysical survey.

2.4.4 The requirement to undertake the archaeological investigation is in line with planning policy at a national level, as set out in the *National Planning Policy Framework* (NPPF) (DCLG 2012). The NPPF came into effect in 2012, replacing *Planning Policy Statement 5: 'Planning for the Historic Environment'* (PPS5) (DCLG 2010), to provide updated guidance for LPAs, property owners, developers and others on the conservation and investigation of the historic environment. Heritage assets - those parts of the historic environment that have significance because of their historic, archaeological, architectural or artistic interest - remain a key concept of the NPPF, retained from PPS5. Despite the deletion of PPS5, the *PPS5: Planning for the Historic Environment - Practice Guide* (English Heritage, DCMS and DCLG (revised) 2012), remains a valid, UK Government-endorsed, document.

2.4.5 Chapter 12 of the NPPF 'Conserving and enhancing the historic environment' describes, in paragraph 126, how LPAs should '...*set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment'* and details, in paragraph 128, that '*In determining applications, LPAs should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum, the relevant* [Historic Environment Record] *HER should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, LPAs should require developers to submit an appropriate desk-based assessment and where necessary* [the results of] *a field evaluation*'.

2.4.6 The Northumberland Consolidated Planning Policy Framework (NCPPF) sets out the relevant planning policy documents bringing together the policies from the previously separate seven planning authorities in the county. None of the policies within that suite of documents directly relate to archaeology and the NPPF is, therefore, the primary guidance used in relation to the historic environment, in this instance potential heritage assets of archaeological interest.

2.5 Archaeological and Historical Background

The Prospect Archaeology DBA forms the basis for the following background and the research and writing of the author is acknowledged. This document should be consulted for Historic Environment Record numbers and references.

Prehistoric

2.5.1 There is extremely limited evidence for prehistoric activity in the vicinity of the proposed development site, and none within a wider 1 km radius study area. However, there are monuments in the wider area which indicate some local activity during pre-medieval eras.

2.5.2 The earliest evidence for prehistoric activity in this part of the Northumberland coastal plain dates from the Bronze Age. Burials of this period are known from within the parish of Ancroft; a series of burials run in a band north through the parish. Artefactual evidence from the same period has been found in Scremerston Hill, Ancroft and Cheswick.

Later Iron Age and Roman Periods

2.5.3 The Iron Age and Roman periods are more identifiable from settlement activity and enclosed settlements have been recorded in the parish. Non-defensive, ditched rectilinear or curvilinear enclosures are a common settlement type in the region. Aerial photographic surveys and recent developer funded excavations have demonstrated that they are prolific along the Northumberland and East Lothian coastal plains (Petts and Gerrard 2006, 53; Haselgrove and McCullagh 2000, 1). Radiocarbon dates suggest that these settlements date from the second half of the first millennium BC (Passmore and Waddington 2012, 226). Several cropmark enclosure sites are listed in the Northumberland HER, including double-ditched examples only a relatively short distance to the north-west of the site, in the area around Ancroft.

2.5.4 The northern part of the Northumberland coastal plain was situated within the territory of the tribal group referred to in classical sources as the *Votadini* (Armit 2005, 69). This group inhabited south-east Scotland and north Northumberland with the major hillforts at Traprain Law in East Lothian and Yeavering Bell traditionally being seen as tribal centres (Breeze 1982, 29; Passmore and Waddington 2012, 269). The relationship between this tribe and the Roman occupiers seems to have been relatively peaceable and few permanent Roman military sites are known within the *Votadini* territory.

2.5.5 The course of a Roman road known as the Devil's Causeway runs *c*. 3.5 km to the west of the site. This had been constructed by the mid AD 80s and branched from Dere Street just north of Corbridge running northwards along the coastal plain to the fort at Low Learchild on the River Aln, continuing to its assumed terminal at Tweedmouth (Jobey 1973, 51; Breeze and Dobson 2000, 11).

2.5.6 A Roman fort and possible supply base has long been postulated at Tweedmouth due to the strategic importance of this location on the south side of a major estuary and at the junction of the river and Roman road, though to date no evidence has been discovered (Jobey and Jobey 1987, 172; Passmore and Waddington 2012, 269). The Devil's Causeway was maintained into the early fourth century AD (Breeze and Dobson 2000, 143).

Anglo-Saxon and Medieval

2.5.7 The Anglo-Saxon monastery of Holy Island (Lindisfarne) lies off the coast of Ancroft parish but there is little suggestion of early medieval activity on the adjacent mainland. The place name, Ancroft, has Saxon origins, meaning '*lonely enclosed piece of land'* which seems to suggest that there was little settlement in the immediate vicinity at that time.

2.5.8 Although Haggerston is now within Ancroft parish, Haggerston and Goswick were distinct from Ancroft until 1887. The proposed development site lies on the boundary of the two medieval parishes and it is uncertain to which it belonged. However, its marginal position and the presence of ridge and furrow indicate that it was within open fields during the medieval period. Some of the banks identified during the site walk-over undertaken as part of the DBA may be headlands or field boundaries associated with medieval agricultural activities or could possibly mark the original parish boundary.

2.5.9 A medieval settlement existed at Haggerston, probably to the west of Haggerston Castle in the vicinity of an extant 17th-century dovecote (originally constructed and used as a windmill until the 19th century; now a scheduled monument and listed building). Settlement earthworks surrounded by ridge and furrow are visible in this area on aerial photographs. Documentary records indicate that this was a relatively populous village, only going into decline in the 17th century. It first appears in documentary records in 1208/10, as part of the Bishop of Durham's estate of Islandshire, held by John de Haggerston.

2.5.10 Haggerston Castle itself is first mentioned in documentary records in 1311 when Edward II visited, but is claimed to have been destroyed by fire in 1618. However, a four-storey square tower depicted in a print of *c*. 1772 suggests that something of the original castle may have survived. The whole castle was pulled down in 1805 and a new house built partly on the foundations of the earlier structure in 1893-7.

2.5.11 Haggerston was one of a number of castles constructed in the region during the medieval period in response to raids from Scotland. A tower is alleged to have been located in Goswick, although its precise location is unknown. This structure was recorded as a 'good pile' in a survey 1561 and was the property of the Swinhoe family. No evidence of the site has been found to date.

Post-medieval

2.5.12 John Carey's late 18th-century map of Northumberland shows Haggerston as parkland either side of the main road to the north. Although there is very little detail provided in this map, it does confirm that a house stood within the park at this time and the proposed development site may also have lain within this parkland.

2.5.13 The Haggerston Castle estate had been owned by the Haggerston family throughout the medieval period and into the 17th century when Sir Thomas Haggerston was made a baronet. However, it became a minor estate, and eventually passed on to Lord Herries of Terregles, through marriage. The ruins of Haggerston Castle are understood to have been torn down in 1805 and the estate sold in 1858.

2.5.14 The estate was acquired by the Liverpool banker Thomas Naylor (who changed his name to Leyland as a condition of inheritance) in the 1880s and his nephew Christopher John Leyland (also formerly Naylor) inherited on his death in 1891. C.J. Leyland undertook a major programme of reconstruction and established extensive gardens and parkland. The listed buildings and garden features around the estate are attributed to his period of building. One of the features of the estate was a zoo, open to visitors and sporting a variety of animals and birds. Leyland is further credited with the development of the infamous Leylandii tree. A fire in 1911 destroyed much of the house and Leyland never returned to it. Following his death in 1926 the estate was sold off in 1933 and much of the ruins of the house pulled down.

2.5.15 The proposed development area remained largely unaffected by the development of the holiday park until the establishment of the golf course in the late 20th century. The pasture fields comprising the main part of the proposed development area have remained in agricultural use throughout.

3. PROJECT AIMS AND RESEARCH OBJECTIVES

3.1 Project Aims

3.1.1 The project is 'threat-led' with potential to disturb or destroy important sub-surface archaeological remains, if present. Therefore, the broad aim of the project was to inform the LPA, advised by its Conservation Team, and the Client, advised by Prospect Archaeology, regarding the character, date, extent and degree of survival of archaeological remains at the site.

3.1.2 With the results of the 2013 geophysical survey available, archaeological trial trenching was selected as the next most appropriate investigative tool to test the archaeological potential of the site. Appendix 6 contains the full report on the geophysical survey and that document should be consulted for full details of that component of the overall programme of archaeological evaluation.

3.1.3 Additional aims of the project were:

- to compile a Site Archive consisting of all site and project documentary and photographic records, as well as all artefactual and palaeoenvironmental material recovered;
- to compile a report that contains an assessment of the nature and significance of all data categories, stratigraphic, artefactual, *etc.*

3.2 Research Objectives

3.2.1 The DBA had concluded that the potential existed for as yet unidentified heritage assets to survive at the site below ridge and furrow earthworks of probable medieval date which extend across the site.

3.2.2 Specific research objectives to be addressed by the project were formulated with reference to existing archaeological research frameworks. *Shared Visions: The North-East Regional Research Framework for the Historic Environment* (NERRF) highlights the importance of research as a vital element of development-led archaeological work (Petts and Gerrard 2006).

3.2.3 The following key priority within the NERRF research agenda for the prehistoric period were identified within the WSI as being of direct relevance to this project:

- Iii – Settlement (Later Bronze Age and Iron Age) - in particular, evidence for any pre-Roman settlement evidence.

3.2.4 The following key priorities within the NERRF research agenda for the Roman period were identified within the WSI as being of direct relevance to this project:

- Ri – The Iron Age to Roman transition – in particular, evidence of continuation and/or change in land use through the period of Roman colonisation.

4. ARCHAEOLOGICAL METHODOLOGY

4.1 Fieldwork

4.1.1 The trial trenching evaluation fieldwork was undertaken 28th November-13th December 2013. All fieldwork was undertaken in accordance with the relevant standard and guidance document of the Institute for Archaeologists (IfA) (IfA 2009). PCA is an IfA-Registered Organisation. The evaluation was undertaken according to the WSI compiled by Prospect Archaeology, which should be consulted for full details of methodologies employed regarding archaeological excavation, recording and sampling (Prospect Archaeology 2013b).

4.1.2 Archaeological trial trenching was considered as the most appropriate investigative tool to test the archaeological potential of the site following on from the earlier geophysical survey. Twenty-four trenches (Trenches 1-24) were located to target either potential archaeological features identified by geophysical survey (anomalies 'A-D') or as 'judgement' trenches to test areas where no geophysical anomalies were identified. All trenches were located within the main field, with the exception of Trench 5 which was located within the south-eastern corner of the adjacent field to the north.

4.1.3 A summary of the rationale for the trenching (with proposed trench dimensions) is set out below:

- Trench 1 (50m x 1.70m) - aligned NW-SE, judgement trench.
- Trench 2 (50m x 1.70m) - aligned ENE-WSW, sited to target part of a complex of geophysical anomalies 'C'.
- Trench 3 (50m x 1.70m) - aligned NW-SE, sited to target part of a complex of geophysical anomalies 'C'.
- Trench 4 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 5 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 6 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 7 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 8 (50m x 1.70m) - aligned NE-SW, judgement trench.
- Trench 9 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 10 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 11 (50m x 1.70m) - aligned ENE-WSW, sited to target part of a group of linear geophysical anomalies 'B'.
- Trench 12 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 13 (50m x 1.70m) - aligned NE-SW, sited to target a group of geophysical anomalies 'A'.
- Trench 14 (50m x 1.70m) - aligned ENE-WSW, sited to target part of a NW-SE aligned component of a group of linear geophysical anomalies 'B'.

- Trench 15 (50m x 1.70m) - aligned NNE-SSW, judgement trench.
- Trench 16 (50m x 1.70m) - aligned NE-SW, judgement trench.
- Trench 17 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 18 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 19 (50m x 1.70m) - aligned NE-SW, sited to target a complex of geophysical anomalies 'D'.
- Trench 20 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 21 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 22 (50m x 1.70m) - aligned ENE-WSW, judgement trench.
- Trench 23 (50m x 1.70m) - aligned NNW-SSE, judgement trench.
- Trench 24 (50m x 1.70m) - aligned ENE-WSW, judgement trench.

4.1.4 All trenches were set-out by PCA using a Leica Viva Smart Rover Global Navigation Satellite System (GNSS), with pre-programmed co-ordinate data determined by an office-based CAD Technician. The Smart Rover GNSS provides correct Ordnance Survey co-ordinates in real time, to an accuracy of 1cm.

4.1.5 All trenches were mechanically-excavated by a back-acting *c.* 7.5-tonne excavator (a 'JCB') or a *c.* 13-tonne 360˚ tracked machine with toothless ditching bucket under archaeological supervision. The trenches were excavated to the top of the first significant archaeological horizon, or the clearly defined top of the natural sub-stratum, whichever was reached first. All potential archaeological features were identified and marked on the ground with sprayline at the time of machine clearance of overburden.

4.1.6 Hand cleaning was undertaken in trenches where archaeological features were identified. All potential features were subject to partial or complete excavation within the trenches with photography and archaeological recording taking place at appropriate stages in the process. A selection of photographs is included as Appendix 5 to this report. All trenches were recorded, irrespective of whether or not they contained archaeological features.

4.1.7 Temporary Bench Marks were established across the site using the Smart Rover GNSS instrument. The height of all principal strata and features were calculated relative to Ordnance Datum and indicated on the appropriate plans and sections.

4.1.8 The main earthworks on the site (not including ridge and furrow) were recorded through a combination of Smart Rover GNSS survey and hand sketches with accompanying notation. The results were combined to produce a representation of the main earthworks for inclusion in this report (see Figure 5).

4.2 Post-excavation

4.2.1 The stratigraphic data generated by the project is represented by the written, drawn and photographic records. Post-excavation work involved checking and collating site records, grouping contexts and phasing the stratigraphic data (Appendix 1). A total of 129 archaeological contexts were defined in the 24 trenches (Appendix 2). A written summary of the archaeological sequence was then compiled, as described below in Section 5.

4.2.2 The artefactual material from the evaluation comprised a small assemblage of pottery, clay tobacco pipe, ceramic building material and glass. Examination of the artefactual material was undertaken and relevant comments integrated into Section 5, with a summary report on the material included as Appendix 3. A small assemblage of animal bone was also recovered, specialist examination was undertaken and a summary report is included as Appendix 4. No other categories of organic or inorganic artefactual material were represented. None of the material recovered during the evaluation required specialist stabilisation or an assessment of its potential for conservation research.

4.2.3 The palaeoenvironmental sampling strategy of the project was to recover bulk samples where appropriate, from well-dated stratified deposits covering the main periods or phases of occupation and the range of feature types represented, with specific reference to the objectives of the evaluation. A number of bulk samples were collected but none were processed and assessed for palaeoenvironmental remains as part of the post-excavation work. No other biological material was recovered.

4.2.4 The complete Site Archive will be packaged for long term curation. In preparing the Site Archive for deposition, all relevant standards and guidelines documents referenced in the Archaeological Archives Forum guidelines document (Brown 2007) will be adhered to, in particular a well-established United Kingdom Institute for Conservation (UKIC) document Walker, (UKIC 1990) and the relevant IfA publication (IfA 2008). The depositional requirements of the body to which the Site Archive will be ultimately transferred will be met in full.

5. RESULTS: THE ARCHAEOLOGICAL SEQUENCE

During the evaluation, separate stratigraphic entities were assigned unique and individual 'context' numbers, which are indicated in the following text as, for example [1/23]. The archaeological sequence is described by placing stratigraphic sequences within broad phases, assigned on a site-wide basis in this case. An attempt has been made to add interpretation to the data, and correlate these phases with recognised historical and geological periods.

5.1 Phase 1: Natural Sub-stratum

5.1.1 Phase 1 represents natural glacial drift material exposed within the base of each of the 24 evaluation trenches. This comprised various compositions of clay, sand and silt ranging in colour from mid orange brown to light yellowish brown ([1/3] Trench 1; [2/3] Trench 2; [3/3] Trench 3; [4/3] Trench 4; [5/3] Trench 5; [6/3] Trench 6; [7/3] Trench 7; [8/3] Trench 8; [9/3] Trench 9; [10/3] Trench 10; [11/3] Trench 11; [12/3] Trench 12; [13/3] Trench 13; [14/3] Trench 14; [15/3] Trench 15; [16/3] Trench 16; [17/3] Trench 17; [18/3] Trench 18; [19/3] Trench 19; [20/3] Trench 20; [21/3] Trench 21; [22/3] Trench 22; [23/3] Trench 23).

5.1.2 The maximum recorded height on the natural sub-stratum was *c.* 9.44m OD in Trench 2, located in the north-western corner of the site, and the minimum recorded height was *c.* 3.25m OD in Trench 8, located towards the north-eastern corner. These broadly reflect the natural topography of the site, with a gradual slope down from west to the east. There was also a relatively steep slope down to the west along the western margin of the site, where the natural sub-stratum was recorded at a height of 4.32m OD in Trench 12 and 4.31m OD in Trench 1.

5.1.3 The depth at which natural geological material was encountered below existing ground level varied across the site, ranging from a minimum of 0.25m in Trench 3, where topsoil directly overlay a developed agricultural soil, to a maximum of 1.32m in Trench 13, this in the western portion of the site where a substantial thickness of colluvium overlay the natural geological material.

5.2 Phase 2: Colluvium

5.2.1 In Trench 13, aligned WSW-ENE and located across the sloping western margin of the site, the natural sub-stratum was overlain by a sterile clayey silty sand deposit, [13/4]. This deposit was up to 0.80m thick at the western extent of the trench and petered out in its central portion. It was recorded at maximum and minimum heights of 7.12m OD and 4.42m OD, respectively. This material has been interpreted as being of colluvial origin (commonly referred to as 'hillwash') and was present only within this trench.

5.3 Phase 3: Undated

5.3.1 Phase 3 represents two undated features recorded cut into the natural sub-stratum, in the southern half of Trench 21, located in the south-western corner of the main field. The southernmost feature, [21/8], which was partially exposed adjacent to the eastern limit of excavation, was sub-oval in plan and measured 1.27m north-south by at least 1.87m east-west and was up to 0.10m deep (Figure 3). Its single fill, [21/9], comprised sterile mid orange brown clayey, sandy silt. As it was only partially exposed, definitive interpretation of this feature is impossible, however based on its sterile fill it is may be a natural feature, such as a tree throw.

5.3.2 Located *c*. 0.50m to the north was a sub-circular feature, [21/4], also partially exposed against the eastern limit of excavation (Figure 3). This measured 0.70m NNE-SSW by at least 0.78m WNW-ESE and was up to 0.32m deep, with steeply sloping sides and a flat base (Section 1, Figure 4; Plate 7). Its single fill, [21/5], comprised mid grey clayey, silty sand which yielded no artefactual material. The function of this feature is also unclear and it is tentatively interpreted as a pit of unknown date, though probably of pre-medieval origin as it was overlain by developed soil horizon of likely medieval date (Phase 4).

5.4 Phase 4: Medieval

5.4.1 Phase 4 represents agricultural and land management activity of medieval date; features and deposits assigned to this phase were recorded in all 24 trenches (Figure 5; Plates 1 and 2). The geophysical survey had identified a series of ENE-WSW aligned positive linear responses extending across the central, western and northern portions of the site and a series of NNW-SSE aligned positive linear responses across the eastern portion of the site. Further linear positive responses were identified in the north-western corner of the site aligned NNE-SSW-south. The linear ridge and furrow earthworks, including banks or 'headlands', noted on the site corresponded closely with the pattern of linear geophysical anomalies.

5.4.2 Archaeological features which corresponded with the pattern of linear geophysical anomalies were recorded within the majority of trenches. Numerous ENE-WSW aligned furrows, derived from ridge and furrow ploughing, were recorded: [3/4] Trench 3; [4/5] Trench 4; [5/4] Trench 5; [6/4] Trench 6; [7/4] Trench 7; [9/5] Trench 9; [10/4] Trench 10; [14/4] Trench 14; [15/4] Trench 15; [20/4] Trench 20; [21/6] Trench 21; [23/5] Trench 23 and associated banks, [23/4] and [23/9], in Trench 23. The NNW-SSE aligned furrows were: [8/4] Trench 8; [19/15] Trench 19; and [24/4] Trench 24. A single, north-south aligned furrow, [2/4], was recorded within the north-western corner of the site in Trench 2.

5.4.3 In general, the plough furrows had broad, shallow U-shaped profiles and had various dimensions, between up to *c.* 10m wide in Trench 8 and *c.* 3m in Trench 24 (Figure 5). Cutting into the natural sub-stratum, the depths of furrows where fully excavated ranged from 0.10m, in Trench 8, to 0.60m, in Trench 23 (Section 4, Figure 4).

5.4.4 The fills of all plough furrows (see Appendix 1) generally comprised friable mid orange brown clayey, sandy silt from which a single sherd of medieval pottery was recovered (from fill [23/6] of furrow [23/5]). The spacing of the furrows (between the mid-points of adjacent furrows) varied from between *c*. 10m apart in Trench 6 within the northern portion of the site to *c*. 3m apart within the south-east corner of the site (Figure 5). The broad spacing observed across the majority of the site is typical of that expected for 'broad' ridge and furrow derived from the agricultural system typical of the medieval period.

5.4.5 Banks or 'headlands' were recorded in Trenches 16 and 23 (Figure 5), these representing the limits of the main rows of ridge and furrow, as previously described. Such features are typically the result of the ploughing regime, where the plough turned at the end of the row, creating a linear bank over a period of time. A NNW-SSE aligned bank, [16/6], comprising friable silty sand, was recorded in the eastern portion of Trench 16; it measured 5.68m wide by *c*. 0.35m high and its maximum recorded height was 4.64m OD (Section 3, Figure 4; Plate 3).

5.4.6 In Trench 23, two ENE-WSW aligned banks, [23/4] and [23/9], were recorded in its southern and northern portions, respectively. The southernmost bank, [23/4], comprised friable clayey silty sand; it was 8.20m wide and up to 0.30m high in section. Located *c.* 20m to the north was a similar bank, [23/9], comprising friable silty sand; at least 8.20m wide and up to 0.46m high in section, this bank appeared to have developed within and above a cut, [23/10], in the natural sub-stratum (Section 4, Figure 4; Plate 8). The maximum and minimum heights recorded for these banks were 5.98m OD for the southern bank and 4.28m OD for the northern bank, respectively. Although no dateable artefactual material was recovered from any of the bank deposits, they are considered to be broadly contemporary with the aforementioned ridge and furrow features, which are presumed to be of medieval origin.

5.4.7 A developed soil was recorded in section in all 24 evaluation trenches ([1/2] Trench 1; [2/2] Trench 2; [3/2] Trench 3; [4/2] Trench 4; [5/2] Trench 5; [6/2] Trench 6; [7/2] Trench 7; [8/2] Trench 8; [9/2] Trench 9; [10/2] Trench 10; [11/2] Trench 11; [12/2] Trench 12; [13/2] Trench 13; [14/2] Trench 14; [15/2] Trench 15; [16/2] Trench 16; [17/2] Trench 17; [18/2] Trench 18; [19/2] Trench 19; [20/2] Trench 20; [21/2] Trench 21; [23/2] Trench 23; [24/2] Trench 24). This typically sterile material generally comprised friable mid orange brown clayey, silty sand. The maximum and minimum thickness recorded for any developed soil was 0.48m in Trench 2 and 0.10m in Trench 3, respectively. The colour and composition of all recorded developed soils were similar to that of all furrow fills and in all cases differentiating between the deposits was difficult. Site-wise, this developed soil is interpreted as having accumulated as a result of agricultural activity post-dating medieval ridge and furrow and is therefore of probable later medieval or early post-medieval date. It was truncated by Phase 5 (17th century) features and, therefore, must have developed before the 17th century.

5.5 Phase 5: Post-medieval

5.5.1 Trench 19 was positioned towards the south-eastern corner of the site to test a complex of geophysical anomalies (Figure 5, Anomaly D). To this end, archaeological features and structures of early post-medieval date recorded in the eastern and central portions of the trench broadly correspond with these geophysical anomalies.

5.5.2 At the eastern extent of Trench 19, developed soil, [19/2], was truncated by the construction cut, [19/12], for a stone surface. The construction cut measured *c*. 3.80m ENE-WSW and extended across the *c.*1.70m width of the trench, continuing beyond the limits of excavation, and was up to 0.40m deep (Figure 3). A bedding deposit, [19/13], for the stone surface housed within the feature comprised a *c.* 0.30m thick dark grey silty sand, from which a relatively large assemblage of finds was recovered, comprising pottery, ceramic building material, clay tobacco pipe, glass, metal objects and animal bone. A total of 28 sherds of pottery were recovered, comprising a closely-dated group of later 17th- to early 18th-century material (Appendix 3). The clay tobacco pipe assemblage comprised complete and fragments of at least six bowls and fragments of stem dating to between *c.* 1680 and 1720, this date range corresponding closely with the pottery. A small fragment of early post-medieval window glass was also recovered from this deposit, along with two small fragments of worn ceramic building material. The metal assemblage comprised seven iron nails along with an iron strap. Five fragments of animal bone, in relatively good condition given the sandy nature of the deposit, were identified as cattle, including veal, and duck (Appendix 4).

5.5.3 The stone surface itself, [19/14], comprised roughly hewn and unworked large to medium-sized sub-angular blocks of limestone and sandstone (up to 600mm x 460mm x 300mm); it was encountered at a maximum height of 5.81m OD (Plate 4).

5.5.4 Located *c.* 3m south-west of the stone surface was what appeared to be the southern terminal of a possibly NE-SW aligned stone wall foundation, [19/11], recorded adjacent to the limit of excavation (Figure 3). This occupied a narrow construction cut, [19/10], with the masonry 1.50m wide and 0.40m high, exposed for a maximum length of 0.70m, continuing beyond the limit of excavation to the north. The foundation comprised roughly hewn and unworked large to medium-sized sub-angular limestone blocks (up to 600mm x 400mm x 300mm), encountered at a maximum height of 5.66m OD. No bonding material was evident. Recovered from amongst the stones were two sherds of post-medieval pottery, including a red earthenware fragment with slip-trailed decoration of late 17th- to early 18th-century date, a clay tobacco pipe stem and a glass bottle top dating to the second half of the 17th century (Appendix 3).

5.5.5 Located immediately to the south-west of the possible wall foundation were two postholes, [19/17] and [19/19], which may represent associated structural features (Figure 3). Posthole [19/17] measured *c*. 0.30m diameter and was 0.10m deep and posthole [19/19] measured c. 0.18m diameter and was 70mm deep. The fill of both postholes comprised a similar dark grey silty sand, [19/18] and [19/20], neither of which yielded any artefactual material.

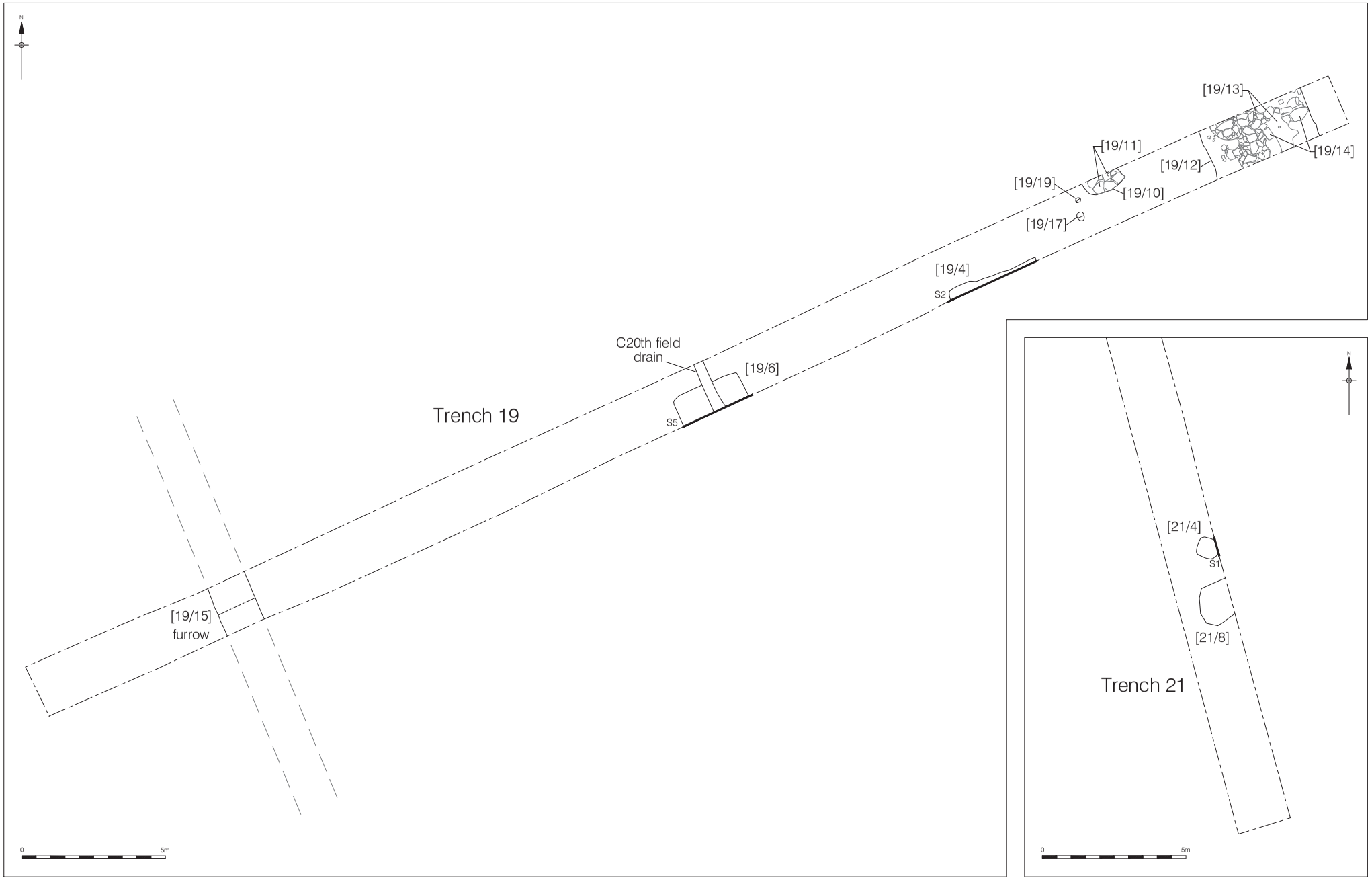
5.5.6 Cutting the developed soil adjacent to the southern limit of excavation in Trench 19 was the north-western side of what appeared to be a substantial feature, [19/4], located *c*. 3m south-west of the possible wall foundation [19/11]. It was exposed for a maximum distance of 0.30m NE-SW, continuing to the south beyond the limit of excavation, and was 3.35m wide and 0.45m deep. It had near vertical sides and a flat base and was recorded at a maximum height of 5.59m OD (Section 2, Figure 4). Its single fill, [19/5], comprised friable orange brown clayey sand with frequent inclusions of charcoal and a roughly hewn stone was also observed. A relatively large assemblage of finds was recovered from this fill, given the small portion exposed within the trench, including pottery, tobacco clay pipe and ceramic building material (Appendix 3). The pottery assemblage included a single sherd of medieval date, most certainly residual, along with two post-medieval red earthenware sherds. As well as a stem fragment, a small clay tobacco pipe bowl was recovered; this smaller than that of the earliest *c*. 1635 Tyneside-made pipes and potentially earlier. An assemblage of 35 pieces of animal bone was also recovered; this material was fragmented and comprised no more than two or three cattle-size bones and a cattle maxillary adult premolar (Appendix 4). A whetstone (SF1) was also recovered, along with a substantial worked stone that may represent part of a small trough (SF2; Plates 9 and 10).

5.5.7 Due to the limited degree to which it was possible to expose feature [19/4], a definitive interpretation is impossible. It could represent the construction cut for a disturbed stone surface. Although this feature lies *c*. 2m to the north-west of the largest geophysical response in the complex of anomalies (Anomaly D) investigated by the trench, it does broadly correspond with the alignment of the large response, suggesting that this feature is of substantial size, possibly extending *c*. 12m to the south-east (Figure 5).

5.5.8 Located *c*. 7.5m to the south-west of feature [19/4], within the central portion of Trench 19 and adjacent to the southern limit of excavation, was the north-western edge of what appeared to be another substantial feature, [19/6], again truncating the developed soil. It was exposed for a maximum distance of 1m NW-SE, continuing to the south, by 2.50m NE-SW and was up to 0.30m deep, with near vertical sides and a flat base (Section 5, Figure 4; Plate 6). The maximum height at which this feature was encountered was 5.21m OD. Its single fill, [19/7], comprised firm sandy silt with moderate charcoal inclusions. The finds assemblage recovered from this feature comprised five sherds of later 17th- to early 18th-century pottery, including three sherds of red earthenware with slip trailed decoration, and five fragments of tobacco clay pipe stems and bowl. This feature is interpreted as a possible refuse pit, although, based on its regular squared corners and flat base, the feature perhaps more probably represents a construction cut. Similar to construction cut [19/12] for stone surface [19/14] recorded at the north-eastern end of the trench, in this case there was no stone surface, although it may simply have been robbed for use elsewhere.

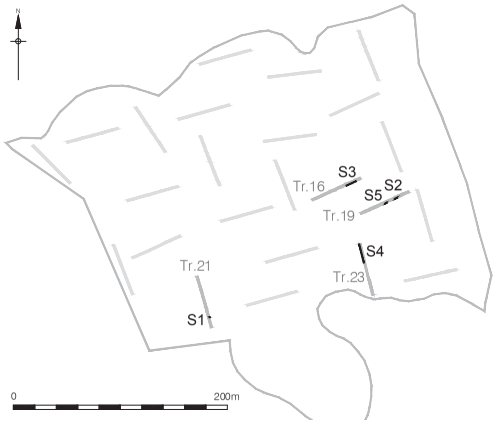
5.6 Phase 6: Modern

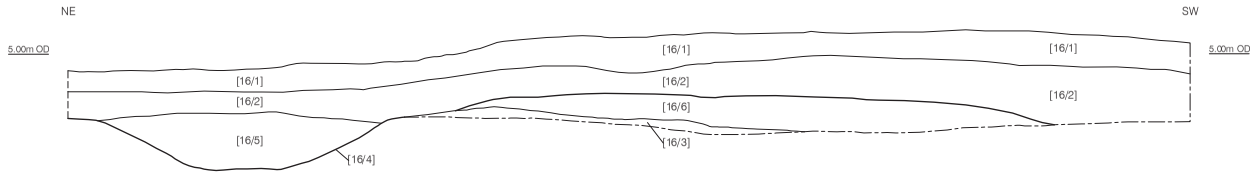
5.6.1 Topsoil, ([1/1] Trench 1; [2/1] Trench 2; [3/1] Trench 3; [4/1] Trench 4; [5/1] Trench 5; [6/1] Trench 6; [7/1] Trench 7; [8/1] Trench 8; [9/1] Trench 9; [10/1] Trench 10; [11/1] Trench 11; [12/1] Trench 12; [13/1] Trench 13; [14/1] Trench 14; [15/1] Trench 15; [16/1] Trench 16; [17/1] Trench 17; [18/1] Trench 18; [19/1] Trench 19; [20/1] Trench 20; [21/1] trench 21; [22/1] Trench 22; [23/1] Trench 23; [24/1] Trench 24), was recorded in all 24 trenches and generally comprised friable dark brownish grey clayey, sandy silt. The maximum thickness recorded for any topsoil layer was 0.30m, this in Trenches 11, 13 and 16. The maximum and minimum heights recorded for topsoil were 10.62m OD, in Trench 2, and 4.03m OD, in Trench 7, respectively. All topsoil had a developed turf line that formed the existing ground surface of the pasture fields across the site.



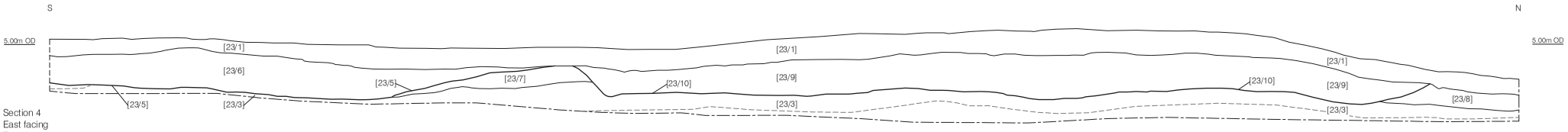
27/01/14 MR

Figure 3
Plans of features in Trenches 19 and 21
1:125 at A3

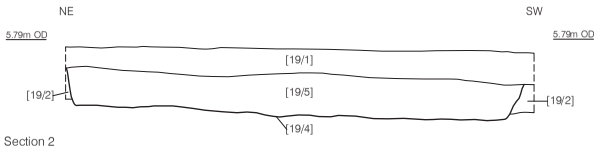




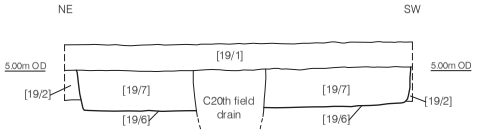
Section 3
Northwest facing
Trench 16



Section 4
East facing
Trench 23



Section 2
Northwest facing
Trench 19



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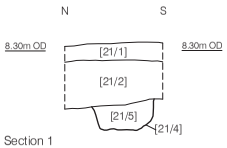
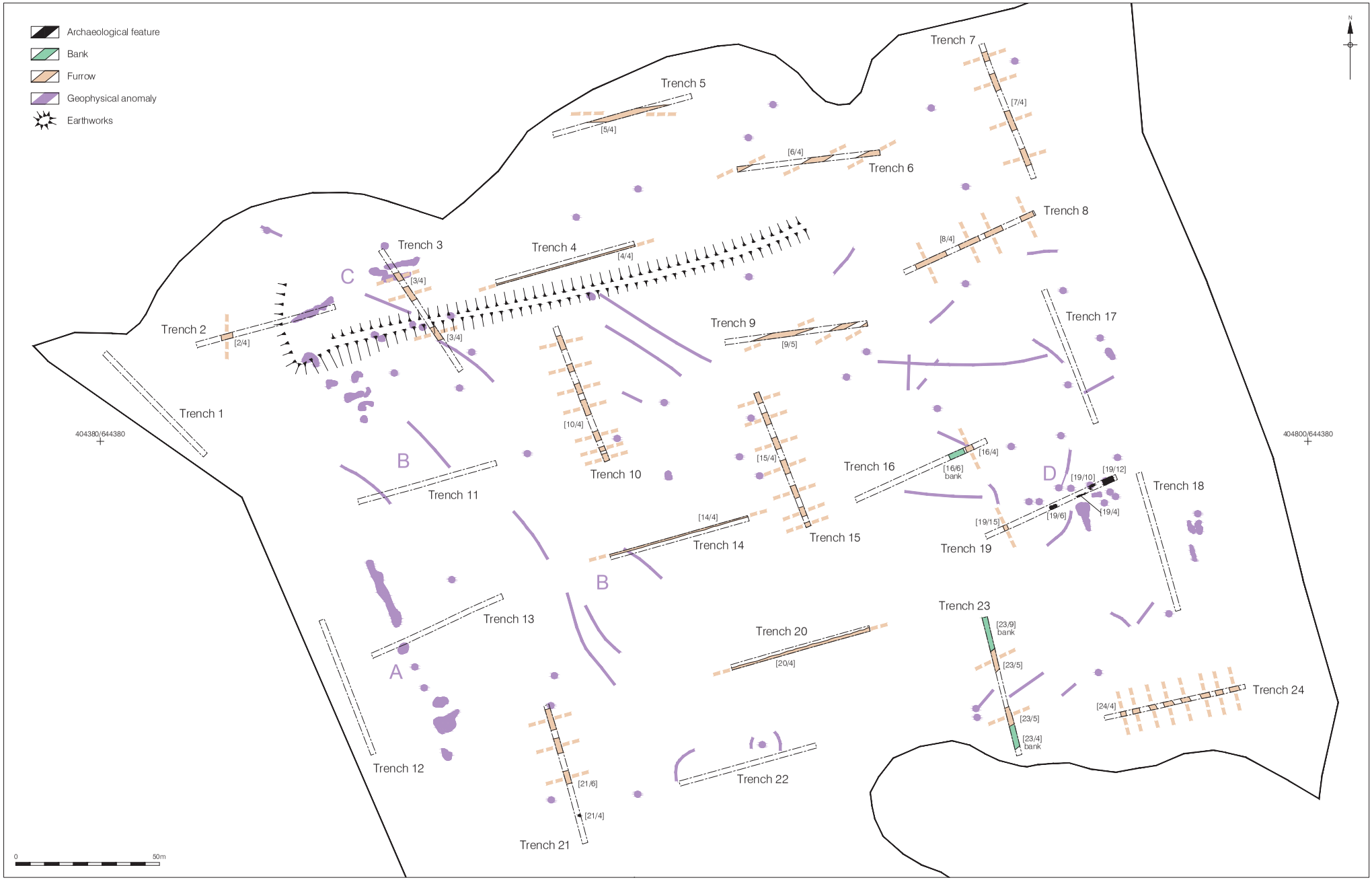
Northwest facing
Trench 19



Section 1
West facing
Trench 21

27/01/14 MR

Figure 4
Sections
Sections - 1:50 and 1:40, Inset - 1:5,000 at A3



27/01/14 MR

Figure 5
Trench locations showing excavated features, earthworks and geophysical survey anomalies
1:1,250 at A3

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 Geological deposits and archaeological deposits and features encountered during the evaluation have been assigned to six phases of activity.

Phase 1: Natural sub-stratum

6.1.2 Natural glacial material comprised the basal deposit encountered in all 24 trenches. This generally comprised various compositions of clay, sand and silt. The natural sub-stratum was recorded at a maximum height of 9.44m OD in the north-western part of the site, in Trench 2, gradually sloping down to the east to 3.25m OD, in Trench 8. This reflects the overall west-east slope of the area, while the sloping (down to the west) western margin of the site was reflected in the maximum height, 4.31m OD, at which the natural sub-stratum was recorded in Trench 1, located in the north-western corner of the site.

Phase 2: Colluvial deposit

6.1.3 A colluvial deposit up to 0.80m thick was recorded in the western half of Trench 13, in the sloping (down to the west) western margin of the site. This material presumably accumulated through the process of colluviation, at the base of the hill slope.

Phase 3: Undated

6.1.4 Two undated features recorded within the southern half of Trench 21 were overlain by a developed soil of probable medieval origin. The southernmost feature is interpreted as being of probable natural origin. To the north, the second feature is interpreted as a possible shallow pit. Although no dateable material was recovered, its fill was broadly indicative of deliberate backfill rather than of natural silting. It is of likely pre-medieval date, possibly prehistoric.

Phase 4: Medieval agricultural activity

6.1.5 Evidence for medieval agricultural activity, in the form of linear plough furrows and associated banks, was recorded in Trenches 2-10, 14-16, 20, 21, 23 and 24. These features are derived from the broad ridge and furrow agricultural system typical of the medieval period. A single sherd of 13th-14th century pottery was recovered from a furrow in Trench 23, supporting the medieval date for these features. An agricultural developed soil, up to 0.48m thick, was recorded within all 24 trenches and therefore probably extends across the site. The composition of this horizon was identical to that of the furrow fills and it largely impossible to differentiate between the two. Although no artefactual material was recovered from the developed soil, it presumably accumulated after the medieval ploughing regime had ceased, and prior to the early 17th-century activity recorded in Trench 19.

Phase 5: Post-medieval (17th- to 18th-century) activity

6.1.6 Archaeological features and structures dating to the early post-medieval period were recorded in Trench 19, located in the south-eastern part of the site. A possible wall foundation may date from the early 17th century and two postholes recorded immediately to the south-west are probably contemporary.

6.1.7 At the north-eastern end of Trench 19, a substantial stone surface was recorded. Its bedding deposit produced a relatively large artefactual assemblage, including pottery, clay tobacco pipe, glass and ceramic building material, which represents a closely-dated group of later 17th- to early 18th-century material.

6.1.8 The north-western parts of two further, probably substantial, features were recorded in Trench 19 and these may represent refuse pits or construction cuts for similar surfaces. These features also produced relatively large artefactual assemblages - considering the small areas exposed - including pottery and clay tobacco pipe, which indicate a similar date to that of the nearby surface. Animal bone and two stone objects comprising a whetstone and part of a possible trough were also recovered.

6.1.9 The Phase 5 remains recorded in Trench 19 probably represent elements of a post-medieval farmstead, with dating evidence indicating that occupation began in the 17th century and continued into the 18th century. No later artefactual material was recovered at the site, suggesting that occupation probably ceased during the 18th century. The post-medieval remains in Trench 19 are considered to be of archaeological significance at a local level.

Phase 6: Topsoil

6.1.10 The present ground surface recorded in all 24 trenches comprised topsoil along with its developed turf line.

6.2 Recommendations

6.2.1 The key research priorities of the evaluation were concerned with archaeological remains of pre-Roman and Roman date. No firm evidence of pre-Roman or Roman occupation of the site was encountered; therefore, the results of the evaluation indicate that further archaeological work is not justified at the site ahead of the proposed development.

6.2.2 The post-medieval remains recorded in Trench 19 are considered to be of archaeological significance at a local level. Therefore, it is recommended that a summary of the project findings relating to the post-medieval activity is prepared as a short article for *Archaeology in Northumberland,* the magazine produced annually by the County Council's Conservation Team to showcase the broad spectrum of archaeological work undertaken throughout the county.

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MAGIC website: *www.magic.gov.uk/website/magic/*.

Northumberland Communities website: *www.communities.northumberland.gov.uk*/.

Northumberland County Council website: *www.northumberland.gov.uk/default.aspx?page=1579*

8. ACKNOWLEDGEMENTS AND CREDITS

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PCA Credits

Project Manager: Robin Taylor-Wilson

Post-excavation Manager: Jenny Proctor

Fieldwork: Aaron Goode (Site Supervisor and Survey), David Green, Aidan Pratt

Report: Aaron Goode

Illustrations: Mark Roughley

Animal bone: Kevin Rielly

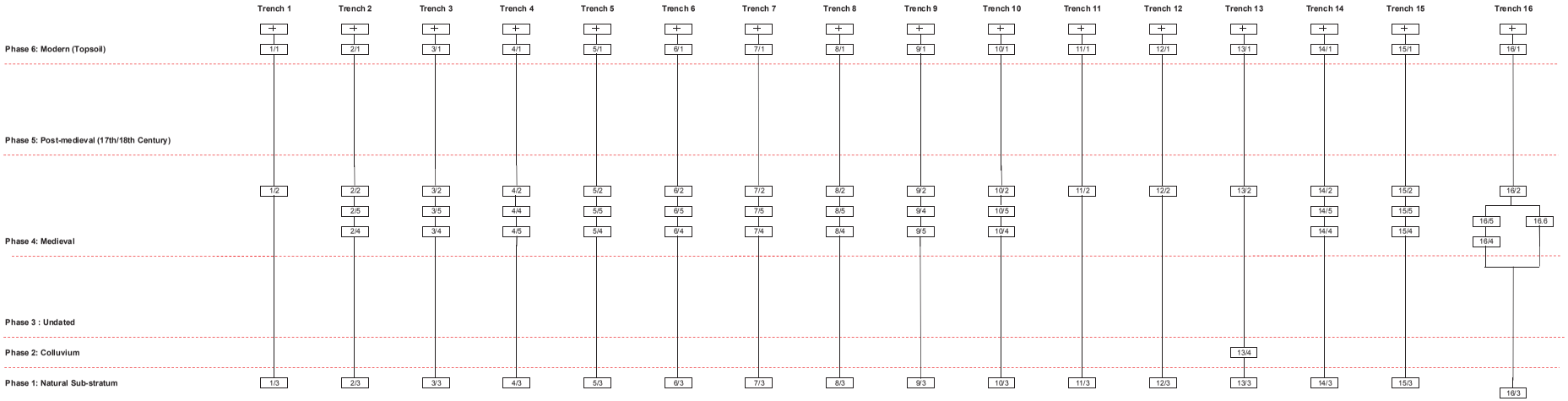
Other Credits

Post-medieval finds: Jenny Vaughan (NCAS)

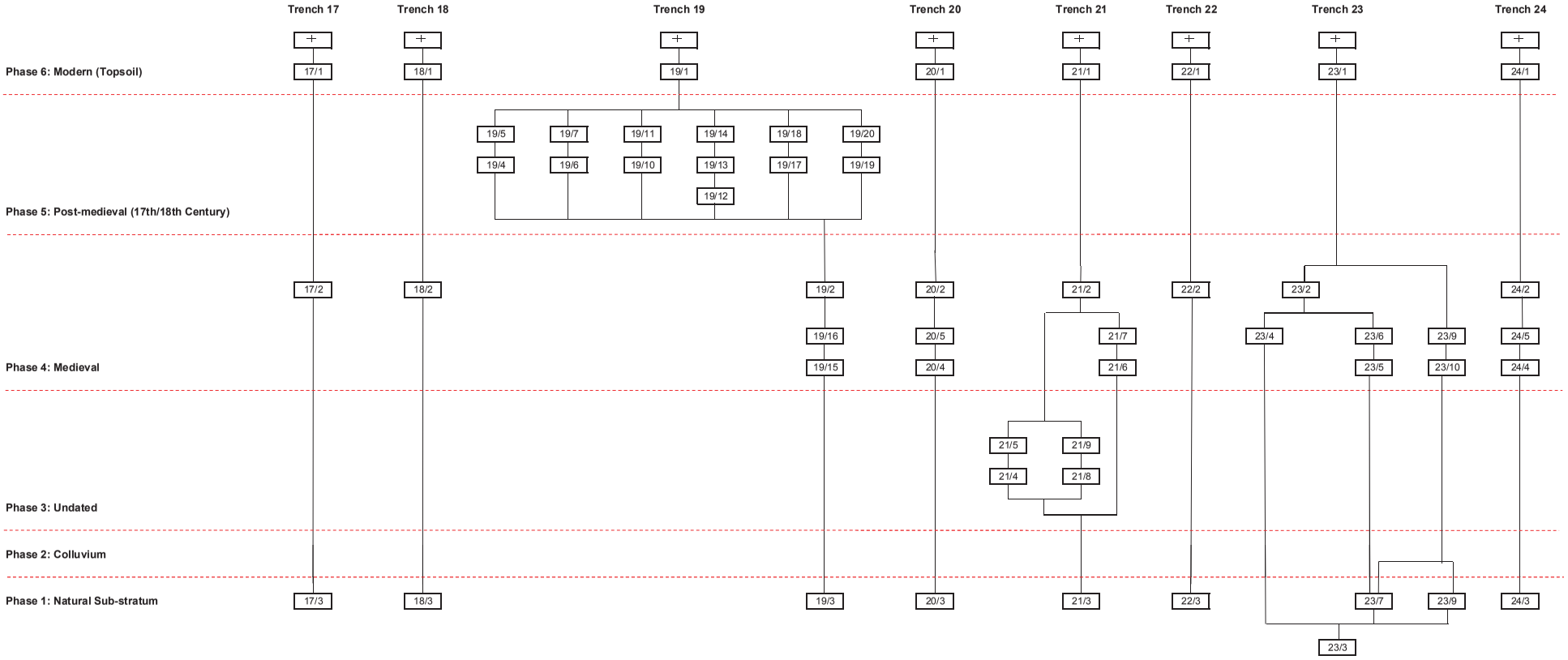
Geophysical survey: Phase Site Investigations (co-ordinated by Mark Whittingham)

APPENDIX 1
STRATIGRAPHIC MATRICES

HAN 13: STRATIGRAPHIC MATRICES



HAN 13: STRATIGRAPHIC MATRICES



APPENDIX 2
CONTEXT INDEX

HAN 13: CONTEXT INDEX

Context	Trench	Phase	Type 1	Type 2	Interpretation
1/1	1	6	Deposit	Layer	Topsoil
1/2	1	4	Deposit	Layer	Developed agricultural soil
1/3	1	1	Deposit	Layer	Natural sub-stratum
2/1	2	6	Deposit	Layer	Topsoil
2/2	2	4	Deposit	Layer	Developed agricultural soil
2/3	2	1	Deposit	Layer	Natural sub-stratum
2/4	2	4	Cut	Linear	Furrow; filled by [2/5]
2/5	2	4	Deposit	Fill	Fill of furrow [2/4]
3/1	3	6	Deposit	Layer	Topsoil
3/2	3	4	Deposit	Layer	Developed agricultural soil
3/3	3	1	Deposit	Layer	Natural sub-stratum
3/4	3	4	Cut	Linear	Furrow; filled by [3/5]
3/5	3	4	Deposit	Fill	Fill of furrow [3/4]
4/1	4	6	Deposit	Layer	Topsoil
4/2	4	4	Deposit	Layer	Developed agricultural soil
4/3	4	1	Deposit	Layer	Natural sub-stratum
4/4	4	4	Cut	Linear	Furrow; filled by [4/5]
4/5	4	4	Deposit	Fill	Fill of furrow [4/4]
5/1	5	6	Deposit	Layer	Natural sub-stratum
5/2	5	4	Deposit	Layer	Developed agricultural soil
5/3	5	1	Deposit	Layer	Natural sub-stratum
5/4	5	4	Cut	Linear	Furrow; filled by [5/5]
5/5	5	4	Deposit	Fill	Fill of furrow [5/4]
6/1	6	6	Deposit	Layer	Topsoil
6/2	6	4	Deposit	Layer	Developed agricultural soil
6/3	6	1	Deposit	Layer	Natural sub-stratum
6/4	6	4	Cut	Linear	Furrows (x 3); filled by [6/5]
6/5	6	4	Deposit	Fill	Fills of furrows (x 3) [6/4]
7/1	7	6	Deposit	Layer	Topsoil
7/2	7	4	Deposit	Layer	Developed agricultural soil
7/3	7	1	Deposit	Layer	Natural sub-stratum
7/4	7	4	Cut	Linear	Furrows (x 4); filled by [7/5]
7/5	7	4	Deposit	Fill	Fills of furrows (x 4) [7/4]
8/1	8	6	Deposit	Layer	Topsoil
8/2	8	4	Deposit	Layer	Developed agricultural soil
8/3	8	1	Deposit	Layer	Natural sub-stratum
8/4	8	4	Cut	Linear	Furrows (x 4); filled by [8/5]
8/5	8	4	Deposit	Fill	Fills of furrows (x 4) [8/4]
9/1	9	6	Deposit	Layer	Topsoil
9/2	9	4	Deposit	Layer	Developed agricultural soil
9/3	9	1	Deposit	Layer	Natural sub-stratum
9/4	9	4	Cut	Linear	Furrows (x 3); filled by [9/5]
9/5	9	4	Deposit	Fill	Fill of furrows x 3 [9/4]
10/1	10	6	Deposit	Layer	Natural sub-stratum
10/2	10	4	Deposit	Layer	Developed agricultural soil
10/3	10	1	Deposit	Layer	Natural sub-stratum
10/4	10	4	Cut	Linear	Furrows (x 7); filled by [10/5]
10/5	10	4	Deposit	Fill	Fills of furrows (x 7) [10/4]
11/1	11	6	Deposit	Layer	Topsoil
11/2	11	4	Deposit	Layer	Developed agricultural soil
11/3	11	1	Deposit	Layer	Natural sub-stratum
12/1	12	6	Deposit	Layer	Topsoil
12/2	12	4	Deposit	Layer	Developed agricultural soil

HAN 13: CONTEXT INDEX

12/3	12	1	Deposit	Layer	Natural sub-stratum
13/1	13	6	Deposit	Layer	Topsoil
13/2	13	4	Deposit	Layer	Developed agricultural soil
13/3	13	1	Deposit	Layer	Natural sub-stratum
13/4	13	2	Deposit	Layer	Colluvium
14/1	14	6	Deposit	Layer	Topsoil
14/2	14	4	Deposit	Layer	Developed agricultural soil
14/3	14	1	Deposit	Layer	Natural sub-stratum
14/4	14	4	Cut	Linear	Furrow; filled by [14/5]
14/5	14	4	Deposit	Fill	Fill of furrow [14/4]
15/1	15	6	Deposit	Layer	Topsoil
15/2	15	4	Deposit	Layer	Developed agricultural soil
15/3	15	1	Deposit	Layer	Natural sub-stratum
15/4	15	4	Cut	Linear	Furrows (x 7); filled by [15/5]
15/5	15	4	Deposit	Fill	Fills of furrows (x 7) [15/4]
16/1	16	6	Deposit	Layer	Topsoil
16/2	16	4	Deposit	Layer	Developed agricultural soil
16/3	16	1	Deposit	Layer	Natural sub-stratum
16/4	16	4	Cut	Linear	Furrow; filled by [16/5]
16/5	16	4	Deposit	Fill	Fill of furrow [16/4]
16/6	16	4	Deposit	Layer	Bank or headland
17/1	17	6	Deposit	Layer	Topsoil
17/2	17	4	Deposit	Layer	Developed agricultural soil
17/3	17	1	Deposit	Layer	Natural sub-stratum
18/1	18	6	Deposit	Layer	Topsoil
18/2	18	4	Deposit	Layer	Developed agricultural soil
18/3	18	1	Deposit	Layer	Natural sub-stratum
19/1	19	6	Deposit	Layer	Topsoil
19/2	19	4	Deposit	Layer	Developed agricultural soil
19/3	19	1	Deposit	Layer	Natural sub-stratum
19/4	19	5	Cut	Discrete	Feature; filled by [19/5]
19/5	19	5	Deposit	Fill	Fill of feature [19/4]
19/6	19	5	Cut	Discrete	Feature; filled by [19/7]
19/7	19	5	Deposit	Fill	Fill of feature [19/6]
19/8	*not used*				
19/9	*not used*				
19/10	19	5	Cut	Discrete	Construction cut for possible surface/wall [19/11]
19/11	19	5	Masonry	Surface/Wall	Surface/wall, within construction cut [19/10]
19/12	19	5	Cut	Discrete	Construction cut for stone surface [19/14]
19/13	19	5	Deposit	Fill	Bedding material for stone surface [19/14]
19/14	19	5	Masonry	Surface	Stone surface, within construction cut [19/12]
19/15	19	4	Cut	Linear	Furrow; filled by [19/16]
19/16	19	4	Deposit	Fill	Fill of furrow [19/15]
19/17	19	5	Cut	Discrete	Possible posthole; filled by [19/18]
19/18	19	5	Deposit	Fill	Fill of possible posthole [19/17]
19/19	19	5	Cut	Discrete	Possible posthole; filled by [19/20]
19/20	19	5	Deposit	Fill	Fill of possible posthole [19/19]
20/1	20	6	Deposit	Layer	Topsoil
20/2	20	4	Deposit	Layer	Developed agricultural soil
20/3	20	4	Deposit	Layer	Natural sub-stratum
20/4	20	4	Cut	Linear	Furrow; filled by [20/5]
20/5	20	4	Deposit	Fill	Fill of furrow [20/4]
21/1	21	6	Deposit	Layer	Topsoil
21/2	21	4	Deposit	Layer	Developed agricultural soil

HAN 13: CONTEXT INDEX

21/3	21	1	Deposit	Layer	Natural sub-stratum
21/4	21	3	Cut	Discrete	Possible posthole/pit; filled by [21/5]
21/5	21	3	Deposit	Fill	Fill of possible posthole/pit [21/4]
21/6	21	4	Cut	Linear	Furrows (x 3); filled by [21/7]
21/7	21	4	Deposit	Fill	Fills of furrows (x 3) [21/6]
21/8	21	3	Cut	Discrete	Possible tree throw; filled by [21/9]
21/9	21	3	Deposit	Fill	Fill of possible tree throw [21/8]
22/1	22	6	Deposit	Layer	Topsoil
22/2	22	4	Deposit	Layer	Developed agricultural soil
22/3	22	1	Deposit	Layer	Natural sub-stratum
23/1	23	6	Deposit	Layer	Topsoil
23/2	23	4	Deposit	Layer	Developed agricultural soil
23/3	23	1	Deposit	Layer	Natural sub-stratum
23/4	23	4	Deposit	Layer	Bank or headland
23/5	23	4	Cut	Linear	Furrows (x 2); filled by [23/6]
23/6	23	4	Deposit	Fill	Fills of furrows [23/5]
23/7	23	1	Deposit	Layer	Natural sub-stratum
23/8	23	1	Deposit	Layer	Natural sub-stratum
23/9	23	4	Deposit	Layer	Bank or headland
23/10	23	4	Cut	Linear	Cut for headland deposit [23/9]
24/1	24	6	Deposit	Layer	Topsoil
24/2	24	4	Deposit	Layer	Developed agricultural soil
24/3	24	1	Deposit	Layer	Natural sub-stratum
24/5	24	4	Cut	Linear	Furrows (x 8); filled by [24/6]
24/6	24	4	Deposit	Fill	Fills of furrows [24/5]

APPENDIX 3
FINDS ASSESSMENT

FINDS ASSESSMENT

By: ***Jenny Vaughan*** *(NCAS) and* ***Jenny Proctor***

Pottery

A small assemblage of 38 sherds of pottery weighing 351g was recovered from Trench 19 and a single small (3g) sherd of pottery was recovered from Trench 23. This sherd and one other were medieval and there were two unidentifiable sherds, apart from these, the group was entirely of 17th-century date, possibly extending into the early 18th century.

Types present

The largest group of sherds (24) were red earthenware. All but four of these had slip- trailed decoration. Most sherds appeared to be from 'open' vessels (*i.e.* dishes or plates). The only slipware rim sherd was from a small group of sherds with the decoration outside, indicating that the vessel was a deep bowl or jar. There was also a plain redware out-turned rim and two sherds of a black-glazed base, possibly a mug or jug.

Fragments of two tin-glazed earthenware vessels were present. A dish on a ring base had blue and purple painted decoration. The other vessel was a plate with pale blue overall glaze with two narrow painted darker blue lines.

There were two other sherds of glazed earthenware, broadly post-medieval but otherwise undiagnostic.

The two medieval fragments were likewise undiagnostic, although of 13th/14th-century date rather than later type.

Discussion

This assemblage of pottery although small is nevertheless of some interest. The main group from Trench 19, context [19/13], is relatively well-preserved and appears to represent a quite closely dated group of later 17th- to early 18th-century material. The clay pipes from this context are further confirmation of this close dating (see below). In addition, the red slipwares almost certainly have a very local origin in Berwick. Slipwares found in north Northumberland differ from the 'metropolitan' type found in great numbers on Tyneside and, as it is known that slipwares were produced in Berwick, or rather Tweedmouth, it has been inferred that this is the origin of these finds. The fabric is often a lighter red, or pink, and rim forms and treatment of the slip decoration are different. No large groups of the Tweedmouth material have been available for study and the full range of products and its characteristics remain unknown.

Although this assemblage on its own is too small to merit further analysis, more extensive excavation on this site may well recover a larger assemblage of this interesting material. This would have great potential for adding to our knowledge of early post-medieval pottery production and distribution in north Northumberland. Samples of Tweedmouth material were part of a project to evaluate geochemical fingerprinting for provenancing Scottish redwares (Chenery *et al.* 2001, 47) so there would be data available for comparison.

Decorative tablewares (*e.g.* slipwares and tin-glazed earthenwares) seem to be universally used in this region in the 17th century. There would be potential, should a large assemblage be recovered, for studying in more detail what products were available to a small rural settlement as compared to urban Tyneside, where several contemporary assemblages have been analysed, and to the large village of West Whelpington in the southern part of the county, which was deserted in the early 18th century. There was also post-medieval material recovered from Holy Island Village though not in any great quantity and from mixed and disturbed deposits.

Pottery catalogue

Context	*Feature*	*Type*	*Sherds (no.)*	*Weight (g)*	*Form sh*	*Comments*
19/5	19/4	med	1	2		Oxidised pink with grey core
19/5	19/4	red	1	42		Thick sherd, glazed one side
19/5	19/4	red?	1	1		A worn chip of red earthenware
19/7	19/6	blackw	2	22	b	Hollow vessel base
19/7	19/6	red sl	3	17		
19/11	19/10	pm whitew	1	2		Yellow gl x2
19/11	19/10	red sl	1	3		
19/13	19/12	pm ew	1	8		Light pinkish buff fabric, gl x2
19/13	19/12	red	1	10	r	Out-turned ?bowl rim gl int.
19/13	19/12	red sl	4	21	r	Slip trail is external so a bowl or jar. Small piece of simple rim, could be either.
19/13	19/12	red sl	12	89		Flatware sherds. Probably at least three vessels. On one the slip trailed areas are pale orange rather than yellow.
19/13	19/12	tin gl ew	4	50	r	Plate rim with pale blue tin glaze with thin blue painted lines round flange.
19/13	19/12	tin gl ew	5	81	r b	A dish on ring base. Blue and purple painted decoration.
19/13	19/12	ungl ew	1	3		? Worn tin gl
23/6		med	1	3		Grey fabric with oxidised exterior and traces of glaze.

Abbreviations used:

blackw	blackware – i.e. black glazed red earthenware
ew	earthenware
gl	glaze/glazed (x2 = glazed inside and out)
pm	post-medieval
sl	slip (trailed)
tin gl ew	tin-glazed earthenware (17th/18th c.)

Clay Tobacco Pipe

Twenty fragments of clay pipe were recovered from Trench 19. They included four more or less complete bowls, the remainder being stems and bowl fragments. The assemblage is listed below.

The bowl from context [19/5] is considerably smaller than the earliest known Tyneside-made pipes (which are about 1635), and may well be earlier. The bowls in context [19/13] are of later type, their Tyneside equivalents date to between *c*. 1680 and 1720. The same maker's mark appears twice (see catalogue). The mark appears to read 'S' (left side) and possibly 'A' (right), the letters lying on their sides. The A has a bar across the top. This is not a known Tyneside maker and may possibly be from Edinburgh.

Clay tobacco pipe catalogue

Context	*Feature*	*Object*	*Count*	*Bore (mm)*	*Comments*
19/5	19/4	bowl	1		Very small bowl with flat base
19/5	19/4	stem	1	7	
19/7	19/6	stem	3	>8	
19/7	19/6	stem	1	7	
19/7	19/6	bowl frag	1		
19/11		stem	1	6	
19/13	19/12	bowl	1		Large bowl with chunky spur similar to Tyneside Type 9
19/13	19/12	bowl	1		Bowl with round base similar to Tyneside Type 10. ?initials on either side of base - ?S and A
19/13	19/12	bowl frag	1		Frag with round base and initials as complete bowl
19/13	19/12	bowl	1		Squat fat bowl similar to 'Yorkshire bulbous' type
19/13	19/12	bowl frags	6		At least two bowls represented, including a round base
19/13	19/12	stem	2	8	
	19/12				

Discussion

As with the pottery, by itself this assemblage is too small to merit further analysis but it nevertheless contains some interesting pipes.

Other Ceramic Items

From context [19/5] came a worn fragment of a light orange-pink brick and a rough grey flake with a hole through it. Neither could be clearly identified or dated.

Context [19/13] produced two worn chunks of red ceramic building material, also undateable but not inconsistent with the other finds.

Glass

From context [19/11] came a dark-green glass bottle top on a short neck. This dates to the second half of the 17th century.

Context [19/13] produced a small fragment of light green window glass, one millimetre thick. This is not closely dateable but is of early post-medieval type.

Metal

Seven small iron nails were recovered from the bedding deposit [19/13] for the stone surface. Six of the nails had small heads and measured between 90mm and 50mm I length, one of the nails had a large head, 25mm in diameter, and measured 25mm in length. A rectangular iron strap with one rounded end, which measured 140mm in length by 25mm wide by 4mm thick, was also recovered from this deposit

Stone

A narrow and well-used rectangular whetstone (SF1) was recovered from fill [19/5] of feature [19/4]. This measured 165mm in length by 30mm wide by 28mm thick and weighted 373g.

A large, broken stone object (SF2) was also recovered from fill [19/5] (Plates 9 and 10). This appears to have been manufactured from a large rounded boulder, possibly originating from the natural glacial till. The corners of the stone remained rounded, but the base and sides had been worked to create a rectangular object with flat surfaces and a vertical sided flat-based rectangular recess had been carved into the interior of the object. It weighed 28.8kg and measured 0.34m wide by 0.17m high and the surviving length was 0.40m. The recess was 0.14m wide and 0.11m deep. The function of this object is uncertain, but it may have been a small trough, and may possibly have been used in some manufacturing process.

General Comment on Finds Assemblage

The later 17th- to early 18th-century pottery and clay pipes from Trench 19 context [19/13] are a good closely dated assemblage of material with no indication of residuality or later contamination. The small clay pipe bowl from context [19/5] could be considerably earlier, suggesting that activity in this area spanned much of the 17th century. The fragment of bottle also falls into this date range and the other finds, though not closely dateable in themselves, are not inconsistent with it.

References

Edwards, L., 1988. 'Seventeenth and Eighteenth Century Tyneside Tobacco Pipe Makers and Tobacconists', no. XI in *The Archaeology of the Clay Tobacco Pipe,* (ed. Peter Davey), BAR British Series 192.

Chenery, S., Phillips, E. and Haggarty, G., 2001. 'An evaluation of geochemical fingerprinting for the provenancing of Scottish red ware pottery', *Medieval Ceramics* 25, 45-53.

APPENDIX 4
FAUNAL REMAINS ASSESSMENT

FAUNAL REMAINS ASSESSMENT

By: ***Kevin Rielly***

The Assemblage

Two post-medieval deposits in Trench 19 produced small collections of animal bone; deposit [19/5] (the fill of a flat-based feature, [19/4], dated to the early 17th century) and [19/13] (a sandy bedding deposit for a stone surface dated to the later 17th to early 18th century) with 35 and 5 bone fragments, respectively.

Condition and Identification

The collection from the earlier fill, [19/5], was rather fragmented, the 35 fragments clearly arising from no more than two or three cattle-size bones accompanying a cattle maxillary adult premolar. In contrast, and perhaps surprisingly considering the sandy sub-stratum, the assemblage from deposit [19/13] was in relatively good condition and comprised a fragment of a probably veal-aged tibia as well as a cattle 2nd phalange and the proximal ulna of a mallard (possibly a domestic duck), both from adult individuals.

Discussion

It can be assumed that the items represent food waste from local habitation; the condition of the early 17th-century collection may be suggestive of re-deposited waste from an earlier horizon.

APPENDIX 5
PLATES

Plate 1: Trench 7, looking NNW (scale 2m)

Plate 2: Trench 14, looking NNE (scale 1m)

Plate 3: Trench 16, furrow [16/4] foreground, looking WSW (scale 2m)

Plate 4: Trench 19, stone surface [19/14], structure [19/11] rearground, looking WSW (scale 2m)

Plate 5: Trench 19, stone surface [19/14] in construction cut [19/2], looking SE (oblique) (scale 1m)

Plate 6: Trench 19, feature [19/6], looking SSE (scale 1m)

Plate 7: Trench 21, pit [21/4], looking east (scale 0.5m)

Plate 8: Trench 23, headland in ENE facing section, looking NW (oblique) (scale 2m)

Plate 9: Stone object SF2, profile view (scale 0.20m)

Plate 10: Stone object SF2, top view (scale 0.20m)

APPENDIX 6
GEOPHYSICAL SURVEY REPORT

Haggerston Castle Holiday Park
Ancroft, Northumberland

Archaeological geophysical survey

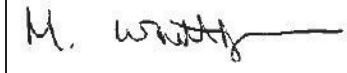
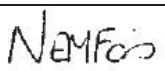
Project No. ARC/1112/407

November 2013

Haggerston Castle Holiday Park
Ancroft, Northumberland

Archaeological geophysical survey

Project No. ARC/1112/407

Report prepared by		Report checked by	
Name	Mark Whittingham BSc MA	Name	Nicola Fairs BSc MSc DIC CGeol FGS
Signature		Signature	
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1. SUMMARY

Phase Site Investigations Ltd was commissioned to carry out a magnetic gradient survey at a site at Haggerston Castle Holiday Park, Ancroft, Northumberland. The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique(s) permit) of archaeological features within the survey area.

The data quality across the majority of the survey area is very good allowing the data to be viewed at a narrow range of readings to better identify weak anomalies. There are several areas that have a more disturbed magnetic background but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

Relatively strong, broadly parallel positive linear anomalies are present in most of the data, associated with ridge and furrow. These responses indicate that the soil has a magnetic susceptibility that is sufficiently high to produce measureable magnetic responses when enhanced. This suggests that if significant infilled archaeological features are present that they would also produce measureable magnetic responses. However, it should be recognised that the ridge and furrow activity may have truncated potential archaeological features and so responses from any such features may be weak.

The majority of the anomalies identified by this survey are thought to relate to agricultural practice / features (predominantly ridge and furrow), modern material / objects or geological / pedological variations. Isolated responses that are thought to be modern in origin and some individual agricultural responses have not been shown on the interpretation.

A number of other anomalies have been identified whose cause cannot be determined. An archaeological origin cannot be completely ruled out for many of these but without supporting evidence it is considered more likely that the majority these are caused by geological pedological features or variations or modern features.

There are several large, strong areas of positive / enhanced response in the south-east of the main survey area. The larger of these do not appear to be suggestive of natural features or variations but there is no clear pattern to their distribution to help interpret the cause of these anomalies. There are two weak positive curvi-linear anomalies and several trends in the vicinity of these areas of positive / enhanced response but it is not certain if the different types of anomaly are related.

Artificial data constructs are present in parts of the data. These are caused by an intermittent connection problem with one of the magnetic sensors and are not associated with sub-surface features. Whilst this issue has produced weak anomalies in parts of the data it has not impaired the interpretation of the data, masked any anomalies from sub-surface features or caused anomalies that may have been mistaken for responses caused by sub-surface features.

2. INTRODUCTION

2.1 Overview

Phase Site Investigations Ltd was commissioned by Pre-Construct Archaeology to carry out an archaeological geophysical survey at a site at Haggerston Castle Holiday Park, Ancroft, Northumberland utilising magnetic gradiometers

The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique permit) of archaeological features within the survey area.

The location of the site is shown in drawing ARC_1112_407_01.

2.2 Site description

The site is situated at Haggerston Castle Holiday Park, approximately 10 km to the south of Berwick-upon-Tweed, Northumberland (centred at NGR NU 046 443).

The site encompasses one pasture field, part of a second pasture field and extended across a golf course into the holiday park. Areas of dense vegetation and uneven ground were present in places.

Ridge and furrow was visible in the site as extant earthworks in the pasture fields.

The geology of the site consists of the Alston Formation (limestone, sandstone, siltstone and mudstone) overlain by glacial till. Alluvial deposits are present to the west of the site and it is possible that these may extend into the western edge of the site (British Geological Survey, 2013).

2.3 Archaeological background

A detailed archaeological background has not been provided but it is understood that no known heritage assets are present within the survey area but there is potential for as yet unidentified heritage assets to survive beneath the medieval ridge and furrow.

2.4 Scope of work

The survey area covered all of the accessible parts of the site where useable data could be obtained. Areas of dense vegetation cover, uneven ground, access roads and areas adjacent to modern ferrous objects were not surveyed. To assist in the interpretation of data in the south of the site, where coverage was limited, the survey was extended to cover adjacent accessible areas.

Due to the presence of obstructions and site conditions described above the area accessible for survey was approximately 9 ha, the extent of which is shown in drawing ARC_1112_407 _02.

Upon processing the data at the completion of the survey it became apparent that an intermittent connection issue (aggravated by the uneven ground conditions in parts of the site) with one of the magnetic sensors had caused some artificial data constructs to appear in the data. The fact that the MACS has sensors spaced at 0.5 m intervals means that even if one sensor is not working data is still collected at a 1 m spacing between the adjacent sensors, which meets the English Heritage recommendation for profile spacings. After assessing this problem it was determined that whilst it produced weak anomalies in parts of the data the issue has not impaired the interpretation of the data, masked any anomalies from sub-surface features or caused anomalies that may have been mistaken for responses caused by sub-surface features. After discussion with the client it was therefore decided not to resurvey any areas.

No other problems were encountered during the survey which was carried out between 13 November and 15 November 2013.

3. SURVEY METHODOLOGY

3.1 Magnetic survey

The survey was undertaken using a Phase Site Investigations Ltd multi-sensor array cart system (MACS). The MACS comprises 6 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger. The Foerster gradiometers do not require balancing as each sensor is automatically 'zeroed' using the control unit software.

The MACS utilises an RTK GPS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GPS system. A survey wheel (odometer) provides back-up location information if the GPS signal drops out during the course of a traverse.

Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features by several metres to reduce the detrimental effect that these surface magnetic features have on the data. The location of the MACS data is converted direct to Ordnance Survey co-ordinates using the UK OSTN 02 projection.

3.2 Data processing and presentation

The MACS data was stored direct to a laptop using in-house software which automatically corrects for instrument drift. A positional value is assigned to each data point based on the sensor number and recorded GPS co-ordinates. No additional data processing is required and the data is gridded in Surfer 9 (Golden Software) using the Kriging option.

The data was exported as raster images (PNG files) and are presented in greyscale format with accompanying interpretations at a scale of 1:1500. All greyscale plots were clipped at -3 nT to 3 nT. Greyscale plots have been 'smoothed' using a visual interpolation but the data itself has not been interpolated.

The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'Base map r2007.dwg'*. The base plan was in the National Grid co-ordinate system and as the survey grids were set-out directly to national grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar responses that will probably be associated with surface / near-surface iron objects. However, X-Y trace plots have not been presented here as they do not show any additional anomalies that are not visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot is provided in the digital archive.

All isolated responses have been assessed using a combination of greyscale and X-Y trace plots. Only the stronger responses, or those that could have archaeological potential, have been shown on the interpretation.

Anomalies associated with various agricultural practices are present in the data but in many cases each individual anomaly have not been shown on the interpretation. Instead the general orientation of the ploughing, ridge and furrow or drainage is indicated.

The data was examined over several different ranges during the interpretation to ensure that the maximum information possible was obtained from the data.

The anomalies have been categorised based on the type of response that they exhibit and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided.

A general discussion of the anomalies is provided for the entire site.

The geophysical interpretation drawing must be used in conjunction with the relevant results section and appendices of this report.

4. RESULTS

4.1 General

The data quality across the majority of the survey area is very good allowing the data to be viewed at a narrow range of readings to better identify weak anomalies. There are several areas that have a more disturbed magnetic background but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

The categories of anomaly, and their possible causes, which have been identified by the survey are discussed in detail below.

Where an anomaly type can have a number of causes then it is assumed that a non-archaeological origin is the most likely cause unless otherwise stated.

Relatively strong, broadly parallel positive linear anomalies are present in most of the data, associated with ridge and furrow. These responses indicate that the soil has a magnetic susceptibility that is sufficiently high to produce measureable magnetic responses when enhanced. This suggests that if significant infilled archaeological features are present that they would also produce measureable magnetic responses. However, it should be recognised that the ridge and furrow activity may have truncated potential archaeological features and so responses from any such features may be weak.

4.2 Dipolar responses

Dipolar responses are those that have a sharp variation between strongly positive and negative components. In the majority of cases dipolar responses are usually caused by modern ferrous features / objects, although fired material (such as brick), some ferrous or industrial archaeological features and strongly magnetic gravel could also produce dipolar responses. All of the dipolar responses at this site are believed to be non-archaeological in origin.

There are numerous **isolated dipolar responses** (iron spikes) across the survey area that are indicative of ferrous or fired material on or near to the surface. The isolated responses are often caused by small objects, such as spent shotgun cartridges, iron nails and horseshoes or pieces of modern brick or pot. Archaeological artefacts can also produce this type of response but unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance. As such this type of anomaly has not been shown on the interpretation.

There are several areas containing strong or numerous dipolar responses (**magnetic disturbance).** This type of anomaly is usually caused by concentrations of ferrous or fired material and are often found adjacent to field boundaries where such material tends to accumulate. If an area of magnetic disturbance is located away from existing field boundaries then it could indicate a former field boundary, several large isolated objects in close proximity, an area where modern material has been tipped or an infilled cut feature, such as a quarry pit. Areas of dipolar response can occasionally be caused by features / material associated with archaeological industrial activity but they are usually caused by modern activity. Responses in areas of magnetic disturbance can sometimes be so strong that archaeological features located beneath them may not be detected.

Above ground metallic or strongly magnetic features, such as fences, gates, pylons and buildings can produce very strong dipolar responses. The strength of magnetic response from these features is such that any sub-surface features located in their vicinity may not be detected.

4.3 Linear responses (artificial data constructs)

There are several linear responses or series of linear responses that were caused by an intermittent connection issue with one of the magnetic sensors (aggravated by the uneven ground conditions in parts of the site). These are artificial data constructs and are not caused by sub-surface features. Whilst this issue has produced weak anomalies in parts of the data it has not impaired the interpretation of the data, masked any anomalies from sub-surface features or caused anomalies that may have been mistaken for responses caused by sub-surface features.

4.4 Linear / curvi-linear anomalies (probable agricultural)

The survey area contains a series of **broadly parallel positive linear** anomalies that are associated with ridge and furrow. The approximate orientation of these anomalies have been shown on the interpretation drawing to indicate the direction of the ploughing regime but for the sake of clarity individual anomalies have not been shown.

Two weak anomalies are present in the east of the main survey area. These appear to correspond with changes in the ridge and furrow and may indicate the presence of a headland or former field boundary.

A linear anomaly in the southern survey area is suggestive of a former field boundary or possibly a field drain. This response is not indicative of an infilled ditch and so has been shown as a probable agricultural feature.

4.5 Linear / curvi-linear trends

There are a number of linear and curvi-linear responses that are weak, irregular or discontinuous. These anomalies have been categorised as **trends** as it is not certain what their cause is or even if they are associated with definite features.

Several curvi-linear trends in the west of the survey area are quite broad and diffuse. These responses are suggestive of natural variations, such as are found in palaeochannel systems. These trends are not thought to be associated with archaeological features.

There are numerous other trends in the east of the main survey area. Some of these may also be associated with natural variations or features but others are not as broad and are generally linear. These trends are too weak to reliably interpret and so their origin or cause is not certain.

4.6 Isolated positive or enhanced responses

Isolated positive or enhanced responses can occur if the magnetism of a feature, area or material has been enhanced or if a feature is naturally more magnetic than the surrounding material. It is often difficult to determine which of these factors causes any given responses and so the origin of this type of anomaly can be difficult to determine. They can have a variety of causes including geological variations, infilled archaeological features, areas of burning (including hearths), industrial archaeological features such as kilns or deeper buried ferrous material and modern fired material. There are a large number of isolated positive or enhanced responses, the majority of which do not have an obvious pattern to their distribution and are probably associated with geological / pedological variations. As such only the stronger or larger isolated responses have been shown on the interpretation.

The broad and relatively strong positive / enhanced responses in the west of the main survey area are generally on the same alignment as a series of trends. The trends are thought to be associated with natural features or variations and it is probable that the isolated responses have a similar origin.

There are several large, strong areas of positive / enhanced response in the south-east of the main survey area. The larger of these does not appear to be suggestive of natural features or variations but there is no clear pattern to their distribution to help interpret the cause of these anomalies.

4.7 Positive or enhanced linear / curvi-linear anomalies

Positive magnetic anomalies indicate an increase in magnetism and if the resulting anomaly is linear or curvi-linear then this can indicate the presence of a man-made feature. **Positive or enhanced linear / curvi-linear** anomalies can be associated with agricultural activity but they can also be caused by ditches that are infilled with magnetically enhanced material and as such can indicate the presence of archaeological features.

There are two weak curvi-linear positive anomalies in the south-east of the main survey area, adjacent to several areas of positive /enhanced response. The cause of these anomalies is not known.

5. DISCUSSION AND CONCLUSIONS

The data quality across the majority of the survey area is very good allowing the data to be viewed at a narrow range of readings to better identify weak anomalies. There are several areas that have a more disturbed magnetic background but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

Relatively strong, broadly parallel positive linear anomalies are present in most of the data, associated with ridge and furrow. These responses indicate that the soil has a magnetic susceptibility that is sufficiently high to produce measureable magnetic responses when enhanced. This suggests that if significant infilled archaeological features are present that they would also produce measureable magnetic responses. However, it should be recognised that the ridge and furrow activity may have truncated potential archaeological features and so responses from any such features may be weak.

The majority of the anomalies identified by this survey are thought to relate to agricultural practice / features (predominantly ridge and furrow), modern material / objects or geological / pedological variations. Isolated responses that are thought to be modern in origin and some individual agricultural responses have not been shown on the interpretation.

A number of other anomalies have been identified whose cause cannot be determined. An archaeological origin cannot be completely ruled out for many of these but without supporting evidence it is considered more likely that the majority these are caused by geological pedological features or variations or modern features.

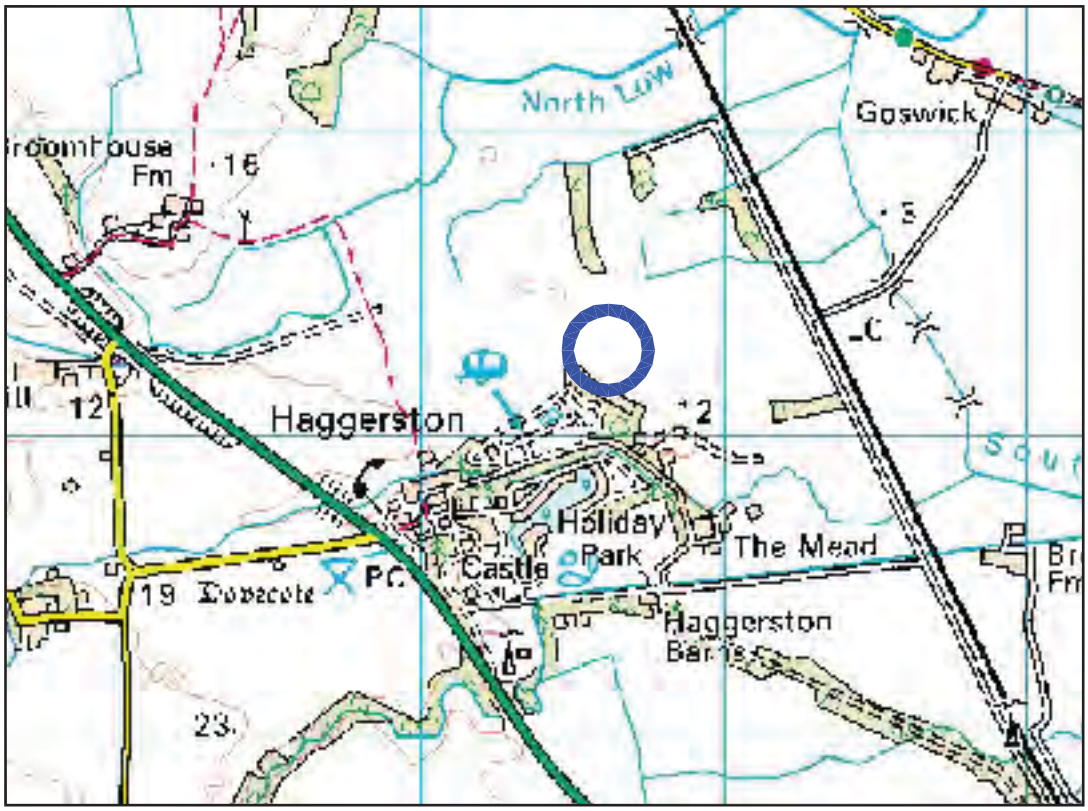
There are several large, strong areas of positive / enhanced response in the south-east of the main survey area. The larger of these does not appear to be suggestive of natural features or variations but there is no clear pattern to their distribution to help interpret the cause of these anomalies. There are two weak positive curvi-linear anomalies and several trends in the vicinity of these areas of positive / enhanced response but it is not certain if the different types of anomaly are related.

Artificial data constructs are present in parts of the data. These are caused by an intermittent connection problem with one of the magnetic sensors and are not associated with sub-surface features. Whilst this issue has produced weak anomalies in parts of the data it has not impaired the interpretation of the data, masked any anomalies from sub-surface features or caused anomalies that may have been mistaken for responses caused by sub-surface features.

It should be noted that a geophysical survey does not directly locate sub-surface features - it identifies variations or anomalies in the background response caused by features. The interpretation of geophysical anomalies is often subjective and it is rarely possible to identify the cause of all such anomalies. Not all features will produce a measurable anomaly and the effectiveness of a geophysical survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a geophysical survey will identify all sub-surface features. Confirmation on the identification of anomalies and the presence or absence of sub-surface features can only be achieved by intrusive investigation.

REFERENCES

British Geological Survey, 2013, online resource - www.bgs.ac.uk



SITE LOCATION

SCALE
0m 500m 1000m

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PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe , County Durham, DL5 6A U

T: +44 [0] 01325 311 751
F: +44 [0] 01325 310 819
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A4 Sheet]	Drawing	Status
AS SHOWN	ARC_1112_407_01	FINAL

Client
PRE-CONSTRUCT ARCHAEOLOGY DURHAM

Site
HAGGERSTON CASTLE HOLIDAY PARK
ANCROFT, NORTHUMBERLAND

Title
SITE LOCATION MAP

Job No
ARC_1112_407

		Drawn	CW
Chk.	MW	Date	20/11/2013

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KEY

SITE BOUNDARY

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe , County Durham, DL5 6AU

T: +44 [0] 01325 311 751
F: +44 [0] 01325 310 819
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_1112_407_02	FINAL

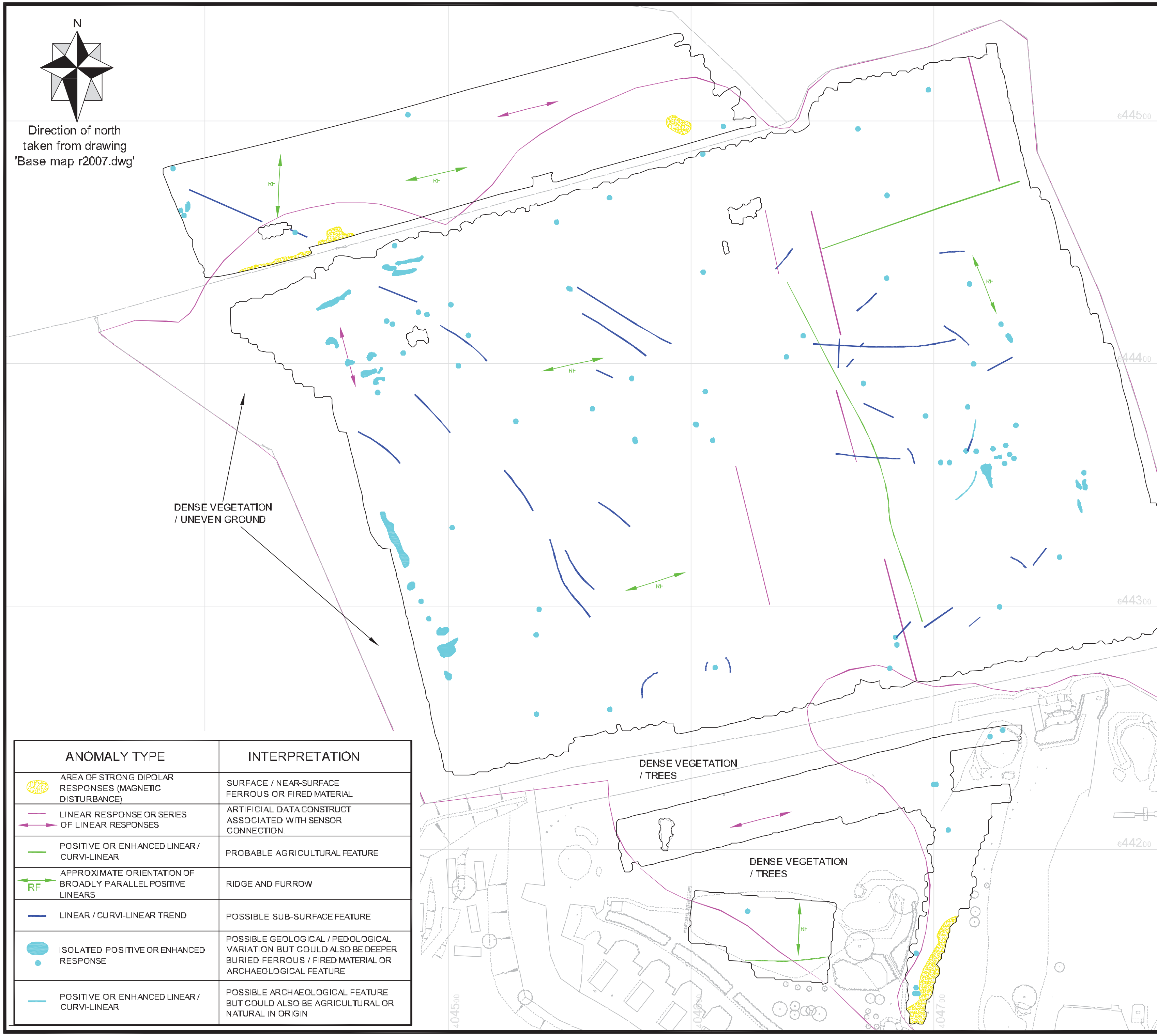
Client
PRE-CONSTRUCT ARCHAEOLOGY DURHAM

Site
HAGGERSTON CASTLE HOLIDAY PARK
ANCROFT, NORTHUMBERLAND

Title
GREYSCALE PLOT OF MAGNETIC GRADIENT DATA

Job No
ARC_1112_407

Surveyed	KK, MC	Drawn	MW
Chk.	NF	Date	15/11/2013



ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL
LINEAR RESPONSE OR SERIES OF LINEAR RESPONSES	ARTIFICIAL DATA CONSTRUCT ASSOCIATED WITH SENSOR CONNECTION.
POSITIVE OR ENHANCED LINEAR / CURVI-LINEAR	PROBABLE AGRICULTURAL FEATURE
RF APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	RIDGE AND FURROW
LINEAR / CURVI-LINEAR TREND	POSSIBLE SUB-SURFACE FEATURE
ISOLATED POSITIVE OR ENHANCED RESPONSE	POSSIBLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR ARCHAEOLOGICAL FEATURE
POSITIVE OR ENHANCED LINEAR / CURVI-LINEAR	POSSIBLE ARCHAEOLOGICAL FEATURE BUT COULD ALSO BE AGRICULTURAL OR NATURAL IN ORIGIN

NOTES

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KEY

SITE BOUNDARY

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
F: +44 [0] 01325 310 819
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_1112_407_03	FINAL

Client
PRE-CONSTRUCT ARCHAEOLOGY DURHAM

Site
HAGGERSTON CASTLE HOLIDAY PARK ANCROFT, NORTHUMBERLAND

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA

Job No
ARC_1112_407

Surveyed	KK, MC	Drawn	MW
Chk.	NF	Date	15/11/2013

APPENDIX 1

Magnetic survey: technical information

1.1 Theoretical background

1.1.1 Magnetic instruments measure the value of the Earth's magnetic field; the units of which are nanoTeslas (nT). The presence of surface and sub-surface features can cause variations or anomalies in this magnetic field. The strength of the anomaly is dependent on the magnetic properties of a feature and the material that surrounds it. The two magnetic properties that are of most interest are magnetic susceptibility and thermoremnant magnetism.

1.1.2 Magnetic susceptibility indicates the amount of ferrous (iron) minerals that are present. These can be redistributed or changed (enhanced) by human activity. If enhanced material subsequently fills in features such as pits or ditches then these can produce localised increases in magnetic responses (anomalies) which can be detected by a magnetic gradiometer even when the features are buried under additional soil cover.

1.1.3 In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes which intrude into the topsoil may give a negative magnetic response relative to the background level. The strength of magnetic responses that a feature will produce will depend on the background magnetic susceptibility, how rapidly the feature has been infilled, the level and type of human activity in the area and the size and depth of a feature. Not all infilled features can be detected and natural variations can also produce localised positive and negative anomalies.

1.1.4 Thermoremnant magnetism indicates the amount of magnetism inherent in an object as a result of heating. Material that has been heated to a high temperature (fired), such as brick, can acquire strong magnetic properties and so although they may not appear to have a high iron content they can produce strong magnetic anomalies

1.1.5 The magnetic survey method is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult, or even impossible, in the vicinity of surface magnetic features. The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

1.1.6 The interpretation of magnetic anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a magnetic survey will identify all sub-surface features.

1.1.7 Most high resolution, near surface magnetic surveys utilise a magnetic gradiometer. A gradiometer is a hand-held instrument that consists of two magnetic sensors, one positioned directly above the other, which allows measurement of the magnetic gradient component of the magnetic field. A gradiometer configuration eliminates the need for applying corrections due to natural variations in the overall field strength that occur during the course of a day but it only measures relative variations in the local magnetic field and so comparison of absolute values between sites is not possible.

1.1.8 Features that are commonly located using magnetic surveys include archaeological ditches and pits, buried structures or foundations, mineshafts, unexploded ordnance, metallic pipes and cables, buried piles and pile caps. The technique can also be used for geological mapping; particularly the location of igneous intrusions.

1.2 Instrumentation

A multi-sensor array cart system (MACS) utilising 6 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger was used for the survey.

1.3 Survey methodology

1.3.1 The MACS utilises an RTK GPS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GPS system.

1.3.2 Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features several metres to reduce the detrimental effect that these surface magnetic features have on the data.

1.3.3 The Foerster gradiometers have a resolution of 0.2 nT but the stability of the cart system significantly reduces noise caused by instrument tilt and movement when compared with a traditional hand-held gradiometer system and the increased data intervals provide a higher resolution data set. The sensors have a range of ± 10,000nT and readings are taken at 0.1 nT resolution.

1.4 Data processing, presentation and interpretation

1.4.1 The MACS data was stored automatically to a laptop using in-house software which automatically corrects for instrument drift. A positional value is assigned to each data point based on the sensor number and recorded GPS co-ordinates. No additional data processing is required and the data is gridded in Surfer 9 (Golden Software) using the Kriging option.

1.4.2 Upon processing the data at the completion of the survey it became apparent that an intermittent connection issue (aggravated by the uneven ground conditions in parts of the site) with one of the magnetic sensors had caused some artificial data constructs to appear in the data. These artificial data constructs could not be processed out without affecting the overall data quality and resolution. The fact that the MACS has sensors spaced at 0.5 m intervals means that even if one sensor is not working data is still collected at a 1 m spacing between the adjacent sensors, which meets the English Heritage recommendation for profile spacings. After assessing this problem it was determined that whilst it produced weak anomalies in parts of the data the issue has not impaired the interpretation of the data, masked any anomalies from sub-surface features or caused anomalies that may have been mistaken for responses caused by sub-surface features. After discussion with the client it was therefore decided not to resurvey any areas.

1.4.3 The data was exported as raster images (PNG files), and are presented in greyscale format at 1:1500. All greyscale plots were clipped at -3 nT to 3 nT.

1.4.4 The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'Base map r2007.dwg'*. The base plan was in the National Grid co-ordinate system and as the survey grids were set-out directly to national grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

1.4.5 The anomalies have been categorised based on the type of response that they have and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided.

1.4.6 Several different ranges of data were used in the interpretation to ensure that the maximum information possible is obtained from the data.

1.4.7 X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar responses that will probably be associated with surface / near-surface iron objects. X-Y trace plots have not been used in the report as they do not show any additional anomies that are not visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot has been provided in the digital archive.

1.4.8 All isolated responses have been assessed using a combination of greyscale and X-Y trace plots. If a response is not thought to have significant archaeological potential then it has not be shown on the final interpretation.

1.4.9 Anomalies associated with ridge and furrow are present in the data. The general orientation of these has been shown on the interpretation but each individual anomaly has not been shown.

1.4.10 The greyscale plots and the accompanying interpretations of the anomalies identified in the magnetic data are presented as 2D AutoCAD drawings. The interpretation is made based on the type, size, strength and morphology of the anomalies, coupled with the available information on the site conditions. Each type of anomaly is displayed in separate, easily identifiable layers annotated as appropriate.

1.5 Limitations of magnetic surveys

1.5.1 The magnetic survey method utilising the Bartington requires the operator to walk over the site at a constant walking pace whilst holding the instrument. The MACS requires the operator to work across an area without significantly jolting the sensors. The presence of an uneven ground surface, dense, high or mature vegetation or surface obstructions may mean that some areas cannot be surveyed.

1.5.2 The depth at which features can be detected will vary depending on their composition, size, the surrounding material and the type of magnetometer used for the survey. In good conditions large, magnetic targets, such as buried drums or tanks can be located at depths of more than 4 m. Smaller targets, such as buried foundations or archaeological features can be located at depths of between 1 m and 2 m.

1.5.3 A magnetic survey is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult or even not possible in the vicinity of surface and near-surface magnetic features.

1.5.4 The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

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

1.5.6 A magnetic survey does not directly locate sub-surface features - it identifies variations or anomalies in the local magnetic field caused by features. It can be possible to interpret the cause of anomalies based on the size, shape and strength of response but it should be recognised that a magnetic survey produces a plan of magnetic variations and not a plan of all sub-surface features. Interpretation of the anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Geological or pedological (soil) variations or features can produce responses similar to those caused by man-made (anthropogenic) features.

1.5.7 Anomalies identified by a magnetic survey are located in plan. It is not usually possible to obtain reliable depth information on the features that cause the anomalies.

1.5.8 Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. It is not possible to guarantee that a magnetic survey will identify all sub-surface features. A magnetic survey is often most-effective at identifying sub-surface features when used in conjunction with other complementary geophysical techniques.

P C A

PCA SOUTH
UNIT 54
BROCKLEY CROSS BUSINESS CENTRE
96 ENDWELL ROAD
BROCKLEY
LONDON SE4 2PD
TEL: 020 7732 3925 / 020 7639 9091
FAX: 020 7639 9588
EMAIL: info@pre-construct.com

PCA NORTH
UNIT 19A
TURSDALE BUSINESS PARK
DURHAM DH6 5PG
TEL: 0191 377 1111
FAX: 0191 377 0101
EMAIL: info.north@pre-construct.com

PCA CENTRAL
7 GRANTA TERRACE
STAPLEFORD
CAMBRIDGESHIRE CB22 5DL
TEL: 01223 845 522
FAX: 01223 845 522
EMAIL: info.central@pre-construct.com

PCA WEST
BLOCK 4
CHILCOMB HOUSE
CHILCOMB LANE
WINCHESTER
HAMPSHIRE SO23 8RB
TEL: 01962 849 549
EMAIL: info.west@pre-construct.com

PCA MIDLANDS
17-19 KETTERING RD
LITTLE BOWDEN
MARKET HARBOROUGH
LEICESTERSHIRE LE16 8AN
TEL: 01858 468 333
EMAIL: info.midlands@pre-construct.com