ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

for
Mr Steve Hill

Crayke Castle
Crayke
North Yorkshire

geophysical surveys

report 4370
February 2017

Durham University

Contents

Figures

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1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted in advance of proposed works at Crayke Castle, near Easingwold, North Yorkshire. The works comprised geomagnetic and earth electrical resistance surveys to the north and east of the castle.

1.2 The works were commissioned by Mr Steve Hill and conducted by Archaeological Services Durham University.

Results

1.3 The possible remains of walls have been detected to the east and south of the ruined tower, as well as several areas of probable rubble. Possible pits or former garden features have also been detected in this area.

1.4 A concentration of magnetic anomalies detected to the east of the former reservoir could reflect a range of features, including remains associated with the former 'Great Barn', various ditch features and ferrous/fired materials. These could be associated with Roman or early medieval structures, pottery production or burials, all of which are either known or expected to be present in this general area of the hilltop.

1.5 A probable ditched enclosure and house platform have been detected in the north-eastern part of the site.

1.6 Occasional weak geomagnetic anomalies could possibly reflect the remains of earthen banks or former tracks.

1.7 Several concentrations of strong dipolar magnetic anomalies were detected throughout the geomagnetic surveys. These typically reflect items of near-surface ferrous and/or fired materials, and in this instance probably reflect building rubble and other debris, some associated with bonfires. It is possible that in situ remains could be present in these areas, but have not been identified due the presence of so many stronger anomalies.

1.8 Recent features detected during the surveys include two service pipes, possible land drains and a probable concrete slab.

1.9 Further to these geophysical surveys, ground-penetrating radar surveys may also be undertaken, at the client's request, in order to try to further characterise sub-surface features at the site.

2. Project background

Location (Figure 1)

2.1 The survey areas were located within the grounds of Crayke Castle, Crayke, 3km east of Easingwold in North Yorkshire (NGR: SE 55910 70680). Crayke Lane bounded the site to the south and west, with occasional stands of trees and agricultural land beyond to the west and north. Immediately east and south-east of the castle was a former reservoir and St Cuthbert's Church and churchyard, with Crayke village beyond.

2.2 Two geomagnetic surveys were undertaken in pasture fields to the north of the castle (Areas 2 & 4 in this report). Earth electrical resistance survey was conducted over several grassed areas east of the castle (Area 3). It was not possible to conduct survey in the wooded and recently deforested areas to the south and west of the castle (Area 1).

Development proposal

2.3 Restoration and re-development works are proposed.

Objective

2.4 The aim of the surveys was to assess the nature and extent of sub-surface features of potential archaeological significance within surveyable areas around the castle, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to proposed works at the site.

2.5 The regional research framework *Yorkshire Archaeological Research Framework: research agenda* (Roskams & Whyman 2007) contains an agenda for archaeological research in the region, which is incorporated into regional planning policy implementation. In this instance, the scheme of works was designed to address the following period priorities for research: early medieval and high medieval.

Methods statement

2.6 The surveys have been undertaken in accordance with instructions from the client, survey proposals provided by Archaeological Services Durham University (ref. DH 16.471rev) and national standards and guidance (see para. 5.1 below).

2.7 Since the survey areas covered parts of a Scheduled Monument, the geophysical surveys were also undertaken in accordance with a 'Section 42' licence granted by Historic England (ref. AA/11556/5) under the Ancient Monuments and Archaeological Areas Act 1979 (as amended by the National Heritage Act 1983).

Dates

2.8 Fieldwork was undertaken on 18th and 19th January 2017. This report was prepared for February 2017.

Personnel

2.9 Fieldwork was conducted by Duncan Hale (Senior Archaeologist) and Mark Woolston-Houshold (Archaeological Geophysicist). Geophysical data processing, analysis and reporting were by Duncan Hale, the Project Manager, with illustrations by Dr Helen Drinkall and Janine Watson.

Archive/OASIS

2.10 The site code is **ECC17**, for **E**asingwold **C**rayke **C**astle 20**17**. The survey archive will be retained at Archaeological Services Durham University and a copy supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (**OASIS**). The OASIS ID number for this project is **archaeol3-276137**.

3. Historical and archaeological background

3.1 The castle and surrounding land is a scheduled ancient monument: 'Crayke Castle: a motte and bailey and later stone castle of the bishops of Durham, incorporating part of an Anglo-Saxon monastic cemetery' (UID: 12602; Historic England List entry number: 1016530). The following information is based on the HE List entry, last amended June 1999, and other published sources.

3.2 The Saxon bishops of Durham also held a manor house in the vicinity, and Crayke was recorded as a possession of the see in the Domesday Book survey. The earliest documentary reference to the castle is for 1195, when Bishop Hugh Pudsey supped there *en route* from Durham shortly before his death. There were several royal visitors to Crayke: King John stayed in 1209, 1210-11 and again in 1211; Henry III stayed in 1227, Edward I in 1292, Edward II in 1316 and Edward III in 1333.

3.3 Both the occupied and ruined sections of Crayke Castle are Listed Grade I. A number of features are excluded from the scheduling. These are the main range of the castle, the 19th century stable block beside Crayke Lane, the surface of the driveway and tennis court, all modern paved areas and garden fences and gates and the disused reservoir, although the ground beneath all these features is included.

3.4 The monument includes a Norman motte and bailey castle whose wooden fortifications were later replaced with a stone tower house and which was built over part of a pre-Conquest monastic cemetery; the castle was held by the bishops of Durham. The monument is situated in a commanding position at the top of a prominent natural outcrop 3km south-west of the Howardian Hills.

3.5 The motte lies beneath the later structures and is still visible to the north of the castle as an earthwork mound rising about 2.5m above the natural hilltop, forming a platform on which later buildings were constructed. The inner bailey defences have been altered over the years and only survive as earthworks at the south-east side as a short section of bank, although the line of the southern edge to the bailey is retained by the present garden wall alongside Crayke Lane. The inner bailey occupied most of the crown of the hill above the 100m contour, extending to the north of St Cuthbert's Church and measuring up to 210m east-west by 90m north-south. Originally the buildings on the motte were constructed of timber but were quickly replaced in stone. Several phases of building and rebuilding are known to have occurred, culminating with work undertaken for Bishop Neville in the mid-15th century. Subsequently, the castle was made untenable as a fortress by an act of Parliament in 1646 and by the 18th century the main range was in use as a farmhouse.

3.6 Two distinct and self-contained buildings are visible. Of these the larger block, known as the `Great Chamber', has been restored and now forms a domestic residence. This was originally constructed in the 15th century but was slightly altered and added to in the 18th and 19th centuries. In its original form it had kitchen ranges appended to its rear, north side which linked it to a hall referred to as the `Old Hall' in a description of 1441. Today the vaulted undercroft of the main kitchen range survives and is used as the modern kitchen: although no further remains of the north ranges are visible, their foundations will survive below ground.

3.7 The construction of the stone castle included the creation of an inner bailey enclosed by a stone wall which roughly corresponded with the earlier bailey and also, at a later date, an outer bailey defined by a curtain wall which extended along the bottom of the steep slope to the north of the castle. The remains of the footings for a projecting tower in the inner bailey wall survive as a platform on the north edge of the outcrop approximately 40m north-east of the castle. Small scale excavations at the east end of the bailey found evidence for the location of a gatehouse allowing access to the castle via a hollow way; this route still survives as Love Lane which runs northwards along the eastern boundary field. Within the inner bailey, the earthwork remains of a large rectangular building in the field north of the churchyard have been identified as a barn (Hildyard 1959) listed in the 16th-century survey of the castle and depicted on a map of Crayke dating to 1688.

3.8 Excavations in 1983 (Adams 1990) also indicated the presence of a medieval pottery kiln at the east side of the inner bailey. Further ancillary buildings will survive below ground in the undisturbed areas of this inner bailey. The curtain wall enclosing the outer bailey survives as a shallow bank and terrace curving round northwards from the western side of the motte to approximately 5m short of the hedge line. It then turns to extend eastward to the north east corner of the field where it then extends northward, following Love Lane. Within the outer precinct, along the slope are the remains of cultivation terraces some of which pre-date the castle. In the north eastern area of the outer precinct a number of building platforms are set amid the terraces. Partial excavation of these in 1994 indicated that they may have supported small timber buildings. The area of the outer precinct was probably enclosed in the 13th century and continued in use for agrarian purposes linked to the castle. In the area between the outer precinct wall and the hedge line to the north and west are further remains of the cultivation terraces pre-dating the castle which are also thought to have continued in use after the outer precinct was enclosed.

3.9 Excavations to the north-east of the church in 1956 (Hildyard 1959) and 1983 (Adams 1990) revealed that the castle bailey was built over the north-western corner of an Anglo-Saxon cemetery. It is thought that further remains of the cemetery and possibly of the monastery itself will also survive below ground. The cemetery was of a monastery founded by St Cuthbert after he became the Bishop of Lindisfarne in 685.

3.10 A Roman box flue tile was also recovered the 1956 excavations, confirming the nearby presence of a hypocaust; a box flue tile had previously been recorded a few metres to the west during a watching brief for construction of the reservoir in 1948. A substantial layer of charcoal and ash was also recorded during the watching brief, thought to be associated with a furnace for the hypocaust.

3.11 The earliest known archaeological investigations on the hill at Crayke were in 1937 (Sheppard 1939), during levelling work for a tennis court east of Crayke Hall, just south-east of the bailey. Late Roman pottery and early Anglian metalwork were recovered, together with a hoard of 8th-century Viking metalwork and two fragments of an early 9th-century stone cross; another medieval (14th-16th century) pottery kiln was also recorded.

4. Landuse, topography and geology

4.1 At the time of fieldwork the survey areas comprised two pasture fields in the north (Areas 2 & 4), separated until recently by a mature hedge, and grassed areas to the east and south-east of the castle buildings (Area 3). It was not possible to conduct survey in the wooded and recently deforested areas to the south and west of the castle (Area 1).

Western part of Area 2, looking south to the castle

Ruined tower with east part of Area 2 behind to the left and Area 3 to the right

4.2 Area 2 contained two ponds and several areas of disturbed ground, typically where trees had been removed; these were covered with tree stumps and debris, bramble and fire residues (above).

Area 4 with former hedge to left, looking south-west

4.3 As well as areas of grass, Area 3 (below) contained a stone flag path, gravel surface and ruined tower in the north, a former tennis court with tarmac surface in the east (currently used for storing timber and housing a steel container), a 19th-century stable block and refuse skip in the south-east with adjacent gravel and stone hardstanding to the west and south respectively, part covered in debris, and a gravel surfaced driveway. A large tree stood within the circuit of the drive.

Area 3, looking south-east from the motte

Area 3, stable block with hardstanding, looking north-east from gate

4.4 A disused reservoir stood to the east of the former tennis court. The reservoir was constructed in 1948 and had been covered with earth and vegetation. This cover has been pulled back by machine to expose the concrete structure of the reservoir, and stands in spoilheaps around the structure.

The former reservoir and spoilheaps, looking south-east

4.5 Further spoilheaps were present along the top of the slope on the north side of the castle and ruined tower. It is understood that these spoilheaps are associated with recent tree clearance around the castle.

4.6 The castle occupies a mound (the former motte) at the western end of a hilltop, at elevations between 115-119m OD, with commanding views across the surrounding countryside. The bailey is believed to have extended eastward across the hilltop; land at the eastern edge of the survey was at an elevation of approximately 110m OD. Areas 2 and 4 to the north occupied steep slopes down to approximately 95m OD at the northern limit of the surveys. The ground started to level out there,

particularly within Area 4 to the north-west. The land also fell away steeply to the west and south of the castle.

4.7 The underlying solid geology of the hill comprises Early Jurassic mudstone of the Whitby Mudstone Formation, which is overlain by sandy gravelly clay of the Vale of York Formation. The hill is surrounded by Staithes Sandstone and Cleveland Ironstone, which contains significant quantities of iron minerals and has a magnetic component.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with Historic England guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Chartered Institute for Archaeologists (CIfA) *Standard and Guidance for archaeological geophysical survey* (2014); the CIfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service & Digital Antiquity *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2013).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance, based on previous work, it was considered likely that cut features such as ditches and pits would be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) would also be present.

5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above, within the pasture areas to the north. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

5.5 The geomagnetic technique would not be so effective near the standing buildings, former tennis court, steel container and skip, and anticipated services so an earth electrical resistance technique was used across those areas. Earth resistance survey can be particularly useful for mapping stone and brick features. When a small electrical current is injected through the earth it encounters resistance which can be measured. Since resistance is linked to moisture content and porosity, stone and brick features will give relatively high resistance values while soil-filled features, which typically retain more moisture, will provide relatively low resistance values.

Field methods

5.6 A 20m grid was established across each survey area and related to the Ordnance Survey National Grid using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic (RTK) corrections typically providing 10mm accuracy.

5.7 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was effectively 0.03nT, the sample interval was 0.25m and the traverse interval was 1m, thus providing 1,600 sample measurements per 20m grid unit.

5.8 Measurements of earth electrical resistance were determined using a Geoscan RM15D Advanced resistance meter with MPX15 multiplexer and a mobile twin probe separation of 0.5m. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was 0.1ohm, the sample interval was 1m and the traverse interval was 1m, thus providing 400 sample measurements per 20m grid unit.

5.9 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.10 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and trace plots are presented in Figures 2-4; the interpretations are provided in Figures 5-6. In the greyscale images, positive magnetic and high resistance anomalies are displayed as dark grey, while negative magnetic and low resistance anomalies are displayed as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla and ohm as appropriate.

5.11 The following basic processing functions have been applied to the geomagnetic data:

clip	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities
de-stagger	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

5.12 The following basic processing functions have been applied to the resistance data:

add	adds or subtracts a positive or negative constant value to defined blocks of data; used to reduce discontinuity at grid edges
de-spike	locates and suppresses spikes in data due to poor contact resistance
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.5m x 0.5m intervals

Interpretation: anomaly types

5.13 A colour-coded geophysical interpretation plan is provided. Three types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches
negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

5.14 Two types of resistance anomaly have been distinguished in the data:

high resistance	regions of anomalously high resistance, which may reflect foundations, tracks, paths and other concentrations of stone or brick rubble
low resistance	regions of anomalously low resistance, which may be associated with soil-filled features such as pits and ditches

Interpretation: features

General comments

5.15 A colour-coded archaeological interpretation plan is provided. For ease of reference, anomaly numbers shown bold in the text below (eg **2a**, **4a**, etc) are also shown on the archaeological interpretation plan.

5.16 Positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning, however, in this instance, the stronger examples of this type of anomaly could reflect blocks of the local ironstone with its relatively high iron minerals content. This has recently been demonstrated in surveys at a medieval borough site with the same geology (Archaeological Services 2016).

5.17 Small, discrete dipolar magnetic anomalies have been detected across Areas 2 and 4. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, but could also include ironstone. In most cases these anomalies have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plan, however, they have been omitted from the archaeological interpretation plan and the following discussion.

Area 2

5.18 The most prominent anomalies here are strong dipolar magnetic anomalies, most commonly associated with ferrous and fired materials.

5.19 Two chains of strong dipolar anomalies were detected across Area 2, both aligned broadly south-west/north-east (**2a, 2b**). These anomalies almost certainly reflect service pipes, one of which (**2b**) appears to be associated with the former reservoir.

5.20 A high concentration of small strong dipolar magnetic anomalies (**2c**) was detected to the immediate north and east of the ruined tower. These anomalies almost certainly reflect building rubble and debris, as noted on the ground. Within this area a strong rectilinear anomaly corresponds to the foundation for a possible projecting tower in the inner bailey wall, as noted in the HE list entry and on a recent topographic survey.

5.21 Further concentrations of intense anomalies were detected at the south-western corner of this area (**2d**) and to the north of the former reservoir (**2e**). These anomalies are all likely to reflect building rubble and other debris noted on the ground. Similar, smaller clusters of such anomalies were also detected across other parts of the area (**2f**), and are also likely to reflect rubble and bonfire debris, for example.

5.22 A curvilinear arrangement of small dipolar anomalies (**2g**) was detected in the south-east corner of this area. The location of these anomalies corresponds to a small bank noted in the field. An archaeological trench was excavated along the north side of the field boundary here in 1956 (Hildyard 1959), which identified the ruins of a wall set in a ditch and many roof tiles in this approximate location. The remains were interpreted as part of a substantial 16th-century 'Great Barn' shown on an early plan of the site. The strong geomagnetic anomalies would be consistent with fired clay tiles and/or ironstone blocks.

5.23 Several positive magnetic anomalies were also detected across this area. Some of these anomalies are well-defined while others are broad and diffuse. The stronger anomalies here are generally linear and probably reflect soil-filled ditches; those in the north-east (**2h**) and south-east (**2i**) of the area could represent small ditched enclosures. It is possible that the rectilinear ditch in the south-east (**2i**) could be associated with the barn mentioned above, perhaps a ditch or trench for the wall footings or the stone footings themselves, if built with ironstone.

5.24 The rectilinear ditch in the north-east of the field (**2h**) appears to have an internal ditched division. This feature is of unknown date or function, but could possibly be associated with a hollow way recorded by Adams (1990) adjacent to the eastern field boundary.

5.25 There are many other geomagnetic anomalies in the south-east of Area 2 (eg **2j**, **2k**), which could variously reflect ditches, pits, ironstone, fired clay tiles, spoil from earlier excavations, debris from pottery production or even graves. Spoil deposits, kiln debris and inhumations were all encountered in excavations to the immediate south in the 1950s and 1980s (Hildyard 1959; Adams 1990). The presence of hypocaust flue tiles in this general area indicates the likely nearby presence of a Roman building of enough significance to have a hypocaust system, and the graves could be associated with the monastery founded by St Cuthbert in 685. The locations of these buildings are not known, but are likely to be on the eastern part of the hilltop.

5.26 Diffuse positive magnetic anomalies detected elsewhere in this area reflect slight enhancements of soil magnetic susceptibility, often associated with human activity. An oval anomaly north of the former reservoir (**2l**) corresponds to a slight platform noted on the ground and recorded by Adams. This anomaly could reflect occupation debris, such as burnt materials and decomposed organic matter, and supports the suggestion that this was a house platform (para. 3.8, above).

5.27 Other weak anomalies in this area (**2m**) could possibly reflect the remains of earthen banks or the fills of ditches associated with former tracks.

5.28 A linear negative magnetic anomaly aligned north-south (**2n**), north of the former reservoir, probably reflects a drain or service trench.

Area 3

5.29 Several electrical resistance anomalies have been detected to the east of the castle. Rectilinear high resistance anomalies (**3a**) detected immediately south and east of the ruined tower, each 2-3m wide, could reflect footings for further walls, or other concentrations of stone or rubble; some rubble was evident immediately north of the tennis court during survey.

5.30 Similar high resistance anomalies have also been detected beneath the lawn within the driveway (**3b**). The stronger and better defined anomalies here could also possibly reflect wall footings.

5.31 Three small areas of low electrical resistance (**3c**) were detected east of the castle. These anomalies almost certainly indicate patches of damper ground and could reflect the presence of soil-filled features such as pits or possibly former garden features.

Area 4

5.32 A particularly strong dipolar magnetic anomaly (**4a**) was detected in the north-east of this area. The anomaly is rectangular, measuring approximately 6m by 5m, and probably reflects a reinforced concrete slab or similar structure.

5.33 Occasional narrow positive magnetic anomalies (**4b**) detected in this area could reflect narrow soil-filled features such as gullies or land drains.

5.34 A very weak linear negative magnetic anomaly (**4c**) probably reflects a drain or service trench.

6. Conclusions

6.1 Geomagnetic and earth electrical resistance surveys have been undertaken at Crayke Castle, near Easingwold, in North Yorkshire.

6.2 The possible remains of walls have been detected to the east and south of the ruined tower, as well as several areas of probable rubble. Possible pits or former garden features have also been detected in this area.

6.3 A concentration of magnetic anomalies detected to the east of the former reservoir could reflect a range of features, including remains associated with the former 'Great Barn', various ditch features and ferrous/fired materials. These could be associated with Roman or early medieval structures, pottery production or burials, all of which are either known or expected to be present in this general area of the hilltop.

6.4 A probable ditched enclosure and house platform have been detected in the north-eastern part of the site.

6.5 Occasional weak geomagnetic anomalies could possibly reflect the remains of earthen banks or former tracks.

6.6 Several concentrations of strong dipolar magnetic anomalies were detected throughout the geomagnetic surveys. These typically reflect items of near-surface ferrous and/or fired materials, and in this instance probably reflect building rubble and other debris, some associated with bonfires. It is possible that *in situ* remains could be present in these areas, but have not been identified due the presence of so many stronger anomalies.

6.7 Recent features detected during the surveys include two service pipes, possible land drains and a probable concrete slab.

6.8 Further to these geophysical surveys, and at the client's request, ground-penetrating radar surveys may also be undertaken, in order to try to further characterise sub-surface features at the site.

7. Sources

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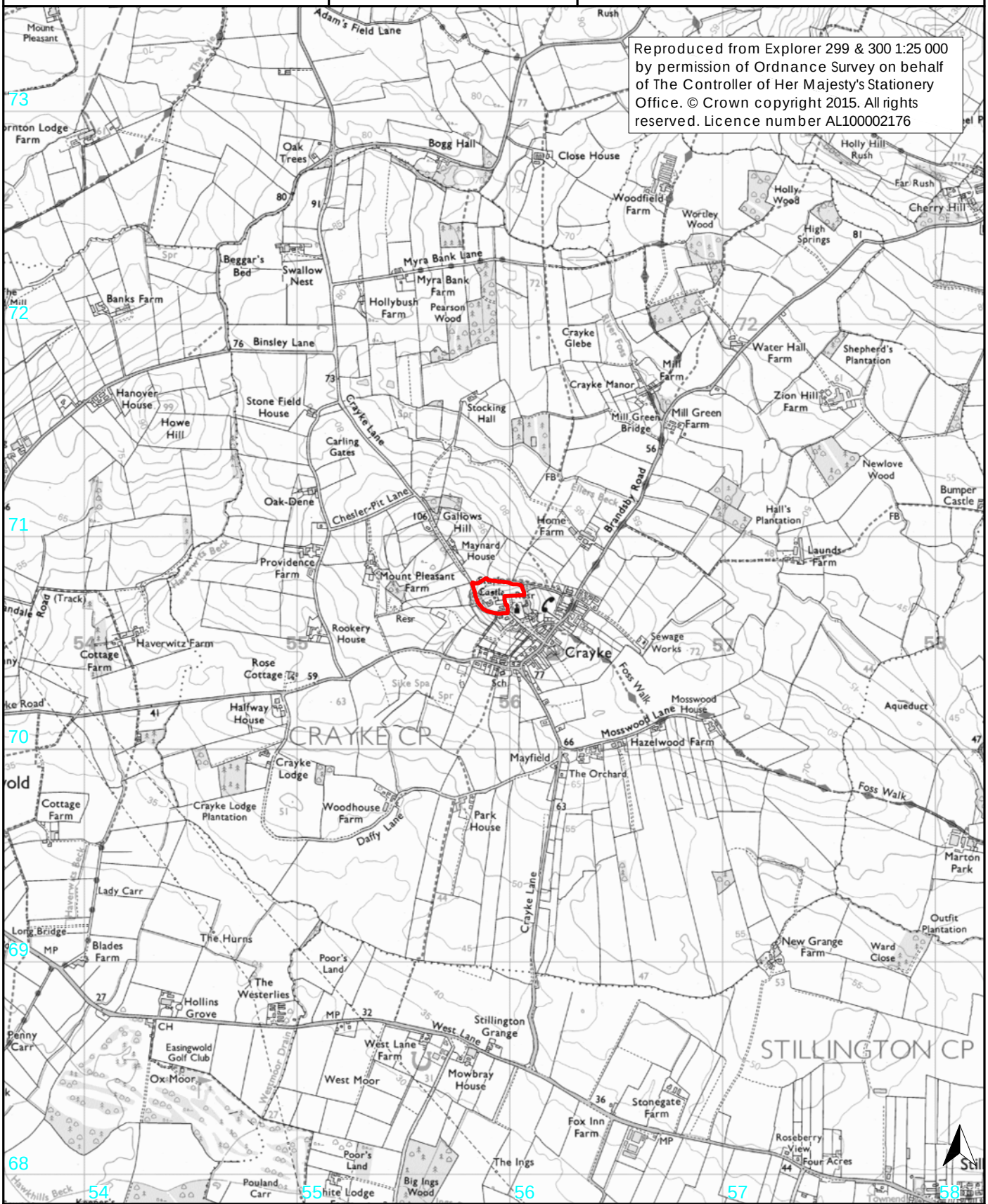
Figure 1: Site location



site location

0 1km
scale 1:25 000 for A4 plot

708

707

706

558

559

560

Area 4

Area 2

Area 1

Area 3

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Figure 2: Geophysical survey overview

0 50m
scale 1:1000 for A3 plot

site boundary

magnetic survey

-6 nT 8

resistance survey

10 ohm 40

708

Area 4

Area 2

Area 1

Area 3

707

559

560

site boundary

magnetic survey

-6 nT 8

resistance survey

10 ohm 40

0 25m

scale 1:500 for A2 plot

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Figure 3: Geophysical surveys

Area 2

28.10nT/cm

Area 3

23.90ohm/cm

Area 4

19.70nT/cm

0 25m

scale 1:500 for A2 plot

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Figure 4: Trace plots of geomagnetic and resistance data

708

707

559

560

Area 1

Area 2

Area 3

Area 4

4a

4b

4c

2a

2b

2c

2d

2e

2f

2g

2h

2i

2j

2k

2l

2m

2n

3a

3b

3c

site boundary

magnetic survey

resistance survey

dipolar magnetic anomaly

positive magnetic anomaly

negative magnetic anomaly

high resistance anomaly

low resistance anomaly

0 25m

scale 1:500 for A2 plot

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Figure 5: Geophysical interpretation

708

707

559

560

Area 1

Area 2

Area 3

Area 4

4a

4b

4c

2a

2b

2c

2d

2e

2f

2g

2h

2i

2j

2k

2l

2m

2n

3a

3b

3c

site boundary

magnetic survey

resistance survey

soil-filled feature

possible soil-filled feature

possible wall footing / rubble

ferrous / fired materials

structural remains

possible drain

service

0 25m

scale 1:500 for A2 plot

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Figure 6: Archaeological interpretation