

ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
Headlands to Headspace
Morecambe Bay Partnership



Cockerham Sands
Cockerham
Lancashire
geophysical surveys

report 4392
February 2017

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1. Summary

The project

- 1.1 This report presents the results of geophysical surveys conducted on land at Bank House Farm, Cockerham Sands, Lancashire, as part of Morecambe Bay Partnership's Headlands to Headspace Landscape Partnership Scheme. The works comprised undertaking archaeological geophysical surveys as a community-based participation and training project. Geomagnetic and earth electrical resistance surveys were undertaken.
- 1.2 The works were commissioned by Morecambe Bay Partnership and conducted by Archaeological Services Durham University.

Results

- 1.3 An intense geomagnetic anomaly detected 40m north of the observation tower almost certainly reflect the remains of a Cold War bunker, probably a Royal Observation Corps nuclear monitoring post built in the late 1950s. These were built to a standard design and located at regular intervals across the country. Archaeological Services have previously found almost identical geomagnetic anomalies over other known monitoring posts, and this one near Cockerham is located centrally between the known bunkers at Heysham, Fleetwood and Forton.
- 1.4 The bunker is not evident in the resistance data due to its depth, though additional geomagnetic and resistance anomalies above and around the bunker almost certainly reflect rubble and disturbance caused by the removal of a protective compacted earth layer over the bunker, and the removal of the access hatch, air vent and instrumentation which would have protruded from the top of the protective mound.
- 1.5 Rectilinear anomalies to the east of the monitoring post could possibly reflect wall footings for another structure, though not necessarily contemporary with the bunker or observation tower.
- 1.6 Occasional linear and discrete anomalies in each area could possibly reflect former ditches and pits.
- 1.7 Former ploughing has been detected across the study area, except in the north-west where the ground is slightly lower and wetter and may never have been ploughed.
- 1.8 Several probable drains were detected, including one which appears to be associated with the observation tower.
- 1.9 Additional training activities for the project included a hands-on ground-penetrating radar demonstration and a geophysical data processing workshop.

2. Project background

Introduction

- 2.1 These archaeological geophysical surveys have been undertaken as a community-based participation and training project, as part of Morecambe Bay Partnership's (MBP) Headland to Headspace Landscape Partnership Scheme, funded by the Heritage Lottery Fund. This project at Cockerham Observation Tower supports the delivery of Headlands to Headspace (H2H) Project 1 (Built Heritage and Lookouts).



The survey area and observation tower at Cockersands

- 2.2 Project 1 (Built Heritage and Lookouts) includes the development and implementation of conservation management plans to secure the long-term management of key built heritage assets within their landscape context. These assets include (i) Second World War Heritage, (ii) Headlands and Lookouts, (iii) Ritual and Religious Sites. Eight key sites were identified during the development stage of H2H to be the focus of this project namely: (i) Walney Island WWI & WWII heritage, (ii) Birkrigg, (iii) Kirkhead Summer House, (iv) Hampsfell Hospice, (v) Jenny Brown's Point, (vi) Warton Crag, (vii) Heysham and Heysham Head and (viii) Cockersands Observation Tower.
- 2.3 Geophysical survey training and participation projects have also been undertaken at Jenny Brown's Point in Lancashire (Archaeological Services 2016) and Kirkhead (Archaeological Services 2017) in Cumbria, to further support the delivery of H2H Project 1 (above) and also Project 17 (Community Archaeology and Training).
- 2.4 The H2H Scheme will raise the profile and appreciation of Morecambe Bay's rich cultural heritage, provide better local protection of aspects of the Bay's built heritage, increase local pride and engender a sense of ownership of lookouts and heritage assets by the local community.
- Location** (Figures 1 & 2)
- 2.5 The present surveys were located next to the observation tower at Bank House Farm, Cockerham Sands, Lancashire (NGR tower: SD 42923 53093). Surveys were conducted in two areas: Area 1 was a small overgrown pasture field, containing the tower, in the south-east of the study area; Area 2 was horse pasture in the north-west of the study area.

Objectives

- 2.6 Headlands to Headspace puts local people at the heart of managing and looking after the heritage assets of the Bay for the long term, especially the very features that local people value most. Headlands to Headspace offers the chance to celebrate and explore what is distinctive about the Bay and make this better connected, more accessible to all, better appreciated and better understood. The scheme helps communities to restore, enhance and celebrate the cultural and natural heritage of Morecambe Bay.
- 2.7 The specific aims of the geophysical survey projects are to:
- promote research, interpretation and capacity building, with community engagement as the primary focus
 - prepare and deliver a high quality training programme to community groups to ensure community participants acquire the necessary skills and knowledge to undertake geophysical surveys and understand the results
 - provide opportunities for community members to undertake geophysical surveys within specified H2H Scheme areas as community participation and training events
 - process all data and assess the nature and extent of any sub-surface features of potential archaeological interest
 - produce comprehensive reports for community benefit and accession to the local Historic Environment Record (HER) and Archaeology Data Service (ADS)
- 2.8 The specific research aims of the present surveys were to assess the nature and extent of any sub-surface features of potential archaeological or historic significance near the observation tower, including other possible Second World War structures.

Research

- 2.9 Research objectives are built into archaeological projects in accordance with the Historic England national policy framework and its objectives, outlined in *Exploring Our Past* (Historic England 1991), *Frameworks for our Past* (Historic England 1996), the *Research Agenda* (Historic England 1997), and the *Policy Statement on implementation* (1999). This project addresses research priorities set out in *The Archaeology of North West England: an archaeological research framework for the North West Region. Volume 2: research agenda and strategy* (Brennand et al. 2007), specifically the following 'Themes and priorities':

- F) Collaboration and Community
- J) Buildings archaeology
- L) Field methods and standards
- Q) Coastal, marine and maritime
- R) Making information Accessible

Methods statement

- 2.10 The surveys have been undertaken in accordance with a brief provided by Morecambe Bay Partnership (Appendix), a Project Design provided by Archaeological Services Durham University, and national standards and guidance (para. 5.1 below).

Dates

- 2.11 The project began with an evening presentation on archaeological geophysics on 25th July 2016. Geophysical surveys were undertaken on 26th and 27th July 2016; ground-penetrating radar was also demonstrated. A data processing workshop was held on 28th July 2016. This report was prepared for February 2017.

Personnel

- 2.12 Fieldwork was conducted by H2H community members: Nic Fogg, Alex Hirst, Cassandra Hall, Andrew Holme, Nidia Lisic, Louise Martin, Samantha Mayoh, Katherine Stronach, Matt Thomas and Susan Weaver.
- 2.13 Participants were trained and supervised by Duncan Hale and Richie Willis (Archaeological Services Durham University). Geophysical data processing was by Duncan Hale. This report was prepared by Duncan Hale (the Project Manager for Archaeological Services), with illustrations by Linda Bosveld and Janine Watson.
- 2.14 Overall project management and coordination was provided by Louise Martin (H2H Cultural Heritage Officer, MBP).



Team photo (courtesy of Louise Martin at MBP)

Acknowledgements

- 2.15 Archaeological Services Durham University and MBP are grateful to the landowner Susan Weaver for facilitating this scheme of works. Thurnam Village Hall is gratefully acknowledged for providing a comfortable base for the training.

Archive/OASIS

- 2.16 The site code is **MBC16**, for **Morecambe Bay Cockerham 2016**. 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 **Online Access to the Index of archaeological investigationS project (OASIS)**. The OASIS ID number for this project is **archaeol3-278122**.

3. Historical and archaeological background

- 3.1 An unimposing brick-built tower at Cockerham Sands is the only remaining structure that bears testament to the former use of this area during the Second World War as a RAF bombing practice range. This observation tower would have been one of a pair of structures associated with mock plane and submarine targets anchored out in the bay which were used for air gunners' practice. This observation tower is the focal point for the present research. Within the bay there were also extensive anti-glider obstacles and bombing range markers. Three anti-aircraft batteries were located in the Heysham area, north of the present site, one of which is recorded as Heavy Anti-Aircraft Battery Heysham H1 and was armed with four 3.7-inch guns.
- 3.2 The following archaeological background information is largely derived from the Pastscape website and the North West Rapid Coastal Zone Assessment (NWRCZA; Johnson 2009).
- 3.3 Evidence for Palaeolithic activity in the wider area, is largely restricted to a few cave sites on the northern fringes of Morecambe Bay. There is good evidence for Mesolithic activity, however, particularly on Heysham Head where a late Mesolithic site was excavated in 1992, recovering over 1100 flint pieces including scrapers, blades and microliths. Other Mesolithic finds include a well-preserved soil horizon with Mesolithic and Neolithic flints at Dalton Square in Lancaster, and flint finds from Heysham Sands, Kents Bank and Aldingham. A pebble macehead was found at Silverdale in 1853 and a net sinker thought to be of Mesolithic date was recovered from Preesal, near Knott End-on-Sea.
- 3.4 A possible Neolithic long barrow is located at Haverbrack and there are a further 17 Neolithic findspots on this stretch of the NWRCZA coastline.
- 3.5 Several Bronze Age monuments are known on the Furness Peninsula, but fewer near the current site. Of probable Bronze Age date is a round barrow at Arnside; although this is not recorded in the Cumbria HER it was recorded by the Arnside/Silverdale AONB Rapid Identification Survey. A second barrow has recently been investigated near Bolton -le-Sands. A total of 20 Bronze Age findspots are located along this stretch of the NWRCZA coastline, comprising bronze and stone weapons, three 'cinerary urns' found in the 19th century and other pottery fragments and flint tools.
- 3.6 There are no recorded Iron Age sites or findspots in this part of the NWRCZA study area.
- 3.7 The most substantial Roman military site in the wider area is the fort, with associated vicus and roads. Other Roman remains, also in Lancaster, include a possible temple and two cemeteries. A total of 95 Roman findspots are located within this part of the NWRCZA study area, most of them in Lancaster. These finds include coins and pottery, as well as eight altars, three statues and an anchor.
- 3.8 There are two very significant early Christian sites adjacent to each other at Heysham: St Patrick's Chapel and St Peter's Church. The former is located on an exposed rock outcrop overlooking Morecambe Bay and comprises an undivided rectangular building, dating to around the 10th century AD, with an associated cemetery featuring rock-cut graves. The adjacent church of St Peter's was also built sometime in the late 8th or early 9th century AD, although much of the visible

structure is Norman or later. Geophysical surveys have recently been undertaken in the southern part of the churchyard as part of ongoing research by the Coastal and Intertidal Zone Archaeological Network (CITiZAN) and the Morecambe Bay Partnership (Archaeological Services forthcoming).

- 3.9 The most significant medieval ecclesiastical site on this section of coastline is Cockersand Abbey, a scheduled monument situated on low-lying land approximately 500m north of the present survey area. Founded as a hermitage around 1180, when Hugh Garthe settled at Cockersand, it was soon transformed into a hospital dedicated to St Mary. By the late 12th century AD it had become a Premonstratensian Abbey and remained so until the Dissolution in 1539. The remains comprise structures and earthworks, the most visible of which are those of the 13th-century chapter house, Listed Grade I, which survives by virtue of being renovated and reused as a family mausoleum from the mid-18th to the mid-19th centuries. Other upstanding fabric includes parts of the nave walls and the north and south transepts of the abbey church, together with various scattered fragments of masonry. The site of the infirmary is represented by isolated fragments of walling. To the south of the cloister the location of the abbey's main drain is visible as a linear hollow running from the infirmary to the sea.
- 3.10 Another medieval religious site in the area was Cockerham Priory. The priory at Cockerham was Augustinian, founded at the start of the 13th century and dissolved by the middle of the 14th century, although no remains of the site have ever been located.
- 3.11 Further medieval sites in the area include Lancaster Castle, which was created at the end of the 11th century AD by Roger de Poitou and replaced an earlier earthwork castle, possibly of Saxon origin, and a leper hospital. Three deserted medieval villages are listed near the study area, at Hillam, Oxcliffe and Heaton, along with a shrunken medieval village at Milnthorpe. Further evidence of medieval activity in the area is demonstrated by fish traps around the fringes of Morecambe Bay; local trap sites include Crook Farm, Cockerham, possibly built for Cockersand Abbey.
- 3.12 Nearby post-medieval remains include halls, farmhouses and barns, such as: the 16th-century halls of Heysham Hall, Parrox Hall and Bare Hall; the farmhouse and barn at Shepherd's Farm, Cockerham; and the farmhouse and barn at Marsh House Farm, Cockerham. At Sunderland Point, at the mouth of the River Lune, is a quay with a stone jetty, warehouses and associated settlement, built in the early 18th century to provide a more convenient port for Lancaster than the quays further up the River Lune.
- 3.13 More recent features are associated with shipping and industry, and include harbours, docks and wharves, jetties, lighthouses, canals and fish weirs, mines and quarries, for example.

4. Landuse, topography and geology

- 4.1 Area 1 was a small overgrown pasture field, which contained the observation tower; farm buildings and a tank bounded the survey area to the east. Area 2 was horse pasture bounded to the east by Bank House Cottage and to the north by a broad shallow drainage channel. The fields were separated by a post and wire electric fence. The study area was bounded to the south and west by a raised bank to protect against high tides.
- 4.2 Both survey areas were predominantly level with a mean elevation of approximately 5m OD. At the time of survey, it was thought that some slight, irregular earthworks in the central-southern part of this area might have been associated with a former pond and spoilheaps.
- 4.3 The underlying solid geology of the area comprises Late Permian-Mid Triassic sandstone of the Sherwood Sandstone Group, here overlain by Quaternary tidal flat deposits of clay and silt.

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 (GPR), 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, it was considered possible that features associated with the observation tower might be present, and that other possibly older features might also be present, possibly associated with the abbey or priory; such features might include ditches, pits, trackways, wall foundations and fired structures (for example kilns and hearths).
- 5.4 Given the anticipated nature and depth of targets, the non-igneous geological environment of the study area, and to broaden the experience for volunteers, two complementary geophysical survey techniques were considered appropriate: geomagnetic and earth electrical resistance.
- 5.5 The selected geomagnetic technique, fluxgate gradiometry, 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.

- 5.6 Given the possible presence of wall footings, hard surfaces and tracks, an electrical resistance survey was also considered appropriate. Earth electrical resistance survey can be particularly useful for mapping stone 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 features will give relatively high resistance values while soil-filled features, which typically retain more moisture, will provide relatively low resistance values.

Field methods

- 5.7 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.
- 5.8 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.



Geomagnetic survey



Geomagnetic survey

- 5.9 Measurements of earth electrical resistance were determined using Geoscan RM15D Advanced resistance meters and MPX15 multiplexers with 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 1ohm, the sample interval was 1m and the traverse interval was 1m, thus providing 400 sample measurements per 20m grid unit.



Earth electrical resistance survey



Earth electrical resistance survey

- 5.10 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

- 5.11 Geoplot v3 software was used to process the geomagnetic and electrical resistance data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images, trace plots, geophysical and archaeological interpretations are presented in Figures 3-9. 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/ohm, as appropriate.
- 5.12 The following basic processing functions have been applied to the geomagnetic data:
- | | |
|---------------------------|---|
| <i>clip</i> | clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic |
| <i>zero mean traverse</i> | 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 |
| <i>de-stagger</i> | corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses |
| <i>interpolate</i> | 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 |

5.13 The following filter has been applied to the geomagnetic data from Area 2:

high pass filter (applied with Gaussian weighting) for preserving high frequency small-scale spatial detail whilst suppressing low frequency large-scale detail such as underlying geological background

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

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

5.15 Colour-coded geomagnetic and resistance interpretations are 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

5.16 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

5.17 A colour-coded archaeological interpretation plan is provided (Figure 9). For ease of reference, anomaly numbers shown bold in the text below (eg **m1**, **r1**, etc) are also shown on the archaeological interpretation plan.

5.18 Large areas of strong dipolar magnetic have been detected in Area 1. Those around the northern and eastern edges of the survey (**m1**) reflect the adjacent buildings, tank and associated ferrous items, whilst the large concentration in the south-west (**m2**) reflects the existing brick-built observation tower. A chain of small strong

anomalies (**m3**) heading south-east from the tower almost certainly reflects a service trench of some kind, perhaps a drain.

- 5.19 A linear arrangement of weaker magnetic anomalies (**m4**) aligned north-west/south-east in the east of the area probably reflects another service trench or drain, which probably continues north through Area 2, adjacent to the western edge of Bank House Cottage garden. This feature has also been detected as an electrical resistance anomaly (**r1**).
- 5.20 Closely-spaced, weak, parallel positive and negative magnetic striations (**m5**) have been detected across parts of both survey areas, aligned broadly east-west; corresponding, weak, high and low resistance striations (**r2**) have also been detected in parts of those areas. These anomalies almost certainly reflect former ploughing of these areas. No similar evidence for former ploughing was detected across the north-western part of Area 2 where the ground is slightly lower and wetter, and may never have been ploughed.
- 5.21 A small group of weak, narrow, linear positive magnetic anomalies (**m6**) was detected in the south of Area 1. These anomalies are oblique to the former plough direction and may reflect soil-filled features, possibly small ditches or gullies. Similar linear and discrete positive magnetic anomalies detected in Area 2 (**m7**) could also reflect soil-filled features such as ditches, headlands and pits.
- 5.22 The most prominent geomagnetic anomaly in Area 2 is a large dipolar anomaly (**m8**) in the east of the survey; this comprises an intense positive anomaly measuring approximately 11m by 4m, which is surrounded by a strong negative 'shadow'. The positive magnetic anomaly almost certainly reflects a buried structure with a lot of ferrous material, in this instance reinforced concrete; the steel re-bars give the anomaly its intensity, though note that the geomagnetic anomaly is almost certainly larger than the actual structure beneath. This structure is almost certainly a 'Cold War' bunker or monitoring post. Geomagnetic surveys over known nuclear monitoring posts at Scarborough and Hartlepool on the east coast have produced almost identical anomalies, in terms of size, shape and intensity (Archaeological Services 2010 & 2014).
- 5.23 Between 1956 and 1960, the Royal Observer Corps (ROC) built over 1,500 monitoring posts throughout the country, to a standard design, in order to report nuclear blasts and monitor fallout (ROC Association website). Almost half of the total number of posts were closed in 1968 during a reorganisation and contraction of the ROC. Several others closed over the next 20 years, largely as a result of structural difficulties, and the remainder were closed in 1991 following the break-up of the Communist Bloc.
- 5.24 As well as the similarity to other known bunker anomalies, the location too is typical of a monitoring post. The underground posts were usually built close to existing overground aircraft observation posts and were located in a network, approximately 7 to 10 miles apart from neighbouring posts. Although the location of this bunker near Cockerham is not shown on ROC plans seen by the author, it is located centrally between known posts at Heysham, Fleetwood and Forton.

- 5.25 The uneven nature of the ground here, with slight mounds and hollows, reflects the disturbed nature of the near-surface above and around the bunker, almost certainly due to the removal of the bunker hatch, air ventilation superstructure and instrumentation, and the removal of the compacted earth mound which would have helped to protect the bunker. A slight hollow originally thought to be a former pond, with adjacent low mounds, corresponds to the location of the bunker and spoilheaps around it.
- 5.26 The bunker structure has not been identified in the resistance data as it is too deep to be detected by the resistance probe configuration used in this instance, which measured to a theoretical depth of 0.75m. The resistance data in the area of the bunker (**r3**) are however characterised by mixed high and low resistance values, typical of disturbed ground, a probable mixture of soil and rubble above and around the bunker location.
- 5.27 High resistance anomalies detected to the east (**r4**) and north-east (**r5**) of the bunker could reflect more substantial rubble deposits and possible structural remains respectively. The anomalies at **r4** may reflect rubble used for hardstanding, possibly related to the construction of the monitoring post. Although partly obscured, the rectilinear high resistance anomalies (**r5**) could reflect wall footings for a structure measuring approximately 5m wide by at least 8m long. The northern and eastern high resistance anomalies/possible wall footings correspond to positive magnetic anomalies (**m8**), which together could be indicative of fired brick, rather than stone or concrete.
- 5.28 A linear low resistance anomaly (**r6**), in the north of the Area 2 resistance data, almost certainly corresponds to a shallow drainage feature noted on the ground.
- 5.29 The small areas of particularly high (**r7**) and low (**r8**) resistance in Area 1 do not have corresponding geomagnetic anomalies, and so are more likely to reflect differential drainage here rather than a rubble deposit and a soil-filled feature respectively. The increased soil moisture at **r8** could be associated with the possible drain **r1**.
- 5.30 Small, discrete dipolar magnetic anomalies have been detected across both survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geomagnetic interpretation plan, however, they have been omitted from the archaeological interpretation plan.

6. Conclusions

- 6.1 Geophysical training and surveys have been undertaken around the observation tower at Bank House Farm, Cockerham Sands, Lancashire, as part of Morecambe Bay Partnership's programme of community participation heritage projects. The surveys were undertaken to help investigate the archaeology and 20th-century military history of the land.
- 6.2 An intense geomagnetic anomaly detected 40m north of the observation tower almost certainly reflect the remains of a Cold War bunker, probably a Royal Observation Corps nuclear monitoring post built in the late 1950s. These were built

to a standard design and located at regular intervals across the country. Archaeological Services have previously found almost identical geomagnetic anomalies over other known monitoring posts, and this one near Cockerham is located centrally between the known bunkers at Heysham, Fleetwood and Forton.

- 6.3 The bunker is not evident in the resistance data due to its depth, though additional geomagnetic and resistance anomalies above and around the bunker almost certainly reflect rubble and disturbance caused by the removal of a protective compacted earth layer over the bunker, and the removal of the access hatch, air vent and instrumentation which would have protruded from the top of the protective mound.
- 6.4 Rectilinear anomalies to the east of the monitoring post could possibly reflect wall footings for another structure, though not necessarily contemporary with the bunker or observation tower.
- 6.5 Occasional linear and discrete anomalies in each area could possibly reflect former ditches and pits.
- 6.6 Former ploughing has been detected across the study area, except in the north-west where the ground is slightly lower and wetter and may never have been ploughed.
- 6.7 Several probable drains were detected, including one which appears to be associated with the observation tower.
- 6.8 Additional training activities for the project included a hands-on ground-penetrating radar demonstration and a geophysical data processing workshop.



GPR demonstration, close to the bunker location



Data processing workshop

7. Sources

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Appendix: Project brief



Contractors brief for delivering geophysical surveys and volunteer participation/training

1. Project Overview

- 1.1. As part of the Heritage Lottery Funded Headland to Headspace Landscape Partnership Scheme, Morecambe Bay Partnership wishes to appoint a contractor to undertake geophysical surveys, including a participation/training project for community participants/volunteers.
- 1.2. This training project will support the delivery of Headlands to Headspace (H2H) Project 1 (Built Heritage and Lookouts) and Project 17 (Community Archaeology and Training). Further information on the Headlands to Headspace Landscape Partnership Scheme and an overview of the projects (including outputs and outcomes) is provided in Appendix 1. This project should follow current Chartered Institute for Archaeologists (CIfA 2014) and Historic England (formally English Heritage; English Heritage 2008) guidance/best practice for undertaking geophysical surveys.

2. Aim

- 2.1. The aim of this work is to:
 - Undertake geophysical surveys within the H2H Scheme area as community participation training events, record data and report results.
- 2.2. Outputs:
 - Develop a training programme to ensure community participants acquire the necessary skills and knowledge to undertake geophysical surveys and understand the results;
 - Provide community participation/training opportunities as part of all surveys undertaken;
 - Process all data and produce comprehensive reports for accession to the local Historic Environment Record and Archaeological Data Service (ADS).

3. Scope of the work

- 3.1. The contractor will work in liaison the H2H Cultural Heritage Office (CHO) to:

- Develop a training programme for small groups (20 people max per group) of community participants/volunteers in the techniques and approaches to geophysical survey;
- Develop a volunteer training pack to include guidance on undertaking geophysical survey;
- Deliver on-site survey of sites (minimum of 4 sites) to include training sessions/workshops for small groups of community participants/volunteers;
- Co-ordinate and monitor data collection by project participants/volunteers;
- Ensure all data is processed and reported and results are accessioned to the Historic Environment Record and Archaeological Data Service (ADS).

4. Project delivery

- 4.1. This project will be developed and delivered from Winter 2015. The training programme/resources will be developed during winter 2015/6 with workshops/survey being delivered throughout 2016-7 (as appropriate).
- 4.2. The minimum number of training sessions and sites to be surveyed is four with a maximum of 10 sites (no greater than 40 hectares per site). It is hoped that at least one training session/survey will be held during the 2016 Festival of Archaeology (16th-31st July) and the contractor should be available to deliver a training session/survey during this time.
- 4.3. The contractor will work in liaison with the H2H Cultural Heritage Office (CHO). The H2H Cultural Heritage Group will provide strategic guidance to the programme. Other members of the H2H team will be involved as appropriate – e.g. volunteer opportunities and recruitment will be overseen by the H2H Community and Training Officer and CHO.
- 4.4. The contractor will be required to quote for:
 - Preliminary site visits (if required);
 - Production of site specific Risk Assessments;
 - Development of volunteer training programme, guide and resources;
 - Provision of survey equipment;
 - Delivery on site survey/ training sessions;
 - Processing and reporting data collected;
 - Accessioning the recording to the Historic Environment Record and ADS.

The planning and delivery of the training sessions will be supported by the CHO.

5. Training content

- 5.1. The training sessions are expected to include an overview of the principals and approaches to geophysical survey, including the techniques used for different sites, establishing site survey grids, processing data sets and reporting/archiving results.
- 5.2. A guide to accompany the training sessions should be developed and be provided to each participant/volunteer. This guide will become copyright of Morecambe Bay Partnership and is to be shared as an online resource and used for future training (if required).

6. Responsibilities of the contractor

6.1. The contractor will be expected to:

- Develop relevant training materials/resources and deliver a quality community training programme to four separate groups (in liaison with the CHO);
- Produce lesson plans for the workshops in liaison with the CHO);
- Obtain landowner (and any other third party) consent for site visits (in liaison with the CHO);
- Produce Risk Assessments for each event/workshop
- Oversee the volunteers and quality/results of their work;
- Produce reports for each site surveyed.

6.2. In addition, consultants should monitor the success of the training sessions on an ongoing basis, and adjust future sessions as necessary to reflect group needs. A final short evaluation of the training sessions should be provided and a photographic record of the sessions should be provided to the client, with permission for the client to use them in digital media and print

6.3. To assist with the tendering process an *indicative* list of sites is shown, including size and current land use. This list is only indicative at this stage and may be subject to change/landowner permission. Tenders should include provision to establish the training programme/guide, a rate per hectare of undertaking site surveys and processing/reporting results for each survey undertaken.

Site	Approximate Survey Area	Current Land Use
Cockerham Sands	Up to 3.2 hectares	Private ownership. Pasture. Currently used for grazing horses
Jenny Browns Point	Up to 1.2 hectares	Land around chimney Private ownership, eroding saltmarsh Land to north of chimney National Trust with tenant farmer. Pasture
Kirkhead	Up 4.8 hectares	Private ownership. Pasture. Currently used for grazing horses
Furness Peninsular/Barrow-in-Furness area (sites to be determined).	Up to 5 sites and c. 100 hectares	TBC

Site	Approximate Survey Area	Current Land Use
Possibly 5 separate sites		

- 6.4. Please note that the above is indicative and tenders submitted should reflect the contractor’s cost for the following elements of the project:
- Fixed price for developing of training workshop/materials;
 - Day rates/price per site for delivering on site survey/training (please indicate what area is anticipated to be surveyed in a day with volunteers and price per hectare);
 - Travel expenses (per mile/day/accommodation);
 - Production of report (maximum/minimum per site);
 - Archiving.
- 6.5. Contractors will be expected to have a robust contingency plan in place to cover accident/illness, will be expected to provide such information to Morecambe Bay Partnership and will be responsible for ensuring a contingency plan is in place throughout the entirety of the project/contract. This plan is to include time/cost of project handover and delivery of sessions at short notice (if required).

7. Health and Safety

- 7.1. The contractor will be responsible for health and safety during all training sessions.
- 7.2. Specific and comprehensive Risk Assessments must be produced prior to the commencement of training and be provided to the CHO.

8. Reporting

- 8.1. The contractor will be expected to produce a report for each site surveyed and should include:
- Introduction/background to the project;
 - Brief historical background to the site;
 - Methodologies employed for data collection;
 - Overview of results of the project (including illustrations/photographs and maps, as appropriate).
- 8.2. Contractors are required to submit draft reports for comments before any report is finalised.
- 8.3. Morecambe Bay Partnership requires 1 hard copy and a digital copy (in MS Word and PDF format) of each final report, which should be fully proof-read. A copy of the report should also be produced and accessioned to the Historic Environment Record and be archived with the ADS. Costs for report production and archiving should be included in the tender.

- 8.4. The client will hold the copyright on the reports produced and its publication (including copyright on the brand and design). Permission will be granted by contractor to disseminate all data collected/produced through digital media (such as websites). Use of any of the information contained within the reports must be appropriately referenced.
- 8.5. Any information supplied by the client to the contractor during the project must be returned no later than one month after the end of the contract period.

9. Insurance

- 9.1. The contractor should hold £2m public liability and £1m professional indemnity insurance. Proof of insurance should be included in the tender submission.

10. Work proposals and deadlines

- 10.1. Interested consultants should submit a work proposal/project design and quotation to arrive by 5pm Friday 27th November 2015.
- 10.2. Submissions should be sent by email to Louise Martin louise@morecambabay.org.uk and to Sophie Cringle h2h@morecambabay.org.uk and will be acknowledged. These should arrive by date shown on the timetable. Late submissions will not be accepted.
- 10.3. The work proposal/project design and quotation should demonstrate the following award criteria:
- Your understanding and summary of the task;
 - How you propose to work with us and help us to achieve the outcomes of the project;
 - Methodologies proposed;
 - A work plan including schedule of tasks and milestones;
 - Expertise in undertaking similar work;
 - Team structure and competencies - lead and contributors;
 - Costs including a breakdown of each consultant's role, day rate, number of days working on the project, purchases, travel costs and other expenses;
 - Value for money;
 - What systems you have in place to ensure that you can meet the deadlines – e.g. who you will collaborate with in case of illness or other delays.
 - CVs (2 pages max) for the consultant(s) who will work on the project;
 - Two referees
- 10.4. The deadline for submission of quotations is 5pm Friday 27th November 2015. Training sessions will be planned during November/December 2015, with delivery timetabled to commence in Spring 2016. A proposed timetable is shown below. Sessions should be held to ensure that a wide variety of audiences are reached.

Deadline for quotation submission	5pm Friday 27 th November 2015
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Production of training resources	Winter 2015
Delivery of Training	2016-2017 (as appropriate to the site/land use)

- 10.5. The successful contractors should initially discuss the scope of the work with the client to agree a detailed timetable for the work.
- 10.6. All work, is required to be accessioned with the Historic Environment Record and ADS within 3 months of the completion of the project.

11. Quotations and Contract

- 11.1. The quotations should include all training materials, transport and subsistence, production of fully illustrated printed and digital reports.
- 11.2. A full contract will be drawn up, following the award of the contract, by Cumbria County Council, which acts as the Lead Body for Morecambe Bay Partnership. By submitting a tender for this contract, contractors are bound to the Standard Terms and Conditions of Cumbria County Council (Appendix 2) and Morecambe Bay Partnership Procurement Policy and Delegated responsibility for financial decisions (Appendix 3). Any queries regarding this contract and the T+C's should be raised prior to submission of a tender. Payment will be made in stages on the satisfactory completion of the set milestones.

12. Project Management

- 12.1. The project will be managed by Morecambe Bay Partnership’s Cultural Heritage Officer.
- 12.2. The contractor will report to the client immediately if there are any un-foreseen delays, which may limit the ability to complete the work to schedule.
- 12.3. Training materials, workshop contents and all events should be discussed with Cultural Heritage Officer before being organised, printed or run.

13. Background and Essential Guidance

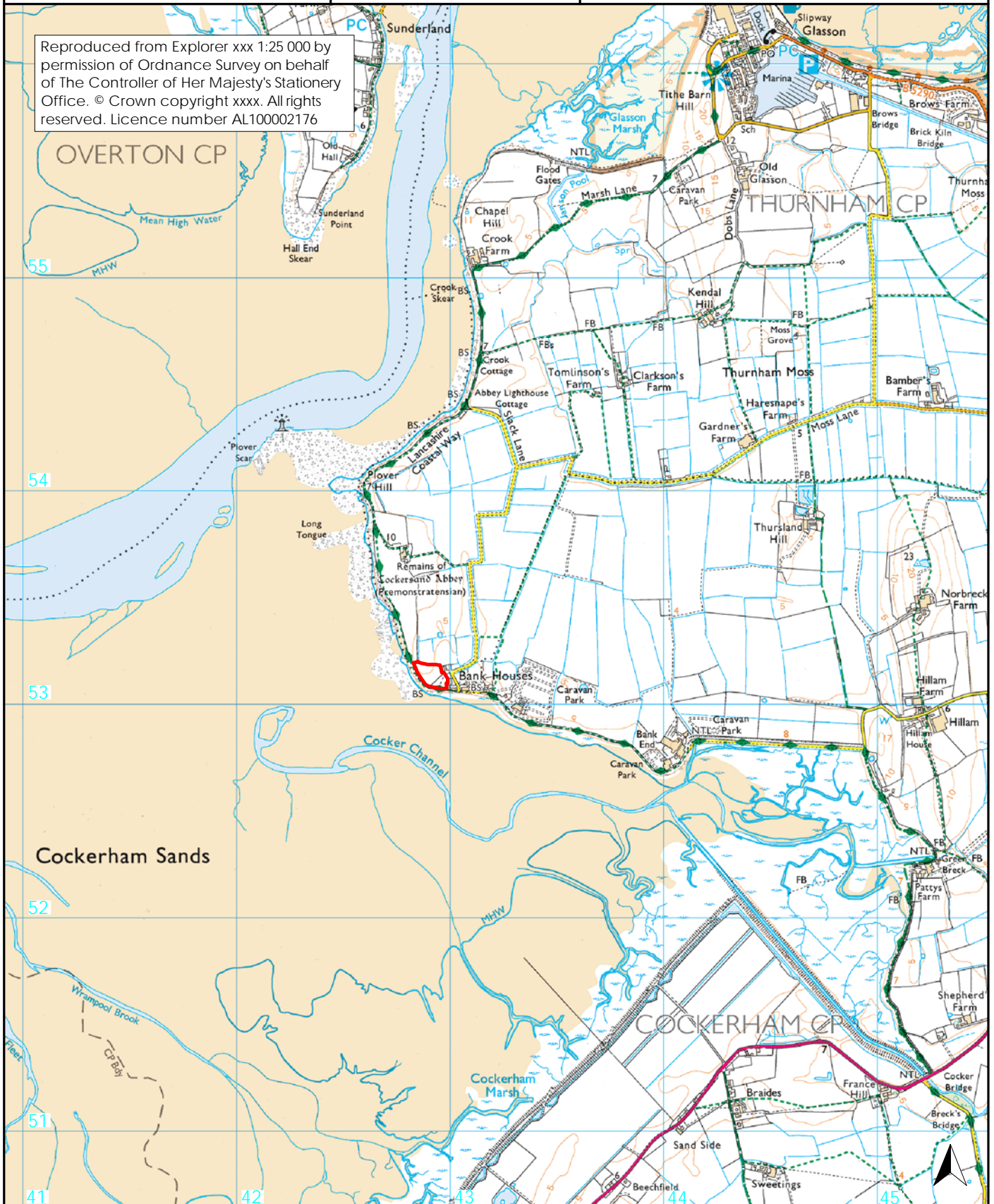
- 13.1. The H2H Landscape Conservation Action Plan (LCAP) will be provided on appointment along with details of the H2H Project area.
- 13.2. The H2H team has access to data and support from their partners. This will be shared when appropriate/possible.
- 13.3. Heritage Lottery issue a number of guidance documents. The consultants are expected to be familiar with and work with these, especially:
- Planning Activities in Heritage Projects
 - Thinking about Audience Development
 - Thinking about Community Participation

14. Contract manager:

- 14.1. The contract manager is Louise Martin, H2H Cultural Heritage Officer. Contact details are Morecambe Bay Partnership, The Factory, Castle Mills, Aynam Road, Kendal, LA9 7DE. louise@morecambebay.org.uk 01539 734888/ 07760 881581

Figure 1: Site location

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 site location

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scale 1:25 000 for A4 plot

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

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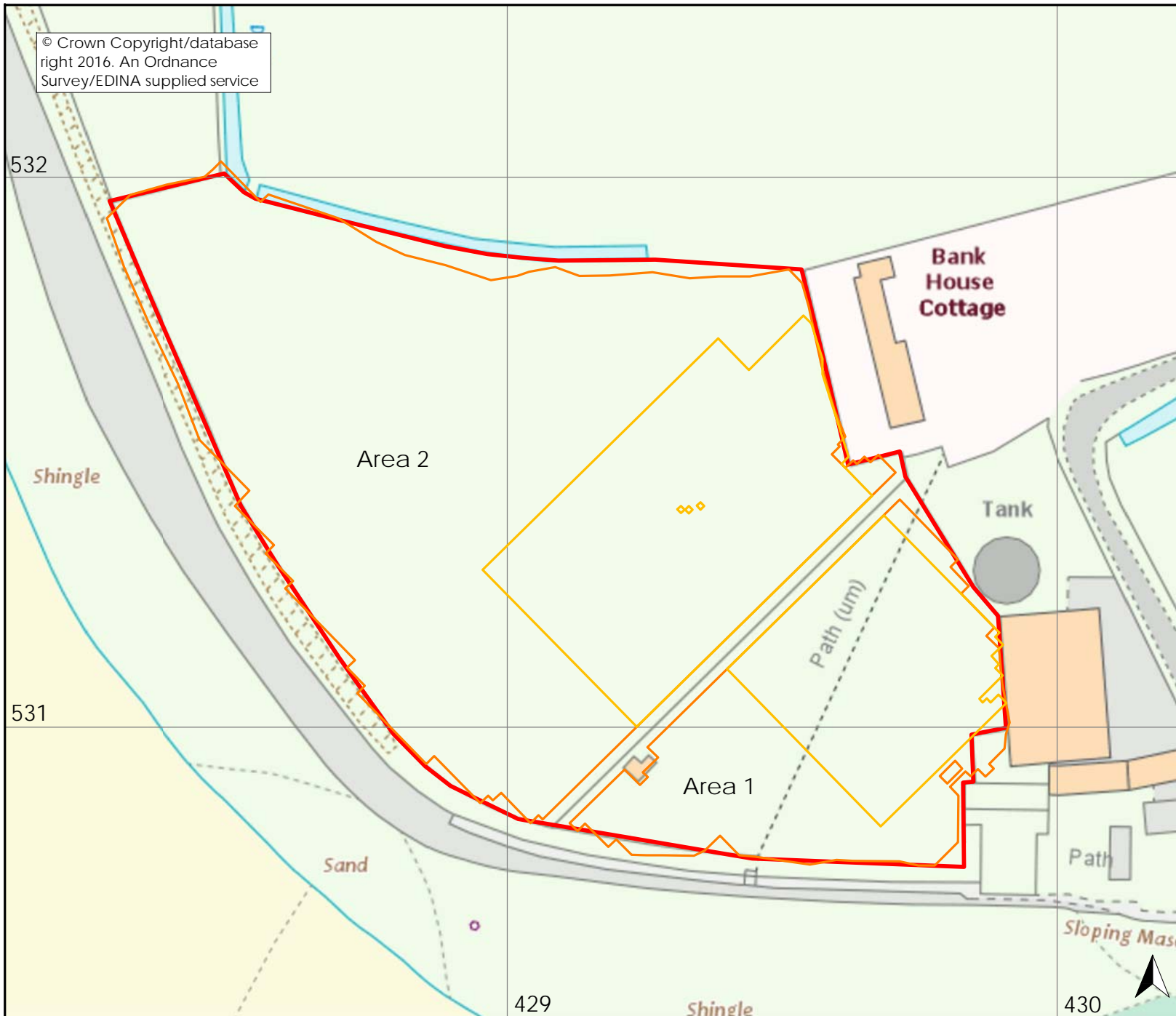
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Lancashire

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Figure 2: Geophysical survey areas

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-  site boundary
-  magnetic survey
-  resistance survey



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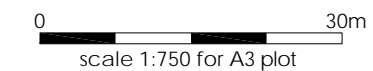
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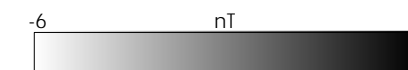
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Figure 3: Geomagnetic survey greyscales



 magnetic survey

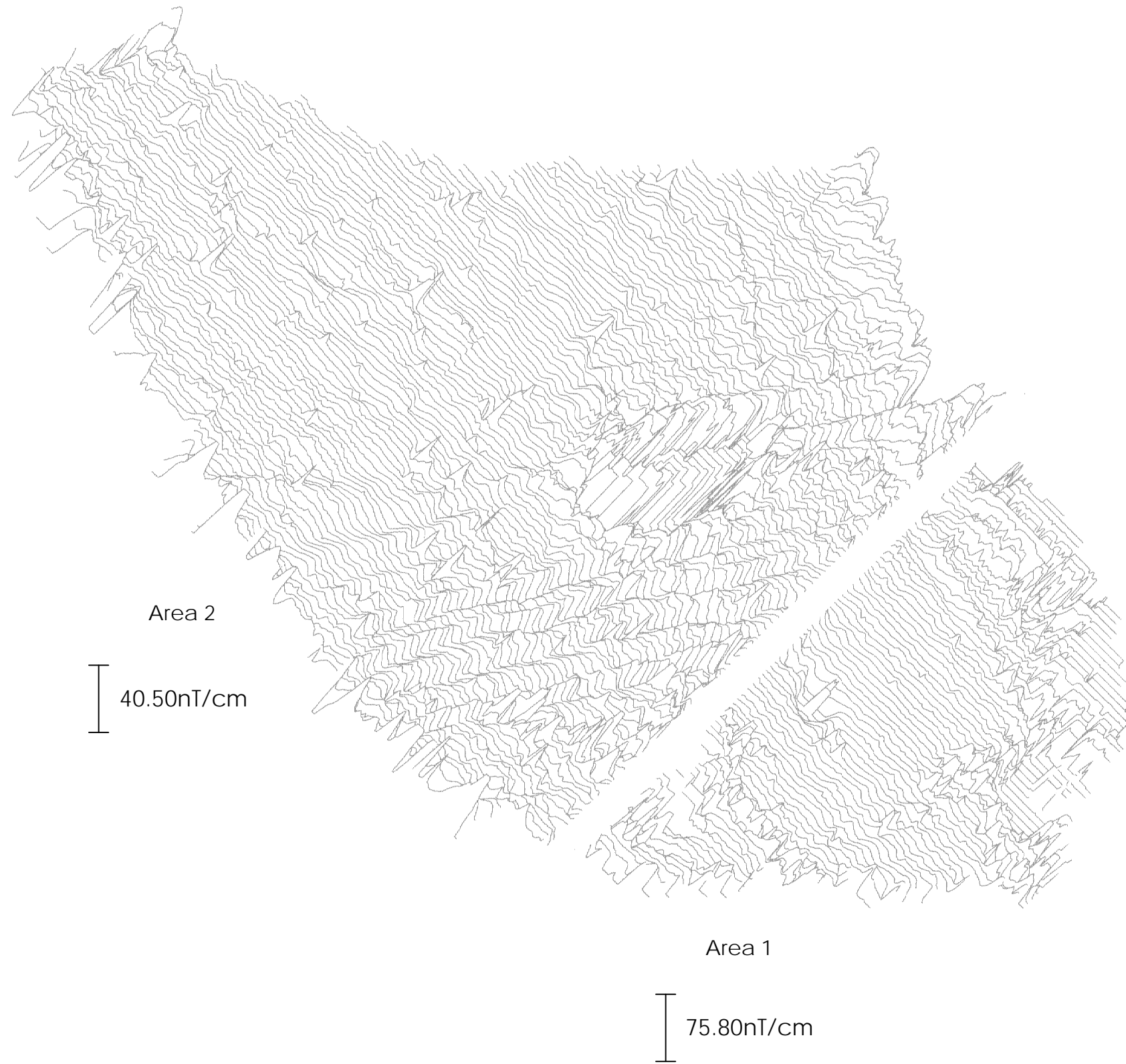
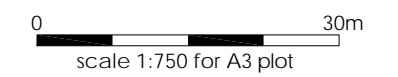


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Figure 4: Geomagnetic survey trace plots



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



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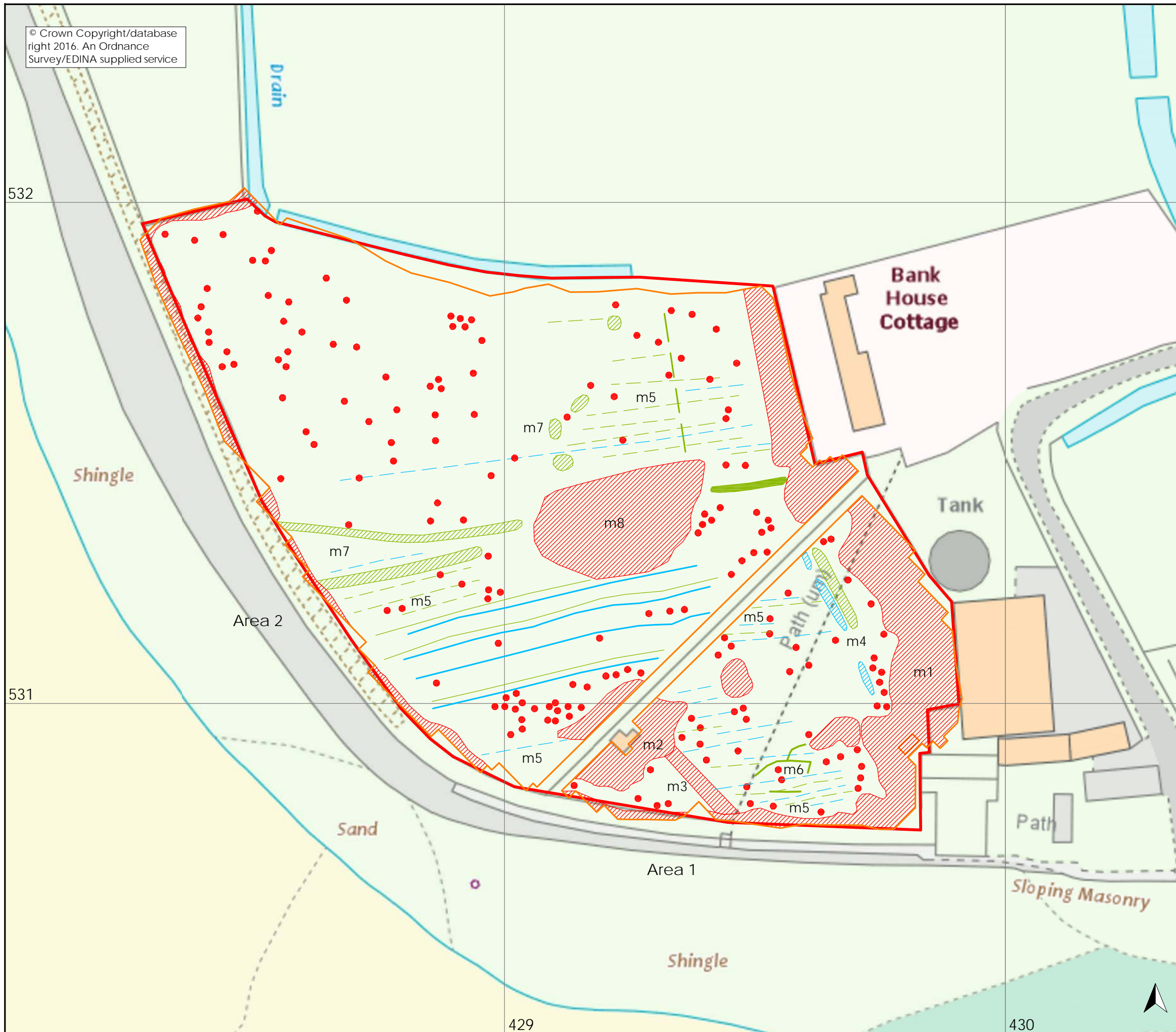
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Figure 5: Geophysical interpretation of geomagnetic data

0 30m
scale 1:750 for A3 plot

-  magnetic survey
-  dipolar magnetic anomaly
-  positive magnetic anomaly
-  negative magnetic anomaly



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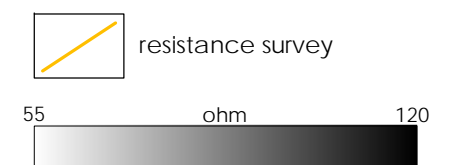
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Figure 6: Resistance survey greyscales

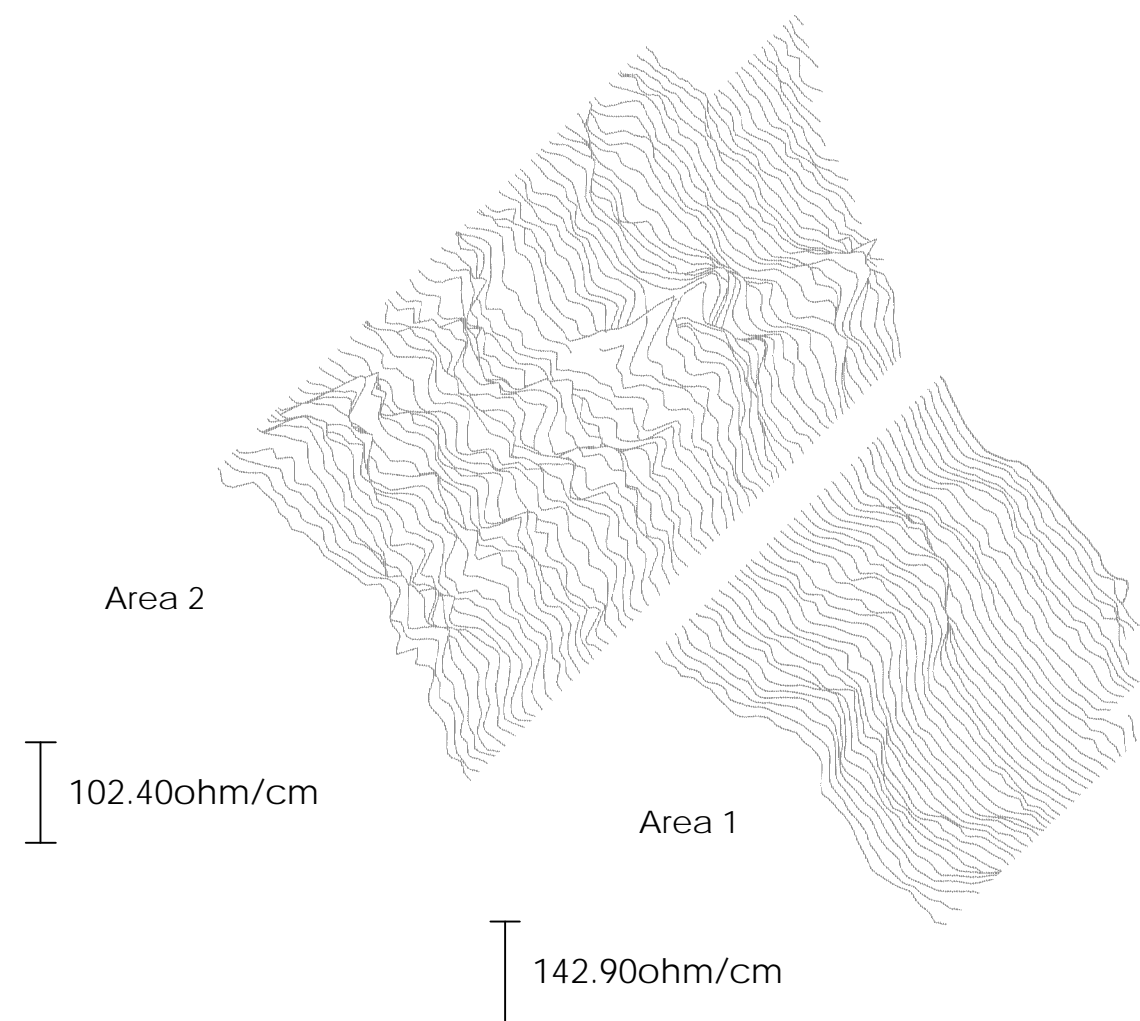
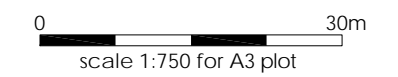


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Figure 7: Resistance survey trace plots





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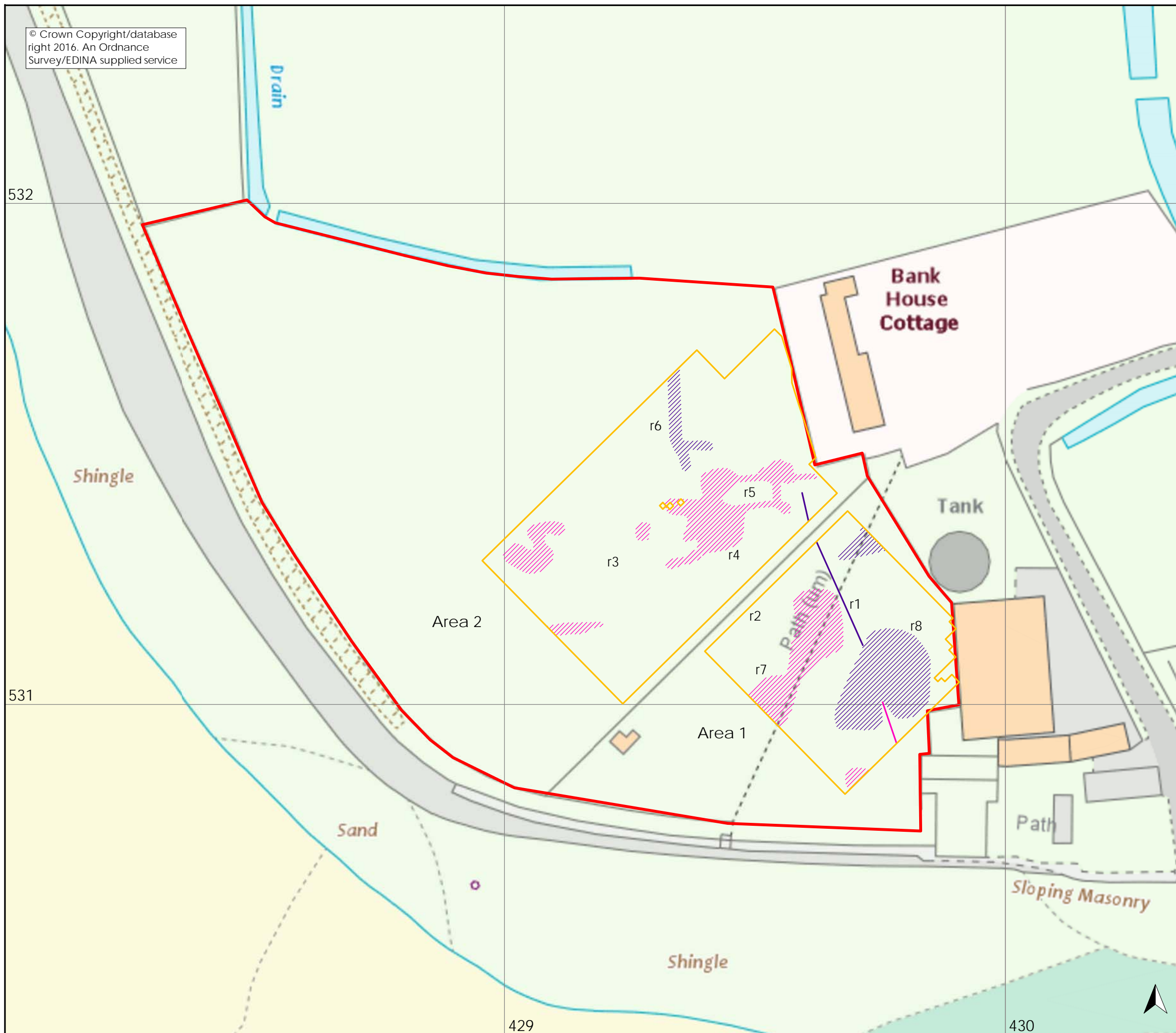
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Figure 8: Geophysical interpretation of resistance data

0 30m
scale 1:750 for A3 plot

-  resistance survey
-  high resistance anomaly
-  low resistance anomaly



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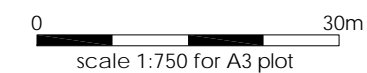
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Figure 9: Archaeological interpretation



- magnetic survey
- resistance survey
- possible soil-filled feature
- possible structural remains
- probable rubble
- probable bunker
- probable drain/service
- former ploughing

