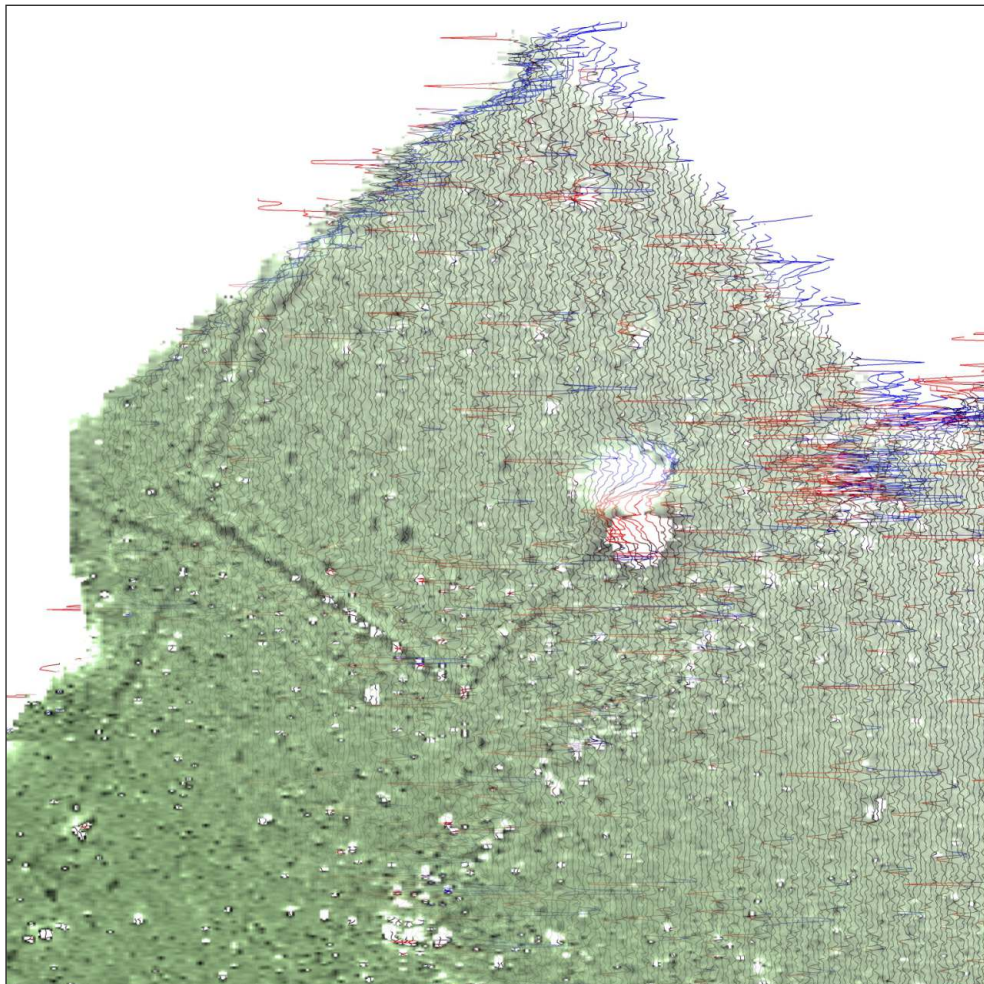




making sense of heritage

Land at Oakley Road Chinnor, Oxfordshire

Detailed Gradiometer Survey Report



Ref: 101660.02
November 2013



**Land at Oakley Road
Chinnor, Oxfordshire**

Detailed Gradiometer Survey Report

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Detailed Gradiometer Survey Report

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Land at Oakley Road Chinnor, Oxfordshire

Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land at Oakley Road, Chinnor, Oxfordshire. The project was commissioned by Terence O'Rourke on behalf of Cemex UK Properties Ltd. with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features on the site ahead of a proposed housing development.

The site comprises one large arable field and a much smaller pasture field located to the south of Chinnor near to Oakley Road (B4009), some 15km SSW of Aylesbury. The site occupies a northwest facing slope in an area of gently undulating land and the gradiometer survey covered 8 hectares and has demonstrated the presence of anomalies of likely, probable and possible archaeological interest within the survey area, along with regions of increased magnetic response and several former field boundaries.

Of primary archaeological interest are the enclosures identified within the northern portion of the larger field, which are clearly defined from the magnetic background. Numerous isolated pit-like and fragmentary linear anomalies can be seen within these enclosures and in close proximity, although the archaeological origin of these anomalies is not conclusive. A further former field at the eastern extent of the survey area is visible through the removal of its boundaries, seen as regions of magnetic disturbance within the dataset.

Other possible former boundaries can be seen, with other isolated anomalies considered to be of possible archaeological interest. Ploughing trends oriented parallel with existing boundaries are visible throughout the dataset, probably associated with modern agricultural activity.

There is a large amount of ferrous debris present in the smaller pasture field which may obscure other archaeological features, although a possible former boundary has been identified crossing the centre of the field. The magnetic disturbance associated with a former railway can be seen bordering the southeastern boundary of the survey area.

The geophysical survey was undertaken between 21st and 29th October 2013.



Land at Oakley Road Chinnor, Oxfordshire

Detailed Gradiometer Survey Report

Acknowledgements

The detailed gradiometer survey was commissioned by Terence O'Rourke on behalf of their client Cemex UK Properties Ltd. The assistance of John Trehay of TOR and Simon Barrett of Cemex is gratefully acknowledged in this regard.

The fieldwork was directed by Jennifer Smith and assisted by Clara Dickinson. Genevieve Shaw processed and interpreted the geophysical data in addition to writing this report. The geophysical work was quality controlled by Ben Urmston. Illustrations were prepared by Kenneth Lymer. The project was managed on behalf of Wessex Archaeology by Caroline Budd.



Land at Oakley Road Chinnor, Oxfordshire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology (WA) was commissioned by Terence O'Rourke on behalf of their client Cemex UK Properties Ltd, hereafter "the client", to carry out a gradiometer survey of land off Oakley Road, Chinnor, Oxfordshire (**Figure 1**), hereafter "the Site", centred on NGR 475175, 200050. The survey forms part of an ongoing programme of archaeological works being undertaken at the pre-application stage of a proposed housing development at the Site.

1.1.2 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology and approved by Oxfordshire County Council in advance of the commencement of the survey (WA 2013).

1.2 Aims and Objectives

1.2.1 The aim of the geophysical survey, as defined by the WSI (WA 2013) was to collect data over the entire proposed development area in order to establish the presence/absence, extent, character and date of any archaeological remains which may be present within the Site. In order to achieve this aim the following objectives were identified:

- To conduct a geophysical survey over the whole development area
- To characterise any archaeological sites identified during the detailed survey
- To prepare a report on the results of the geophysical survey in order to present a comprehensive view of the archaeological potential of the Site and allow an informed decision to be made concerning the Site's archaeological potential.

1.3 The Site

1.3.1 The survey area comprises one large arable field and a much smaller pasture field located to the south of Chinnor near to Oakley Road (B4009), approximately 15km SSW of Aylesbury (Figure 1). The area surveyed occupied 8 hectares of land at the Site.

1.3.2 The Site occupies a northwest facing slope in an area of gently undulating land; the highest part of the Site lies along the southeast edge of the survey area at 130m above Ordnance Datum (aOD) and slopes down to just over 120m aOD at the northwest edge of the Site. The Site is surrounded by arable and pasture farmland divided by field boundaries with wooded areas and to the south of the arable field is a dismantled railway line with a working chalk quarry immediately adjacent. The survey area is bounded to the northwest by the B4009 and housing plots and the other sides are defined by field boundaries.



- 1.3.3 The solid geology on the Site is recorded as chalk (Cretaceous) with upper greensand and gault recorded a short distance to the north (Ordnance Survey 1957). No Quaternary deposits are recorded on the Site although there are deposits of clay with flints to the southeast of Chinnor (Ordnance Survey 1977).
- 1.3.4 The soils underlying most of the Site are likely to be the typical brown calcareous earths of the 511g (Coombe 2) association with grey rendzinas of the 342a (Upton 1) association located to the southeast (Soil Survey of England and Wales 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

1.4 Archaeological background

- 1.4.1 A search for archaeological and historic sites within a 1km radius of the Site via the Heritage Gateway indicates the presence of several sites, predominantly of prehistoric, Romano-British and early medieval date. None of which fall directly within the Site. There were no Scheduled Ancient Monuments within the boundaries of the Site.
- 1.4.2 The Site lies within an area of archaeological potential as it is located on the outskirts of the historic core of Chinnor and lies immediately to the south of Oakley, a hamlet of the main village and parish of Chinnor. Chinnor is a medieval borough mentioned in 1338 (Pastscape 623301) and with the expansion of Chinnor in the 19th and 20th century Oakley is now almost an extension of it.
- 1.4.3 Archaeological sites and artefacts from findspots in the area date from the prehistoric through to the modern period with more significant archaeological evidence dating from the Iron Age to the medieval period. The main features relevant to the archaeological potential of the Site have been summarised and discussed below. The research has been undertaken mainly through online national heritage resources (these are listed in the references).

Prehistoric

- 1.4.4 A series of investigations were undertaken in antiquity which identified the presence of several archaeological sites. A pair of bowl barrows and a single barrow all dating to the Bronze Age period, are situated on the nearby Chinnor Hill up on the ridge to the east of the Site (MOX 312 and MOX 12647 respectively), the barrows are scheduled (SAM 1016067). These barrows are surrounded by partly infilled quarry ditches and a secondary early medieval inhumation was discovered during investigations in 1899.
- 1.4.5 An Iron Age settlement has been identified on Chinnor Hill on the chalk ridge to the east of Chinnor (MOX 5970). Iron Age finds and features were discovered including a hearth, two pits, iron knives, bone knife, awl, comb, needle and ring-headed pins, although no enclosure ditches or bank were found. To the south-east of this site in the quarry further Iron Age features and artefacts were discovered including a bronze swan's neck pin and pits containing animal bones (MOX 5336). The proximity of these Sites and artefacts to the Icknield Way, an upland route still in use but dating from the prehistoric period, concentrates the potential for prehistoric sites to this upland area on the chalk ridge. The survival of archaeological material is possibly greater due to the past land use of the area being predominantly for pasture instead of arable. In addition to the prehistoric sites located on the upland area, prehistoric features and artefacts have also been discovered in Chinnor itself.



- 1.4.6 On land adjacent to 8 Church Road an evaluation revealed a pot sherd dating to the prehistoric period with further sherds of pottery dating to the 2nd-4th century AD and interpreted as Roman wares. Linear features interpreted as a gully and two ditches were recorded and tentatively dated to the prehistoric period as they had no associated artefacts for dating them, see below for further information (MOX 15833).
- 1.4.7 A bronze coin identified as an autonomous coin from the ancient Greek city of Syracuse is dated contemporaneously with the British Iron Age and was recorded as a findspot but its location on the south-west corner of an OS grid suggests that this find has been located to a general area rather than to an actual grid location (Monument No 342615/MOX 2813)

Romano-British

- 1.4.8 At land adjacent to 8 Church Road an evaluation of four trenches revealed a concentration of archaeological features in one of the trenches. Visible were gullies and ditches which may relate to field boundaries but with no other settlement evidence found. Three of the five pieces of pottery found were 2nd-4th century AD Roman wares and one is potentially prehistoric (see above). A watching brief carried out as mitigation following on from the evaluation recorded a small number of archaeological deposits further defining the linear features found previously and interpreted them as boundary ditches. No further artefacts were found however which led to the interpretation that the area is peripheral to any Roman settlement (MOX 15833).
- 1.4.9 A single undated inhumation, with the body orientated ENE – WSW, was found while digging a trench for a land drain (MOX 17413) and it is included here because a single sherd of Romano-British greyware was recovered from unstratified from the trench but it is not specified whether it was from the grave fill. As well as the inhumation a further three features were discovered consisting of two pits and a posthole but no associated dating evidence was uncovered.
- 1.4.10 Romano-British findspots in the area include recorded Romano-British pottery sherds found c. 2.40m down in a quarry face by Dr John Evans in 1920 (MOX 3605) and a Roman copper-alloy harness fitting of 1st-2nd century date (MOX 17424).

Saxon

- 1.4.11 There is a secondary inhumation on the Bronze Age bowl barrows on Chinnor Hill (mentioned above) which included a spearhead amongst the grave goods. A second Anglo-Saxon spearhead was found somewhere on Hempton Farm in Chinnor after being exposed by a landslip (MOX 5781) but the exact location is unknown; this could possibly suggest another burial in this area.

Medieval

- 1.4.12 A 1940s RAF aerial photograph of the Site shows a former field boundary within the larger arable field, it divides the field into two areas and is of a rectilinear shape and is evidence of an intact field boundary that survived until relatively recently (<http://www.centremapslive.co.uk/page/crworld>). When the aerial photograph is compared with earlier Ordnance Survey maps the field boundary is also present (Ordnance Survey 1883-1885). This field boundary can be traced back even earlier again to a pre-inclosure map with the field boundary still recorded at this location (<http://www.british-history.ac.uk/image.aspx?compid=63816&filename=fig3.gif&pubid=544>). The pre-inclosure map shows the hamlet of Oakley separated from the village of Chinnor by open fields, with the inference of it being an open medieval field system, with the conjectural



boundary of the open fields of Chinnor in the same location as the field boundary seen on the earliest available OS map (Ordnance Survey 1883-85) and on the 1940s RAF aerial photograph (<http://www.centremapslive.co.uk/page/crworld>). Furthermore, on the pre-inclosure map this field boundary is also interpreted as bounding an area of “*ancient enclosure*” with the area within which the Site is located named as Menley Closes. Therefore the earliest evidence for this field boundary dates to a tithe award map from 1841 (<http://www.british-history.ac.uk/report.aspx?compid=63816>).

- 1.4.13 Although the arrangement of the conjectural open fields in the pre-inclosure map is qualified as not being based on any medieval evidence it is based on later field names and a study of the tithe award map (1841), the inclosure award map (1854) of the parish of Chinnor and land leases in the Oxfordshire Record Office (The Victoria County History of Oxfordshire). From these it is suggested that the closes on the western boundary of Oakley called Menley and listed as an ancient enclosure in the award of 1854 may also date to the medieval period or even earlier, when several areas of land in this parish are recorded as having been enclosed in the 15th century. Menley was the name of a family which flourished in this area in the 13th century. This field boundary could potentially therefore date to the early medieval period. The railway (now dismantled) cut through this enclosed area but it remained intact until the cement works and quarry, established in the early 20th century (MOX 4445), removed the southern half of the enclosed area and took out these potential medieval field boundaries.
- 1.4.14 Within the enclosed area on the pre-inclosure map and to the south of Oakley Road are further smaller fields all with their boundaries aligned north-east to south-west except one field which is on a different alignment and of an irregular shape. At the available resolution of the map it is difficult to distinguish the location of this irregularly aligned enclosure but it does lie within the Site. A proposed date or origin for this field boundary is not given.
- 1.4.15 The area of the second, smaller, pasture field is shown on the Ordnance Survey Map of 1883-85 as an enclosed area of trees, possibly suggested as an orchard or wooded area. To the north of the Site is Oakley Road and there are several farmsteads or properties shown on the OS maps clustered at the centre of Oakley to the north of the Site along Oakley Road (Ordnance Survey 1883-1885).
- 1.4.16 Oakley Stores on Oakley Road immediately to the north of the Site had a find of a rubbish pit dated by a medieval pottery sherd found in the inspection pit of the garage and discovered 0.6m below the level of the modern garage floor, it is identified as pieces of a cooking pot and pitcher dating to the 12th-13th century (MOX 12103).
- 1.4.17 Within the historic core of Chinnor is St Andrew’s Church, the earlier of the two churches in the village, founded in the early 13th century and later restored in the mid-19th century. The earliest surviving features of the medieval church are the nave, aisles, tower with a later 14th century extension of the aisles and the addition of a porch and windows (MOX 5891). A drainage trench was dug in March 1987 running due south from the south east angle of the south aisle for about 3m. At the end of the soakaway, which measured 1m east-west by 1.5m north-south, it was dug to a depth of 1.6m and the stratigraphy was recorded as humic soils between the ground level and 1.1m and then natural chalk at a depth of 1.1m to the base of the soakaway. No archaeological material was found but it does give an indication of the depth of soil to the chalk in this area.

Post-medieval

- 1.4.18 The post-medieval period in Chinnor could be considered one of expansion with the opening of cement and lime works (MOX 4445), the foundation of a new church of St



Mary (MOX 4017) and the opening of Chinnor railway station. The Watlington and Princes Risborough branch line is situated to the south east of the Site and the disused railway borders the Site to the south (MOX 8782). Remains include rails, some sleepers and numerous tracks, some complete.

- 1.4.19 Undated sites in the area include three separate inhumations. The first inhumation, discovered in 1928 during the digging of a gatepost and under a layer of flints, had an urn associated with it now lost and with no further details available (Mon No. 342654/HER 17287); the second undated inhumation was discovered during building works in the centre of Chinnor in 1924 and was described as a crouched burial with no associated finds (MOX 17286); whilst the third was discovered at Chinnor Cement works. It is inferred as prehistoric presumably from its location up on the higher ground of the chalk downs and near the route of the Icknield Way (Mon No. 917552/MOX 10589). The remains, found in 1974, are of a fragmentary and incomplete nature and have been identified as a male of 45+ years of age.
- 1.4.20 Lastly, an undated trackway or holloway is reported to branch off the Icknield Way and climbs obliquely up the face of Oakley Hill, it is partly visible as a cropmark and partly as a Holloway, and it is possibly medieval in origin (MOX 12768).

2 METHODOLOGY

2.1 Introduction

- 2.1.1 The detailed magnetometer survey was conducted using a Bartington Grad601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (2008) and the WSI (WA 2013).
- 2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between 21st and 29th October 2013.

2.2 Method

- 2.2.1 Individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (2008).
- 2.2.2 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (2008). Data were collected in the zigzag method.
- 2.2.3 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse function (± 15 nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey areas, with no interpolation applied.
- 2.2.4 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.



3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

- 3.1.1 The gradiometer survey has been successful in identifying anomalies of likely, probable and possible archaeological interest across the Site, along with former field boundaries and a disused and dismantled railway. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1,500 (**Figures 2 to 3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ± 25 nT at 25nT per cm for the XY trace plots.
- 3.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 4**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 3.1.3 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

3.2 Detailed Survey Results and Interpretation

- 3.2.1 Within the small field at the northwestern extent of the survey area, a linear band of anomalies **4000** lies at the centre of the survey area. Oriented NE-SW, it is possible that it represents the fragmentary remnants of a ditch or field boundary; it is parallel with the southern and northern boundaries, lending credence to this interpretation. Elsewhere, the magnetic background is disturbed by frequent ferrous debris, particularly to the north and west, which is probably modern in origin.
- 3.2.2 The greatest concentration of anomalies of archaeological interest within the survey area is located towards the north of the survey area in the arable field with a series of linear and rectilinear ditch-like anomalies interpreted overall as two separate large features, these are anomalies **4001 to 4003** and **4004 to 4008**. They are intermittent but discrete linear positive anomalies and they are considered to represent ditches possibly forming a former field boundary and an enclosure respectively.
- 3.2.3 At **4001** the positive linear anomaly is intermittent and weak suggesting it could be less well preserved and has been defined as probable archaeology; a weakly negative linear trend parallel to the negative cut feature could be in response to traces of a bank and therefore part of the same overall feature, and it is possible that an area of increased magnetic response masks its western extents. Intermittent pit-like responses at **4002** may indicate poor survival below ground, although it is considered likely that these anomalies form a continuous feature.
- 3.2.4 At **4003** there are two shorter linear sections of positive anomalies perpendicular to each other with a break at the corner. This gap could be an entrance way but as mentioned previously the linear anomalies are intermittent therefore this could be equally from differing survival of sections of the ditch. Anomalies **4001 to 4003** together make an overall rectilinear but irregularly proportioned enclosure. This enclosure is visible on a compiled map based on a tithe award map from 1841 (<http://www.british-history.ac.uk/image.aspx?compid=63816&filename=fig3.gif&pubid=544>).
- 3.2.5 Within and outwith the enclosure **4001 to 4003** are numerous small to medium sub-circular pit-like anomalies of varying sizes with several approaching oval to irregular in their shape. There is not any discernible distribution pattern to these anomalies but the larger ones seem to be concentrated outside of the enclosure to the south of **4001** and



around **4002**. These have been identified as possible and probable archaeology and are possibly smaller cut features such as pits and post-holes.

- 3.2.6 A series of interconnecting positive linear anomalies around **4004** to **4008** are interpreted as ditches and their overall shape suggests an enclosure of rectangular shape with a 'corridor' at either end, probably for the movement and organisation of livestock. The linear positive anomalies are intermittent with numerous segments apparently missing or not visible in the geophysical data. This variation is possibly a reflection of their state of preservation as some ditches are interrupted, e.g. at **4006** and at **4008** where there is a pylon base. At **4004** there is a break in the inner and outer sections of the enclosure and this could possibly represent an entrance. This enclosure is not recorded on available Ordnance Survey maps or aerial photographs.
- 3.2.7 Outside of the enclosure at **4006** is a larger positive approximately circular anomaly which has been interpreted as archaeology, there is a ferrous anomaly immediately adjacent which could possibly be associated and therefore archaeological or could be modern ferrous debris in the ploughsoil. Around **4006** and within the enclosure are further numerous sub-circular and sub oval positive anomalies with one irregular shaped positive anomaly identified as probable between **4006** and **4008**. They vary in strength and size and there is no pattern to their spatial distribution; the majority are interpreted as possible archaeology with some identified as probable. They are likely to represent pits, postholes or the weaker, more irregular and ephemeral ones possibly tree throws or natural hollows.
- 3.2.8 At **4009** to **4013** area discrete linear sections of concentrations of dipolar and bipolar responses. They form an L-shaped feature probably a field boundary and have been interpreted as areas of increased magnetic response and are possibly walls made of burnt or fired debris. This field boundary is visible on previous OS maps (Ordnance Survey 1883-1885) and on a 1940s RAF aerial photograph (<http://www.centremapslive.co.uk/page/crworld>). The location of this field boundary is also present on an earlier tithe map and there is the possibility that it is medieval or even early medieval in origin and in use until relatively recently.
- 3.2.9 Near the southernmost extent of the survey area, interrupted linear anomaly **4014** is oriented NE-SW, approximately parallel with the nearby boundary. Whilst it exhibits only weak contrast with the magnetic background, it is considered likely that this represents a former field division or boundary.
- 3.2.10 To the west of the field boundary there is an irregular shaped positive anomaly at **4015** identified as probable archaeology, the only such anomaly in this part of the Site, and there are numerous small circular positive anomalies spread across this area with no significant patterning or distribution, they have been interpreted as possible archaeology. There are numerous ploughing trends in the area with only one probable anomaly therefore this could be an indicator of the level of survival of such features.
- 3.2.11 The smaller pasture field has a large and dense concentration of bipolar and dipolar responses and this is interpreted as being a spread of dumped material probably containing ferrous and fired material. There is however a short section of intermittent linear bipolar anomalies which has been interpreted as possibly archaeological due to its shape. There are further several sub circular and sub oval shaped positive anomalies in and among the ferrous debris across the Site and these are possibly archaeology. Weaker and more ephemeral anomalies will have been masked by the stronger responses of the ferrous and burnt/fired debris however they might be visible as trends in the data and several have been identified. The trends are linear and curvilinear and while



the majority are positive magnetic anomalies there are a few negative trends. They do not constitute a recognisable feature but are likely to be very small and ephemeral features.

- 3.2.12 There are several concentrated spreads of bipolar and dipolar responses, e.g. west of **4001** and northeast of **4009**. These spreads are often located close to field edges and are considered to be spreads of modern debris including metallic and ceramic debris. It is possible, albeit unlikely, that these spreads may prove to be archaeological in origin.
- 3.2.13 There are numerous linear and curvilinear trends visible in the geophysical data, most of which are associated with ploughing such as those around **4003**, **4007** and **4015** but some others may prove to be archaeological. The trends considered to be of greater interest include curving trends such as those around **4006** and north of **4001** and **4002**; it is unclear what features these anomalies could correspond to but they are likely to be very small and ephemeral features.
- 3.2.14 There are two main areas that contain ploughing trends; within **4008** to **4014**, where they are oriented northeast to southwest and respect the field boundary seen in the geophysical data; across the northern half of the arable field across **4001** to **4008** and a small area to the south of **4003**, where they are oriented approximately north to south. Although it is difficult to determine the phasing, it is likely that the visible ploughing trends relate to later agricultural activity than the anomalies they cross.
- 3.2.15 A disused and dismantled railway is present as a broad ferrous spread along the southeast to southwest border of the Site such as south of **4014**; this feature is not classed as archaeology simply as the identity of the feature is already known. This broad ferrous response will mask any archaeology that may lie underneath.

3.3 Gradiometer Survey Results and Interpretation: Modern Services

- 3.3.1 There are no modern services located in the data although there is a pylon base visible as a ferrous anomaly at **4008**. Along the south east to southwest boundary of the survey is an area of increased magnetic response which is attributed to the dismantled railway marked on the OS map. Gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.



4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of definite, probable and possible archaeological interest within the Site, in addition to regions of increased magnetic response and a former field boundary.
- 4.1.2 The two enclosures are of very different morphology and therefore potentially purpose but their layouts and locations do respect each other and could therefore be contemporary in use although their date is uncertain. These enclosures are also paralleled by the L-shaped area of increased magnetic response identified as a field boundary in use until relatively recently. Although the field boundary has not been defined as archaeology, due to the response suggesting it is possibly constructed of ferrous and burnt/fired debris and therefore possibly modern, it does demarcate a line of boundary that is potentially much older. The enclosure **4001** to **4003** and the location of the field boundary **4009** to **4014** are both marked on a tithe award map from 1841 but studies of this information and from field names has suggested that these features are potentially medieval, or even early medieval, in origin.
- 4.1.3 The field boundary is suggested as demarcating land enclosed in the 15th century (<http://www.british-history.ac.uk/report.aspx?compid=63816>) while the much smaller irregular shaped enclosure lies within this area to the south of the hamlet of Oakley. The enclosure **4004** to **4008** is not shown on any of these maps but it is possibly contemporary with the other two features as it lies between them and none of the ditches crosses each other. If these enclosures and the field boundary are medieval in origin then this provides important evidence for the organisation of land in the parish in this period, as previously the evidence has relied on historical documents and the study of place names. However, the field boundary to the south of the railway has already been removed by the opening of the cement and quarry works in the early 20th century and by the building of the railway line while the field boundary visible in the survey was removed after the aerial photograph was taken in the 1940s.
- 4.1.4 The numerous small positive anomalies identified across the northern area of the arable field are more difficult to ascribe importance to as they do not form a significant patterning or cluster to suggest concentrated areas of activity or settlement and do not respect the enclosures or field boundary but are present across the Site. There is evidence of pits, postholes and gullies excavated that date from the prehistoric period to the medieval as well as several inhumations in the area of Chinnor therefore some of the stronger positive anomalies such as **4006** and **4015** could potentially be archaeological features such as these. Weaker and more ephemeral anomalies ascribed as possible archaeology could also be natural feature such as tree throws.
- 4.1.5 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. It is also the case that strongly magnetised regions, such as certain geological formations, can mask weaker archaeological features. This is possible towards in the pasture field of the Site where a large spread of ferrous anomalies coincides with the area with fewest archaeological remains. There may be more archaeological features on site than were detected in this geophysical data.



5 ARCHIVE

- 5.1.1 Once approved, a .pdf copy and two hard copies of this report will be issued to the Client, if required. A copy of the finalised report in both digital and hard copy will also be submitted to the Oxfordshire HER.
- 5.1.2 Details of the Site will be submitted online to the OASIS (Online Access to the Index of Archaeological Investigations) database upon submission of a planning application.



6 REFERENCES

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Wycombe RAF 1940s <http://www.centremapslive.co.uk/page/crworld> ; Aerial Photograph at 100cm resolution.

<http://www.british-history.ac.uk/image.aspx?compid=63816&filename=fig3.gif&pubid=544>

<http://www.heritagegateway.org.uk>

Lobel, M.D. 1964 (ed.) *Victoria County History: Oxfordshire* accessed online

<http://www.british-history.ac.uk/report.aspx?compid=63816>

Pre-inclosure map of Chinnor based on the tithe award map (1841), the inclosure award map (1854), and land leases in the Oxfordshire Record Office: <http://www.british-history.ac.uk/image.aspx?compid=63816&filename=fig3.gif&pubid=544>



APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey Methods and Equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03nT over a ± 100 nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by English Heritage (2008) for geophysical surveys.

Scanning surveys consist of recording data at 0.25m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH, 2008).

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.



Post-Processing

The magnetic data collected during the detail survey are downloaded from the Bartington system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

Typical data and image processing steps may include:

- Destripe – Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;
- Destagger – Shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Despike – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.



APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into two main categories: archaeological and unidentified responses.

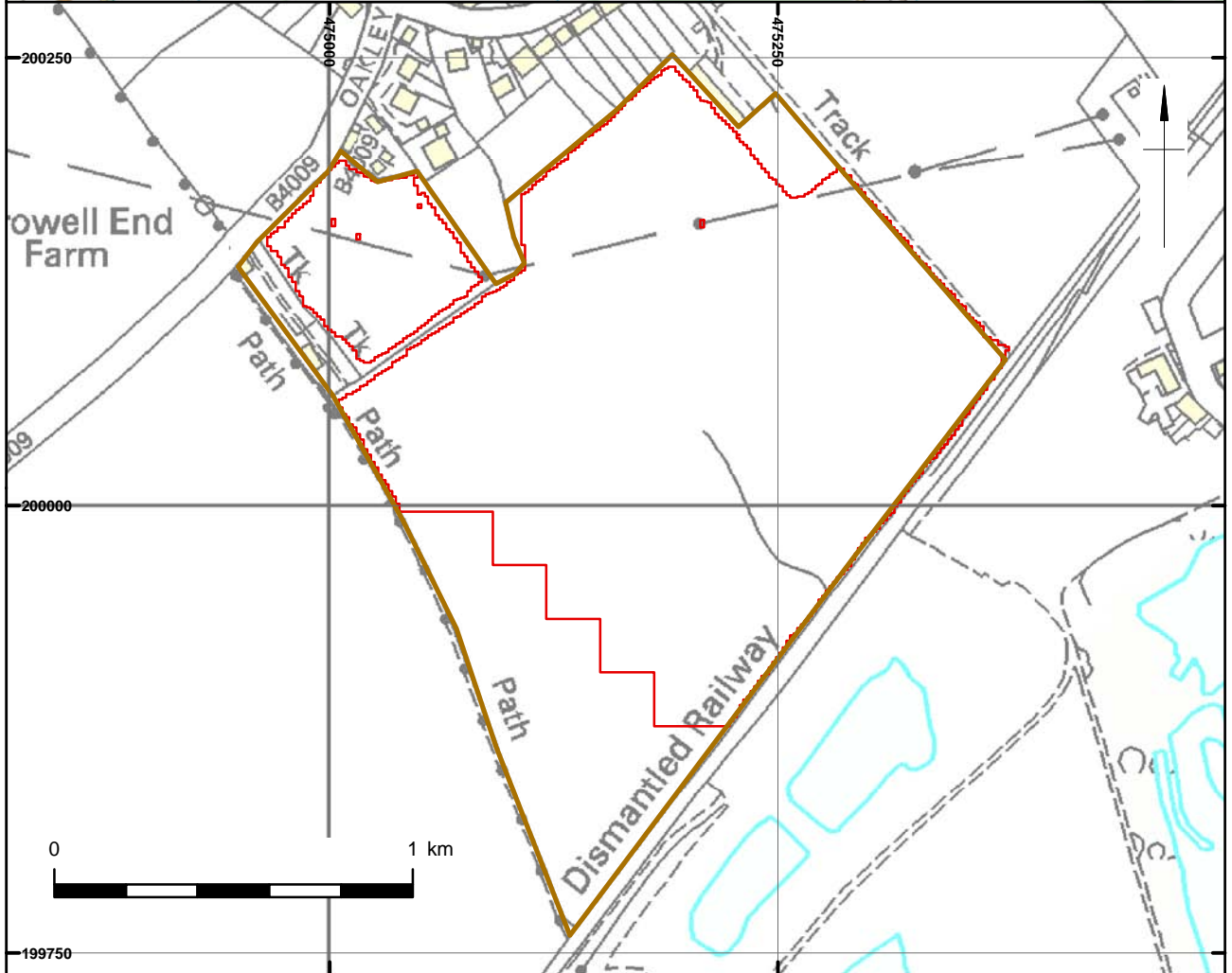
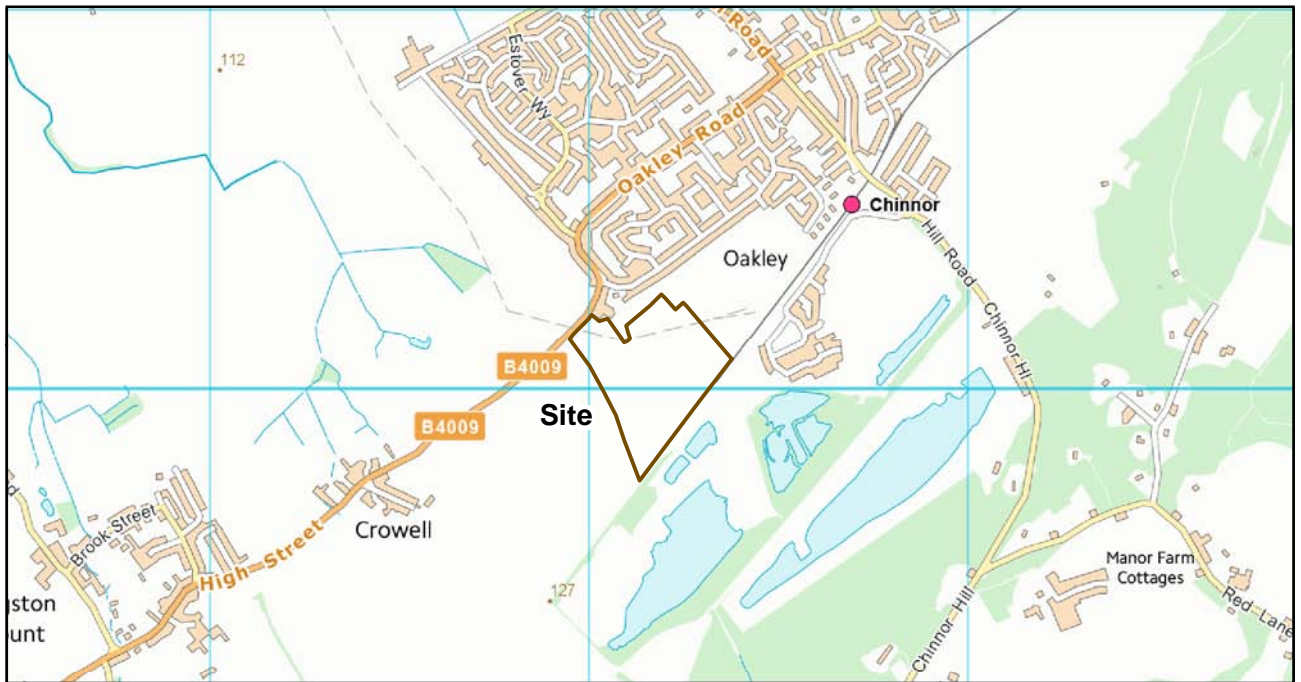
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

The unidentified category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

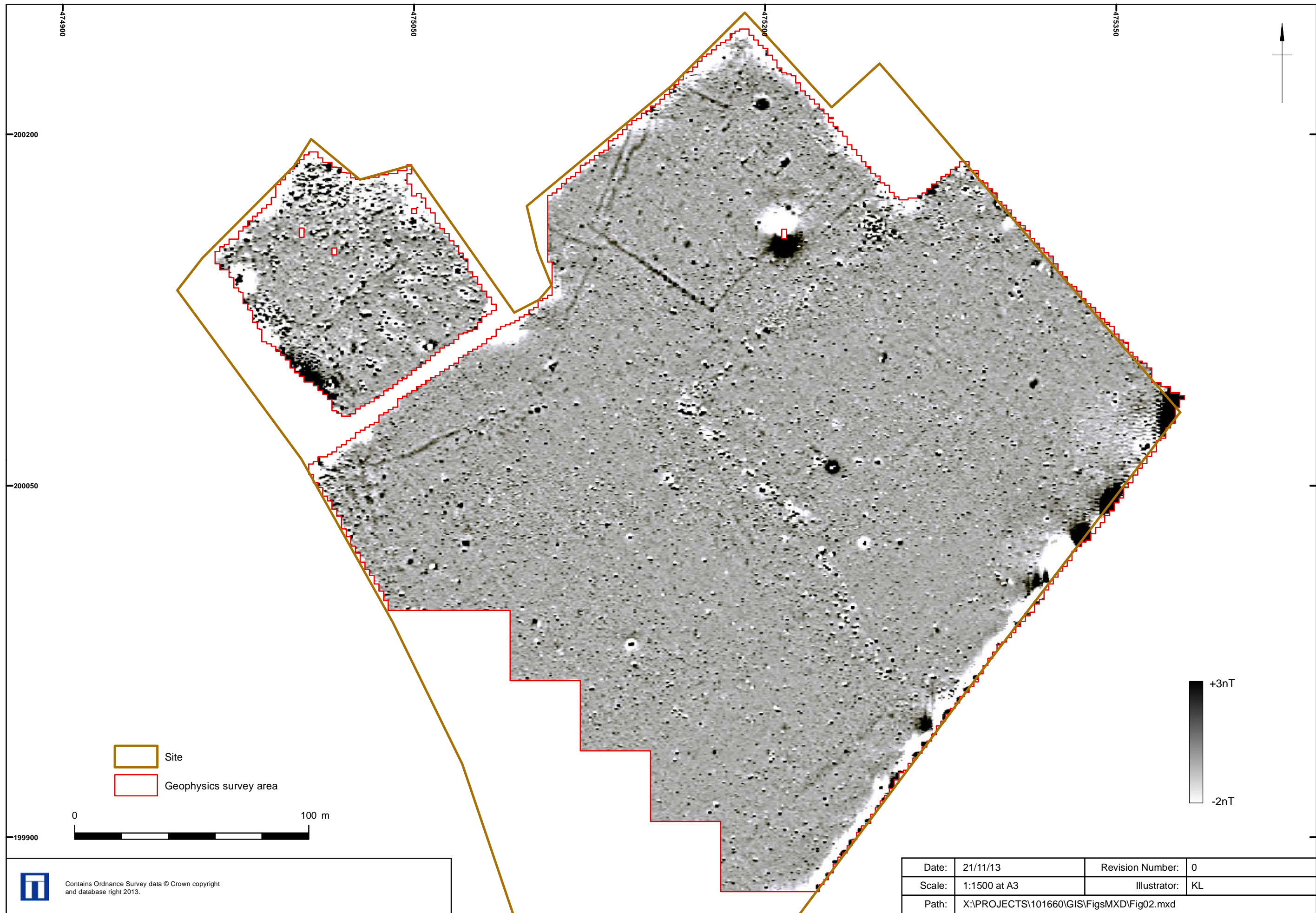
Finally, services such as water pipes are marked where they have been identified.



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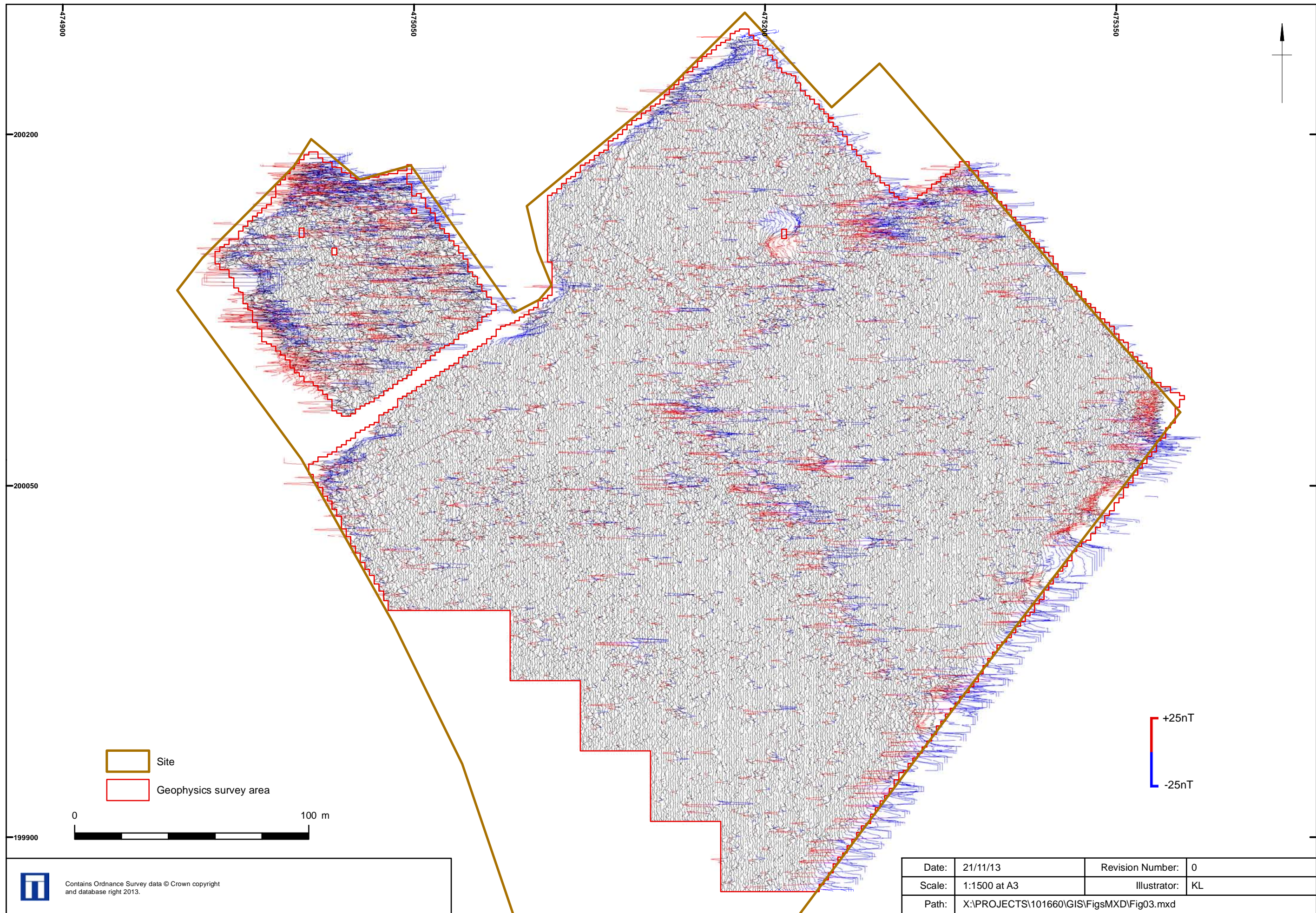
Site location plan

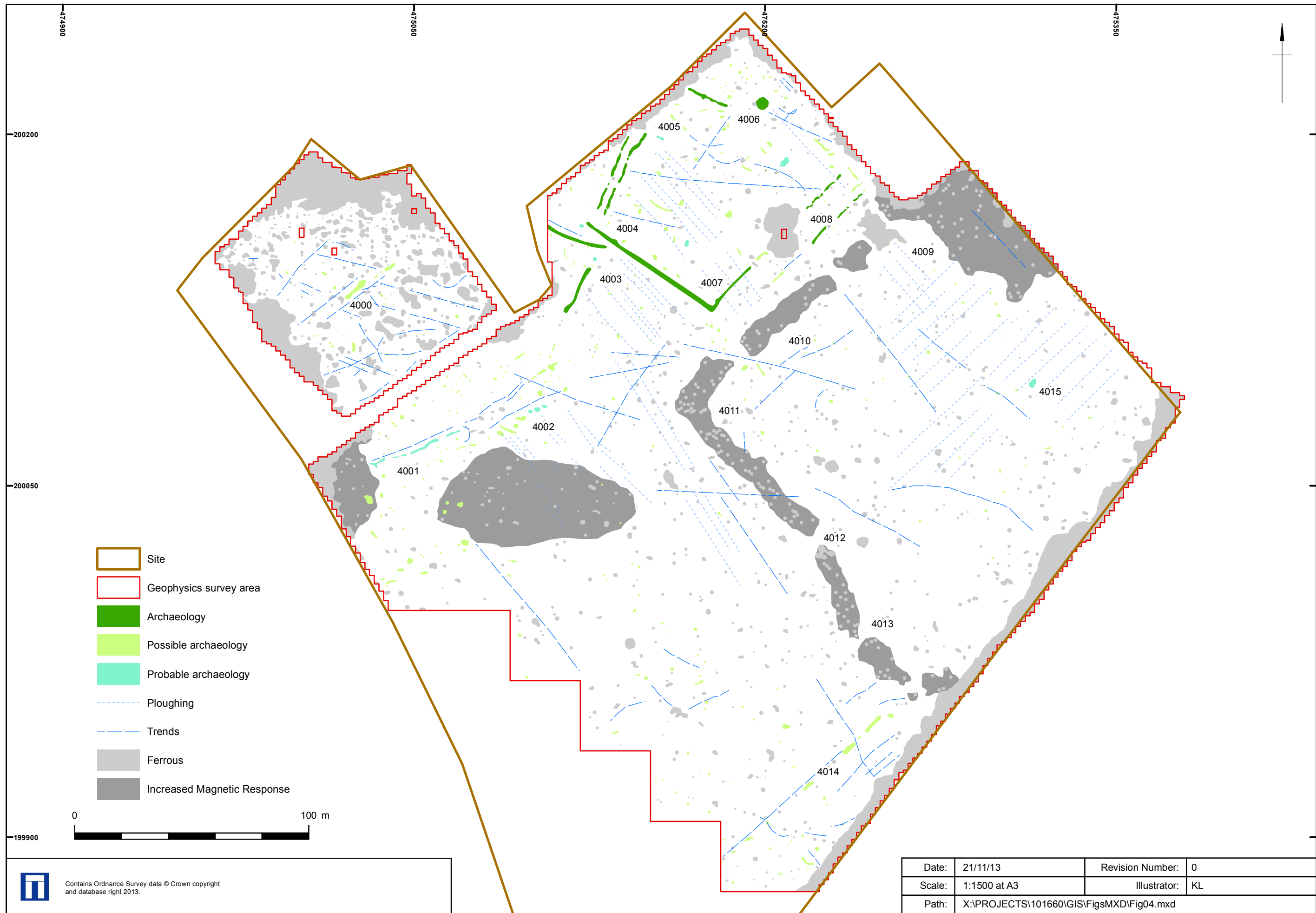
Figure 1



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