

pre-construct geophysics

archaeological surveys

GEOPHYSICAL (GRADIOMETER) SURVEY

LAND AT MANOR FARM, NOKE, OXFORDSHIRE

NGR 454500 214000

REPORT PREPARED BY DAVID BUNN

ON BEHALF OF PEGASUS PLANNING GROUP AND GREEN NATION

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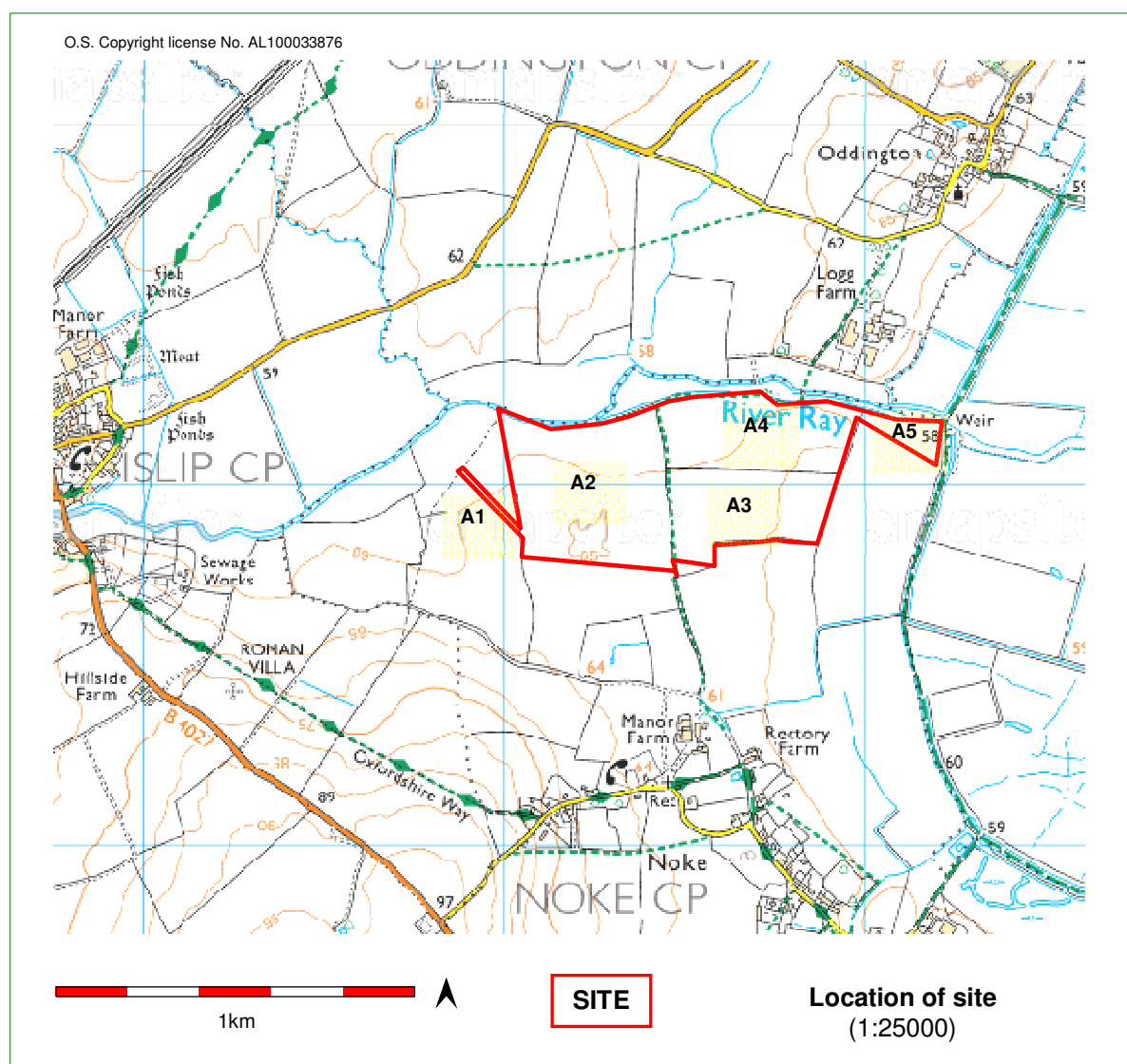
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Non technical summary

- The survey identified potential Romano-British settlement remains in the southern part of the site, some of which correspond to cropmark ditches. An adjacent linear cropmark was also recorded. These are situated on slightly higher and hence potentially better drained ground over limestone.
- The results suggest that remains of former pits lie to the east of the putative settlement, with a possible kiln site in proximity to the south. Of uncertain date, feasibly these might similarly date from at least the Romano-British period.
- Ridge and furrow cultivation was identified across most of the site, most apparent in areas with underlying limestone.
- Modern features include in situ remains of recent field boundaries, buried services and land drains.
- The survey gathered clearly-defined geophysical evidence of two putative Bronze Age ring ditches that lie to the immediate south of the proposed development site.



1.0 Introduction

Acting for Green Nation, Pegasus Planning Group Ltd commissioned a fluxgate gradiometer survey of land at Manor Farm, Noke, Oxfordshire (Fig. 1).

The survey forms part of a scheme of archaeological evaluation designed to inform a forthcoming application for the installation of a ground mounted solar farm and associated infrastructure, a new temporary construction access and use of an existing access for an operational access.

2.0 Location and description (Figs. 1 & 2)

The c.40ha site is situated approximately 0.5km to the north of the village of Noke, Oxfordshire (centred at NGR 454500 214000).

Currently under arable cultivation, it is bordered predominantly by open land. The River Ray lies to the immediate north.

Four separate areas were surveyed within the primary site (Areas 2 – 5). A proposed cable route was also surveyed (Area 1). This extends from the south-western part of the site north-west to terminate at an electricity pole.

3.0 Geology and topography

For the most part, the solid geology in the northern region comprises mudstone (Kellaways Clay Member) - sedimentary bedrock formed during the Jurassic Period in a local environment previously dominated by shallow seas (BGS, 2021).

Limestone (Cornbrash Formation) is recorded in the southern and north-eastern regions. This was deposited in the Jurassic Period in a local environment previously dominated by shallow carbonate seas.

No superficial deposits are recorded, other than a narrow band of alluvium along the northern edge of the site, which is associated with The River Ray.

The site is generally level and lies at a height of approximately 60 AOD, with slighter higher ground at c.65m AOD in the mid-southern region.

4.0 Archaeological Context

Extract from the conclusions of an Archaeology and Built Heritage Assessment prepared by Pegasus Planning Group (Sutherland, 2021):

A moderate amount of earlier prehistoric heritage is recorded in the vicinity of the site, including two possible ring ditches, visible as cropmarks >12m south of the site. Given the recorded heritage in the vicinity, and some undated cropmarks within the site, the site is considered to have moderate potential for archaeological remains from the prehistoric period. The posited line of a Roman road is recorded as running through the east of the site, having been identified through cropmarks. Cropmarks are certainly visible within the southern part of the site, however it remains uncertain as to whether this represents the line of a former road or another linear feature e.g. ditch/enclosure. Additional cropmarks visible to the east may be associated and/or related to drainage. A possible Romano-British pottery working site is recorded immediately to the south of the site, however this appears to have been mislocated.*

On the basis of the possible Roman road, and recorded heritage in the vicinity, the site is considered to have moderate potential for Romano-British and/or Iron Age archaeological remains.

*NB: whilst these lie just outside the red line development area, the survey was extended in order to gather geophysical evidence of these remains.

5.0 Methodology

5.1 The survey methodology is based on relevant heritage industry guidance and best practice advice, including the *EAC Guidelines for the use of Geophysics in Archaeology* (Schmidt et al. 2016), and the '*Standard and Guidance for Archaeological Geophysical Survey*' (Chartered Institute for Archaeologists, 2014).

A Written Scheme for Investigation was submitted to Pegasus Planning Group in advance of the commencement of fieldwork (Bunn, 2021).

5.2 Fluxgate Gradiometry is a non-intrusive scientific prospecting tool that is used to determine the presence/absence of some classes of sub-surface archaeological features (e.g. pits, ditches, kilns, and occasionally stone walls).

The use of magnetic surveys to locate sub-surface ceramic materials and areas of burning, as well as magnetically weaker features, is well established, particularly on large green field sites. The detection of anomalies requires the use of highly sensitive instruments; in this instance the Bartington 601 Dual Fluxgate Gradiometer. This is accurately calibrated to the mean magnetic value of each survey area. Two sensors mounted vertically and separated by 1m measure slight, localised distortions of the earth's magnetic field, which are recorded via a data logger.

This technique only records magnetic variation in relation to natural background levels, established by careful selection of magnetically 'quiet' zones where instrument sensors are calibrated to 0nT. As such, the magnetic response of archaeological remains will vary according to geology/pedology, with a possibility that buried features could remain undetected should their magnetic susceptibility closely match that of the surrounding soils. Additionally, some remains may be buried beyond the effective 1m - 2m range of the instrumentation; for example beneath alluvium. Back-filled shallow pits or ditches might also exhibit minimal variation.

5.3 The fieldwork was undertaken on and between the 7th & 17th of June 2021. The zigzag traverse methodology was employed, with readings taken at 0.25m intervals along 1.0m wide traverses.

The survey grid was established by Global Positioning Satellite using a Leica GS015 RTX, to an accuracy of +/- 0.1m.

The data were processed by using *Terrasurveyor V3*.

The raw data sets are presented as greyscale images on Figs. 4 & 7 (data clipped to +/- 40nT).

A 'Despike' function was applied to reduce the effect of extreme readings induced by metal objects, and 'Destripe' to eliminate striping introduced by zigzag traversing. The data were clipped to +/-2.5nT on the greyscale images of the processed data (Figs. 2, 5 & 8).

Anomalies in excess of +/-10nT are highlighted pink and blue on the interpretive figures (Figs. 3, 6 & 9). These are characterised magnetically as dipolar 'iron spikes', often displaying strong positive and/or negative responses, which reflect ferrous-rich objects. Examples include those forming/deposited along current or former boundaries (e.g. wire fencing), services and random scatters of horseshoes, ploughshares etc across open areas. Fired (ferro-enhanced) material, such as brick/tile fragments (often where the latter are introduced during manuring or land drain construction) usually induce a similar though predominately weaker response, closer to c+/-5nT (highlighted in pink/blue on the interpretive image). Collectively, concentrations of such anomalies typically indicate probable rubble spreads, such as backfilled ponds/ditches and demolished buildings. On a cautionary note, fired clay associated with early activity has the same magnetic characteristics as modern brick/tile rubble. As such, the interpretation of such variation must consider the context in which it occurs.

It should be noted that this technique only records magnetic variation (relative to natural background levels). As such, the magnetic response of archaeological remains will vary according to geology/pedology. Additionally, remains may be buried beyond the effective 1 - 2m range of the instrumentation.

A digital archive of the geophysical data and report will be retained by PCG.

6.0 Results and discussion (Figs. 2 – 9)

6.1 Areas 1 & 2 (Figs 2 – 6)

The survey identified buried ditches, predominantly situated in the south-east part of Area 2 (Figs. 3 & 6: red lines). One example (1) clearly continues eastward into Area 3, where scatters of Roman pottery were noted on the surface during the survey across a more concentrated array of ditches (see below).

An isolated and moderately strong linear anomaly in the mid-western region has been highlighted as a potential ditch (2), with a further possible ditch at the northern edge of the field (3).

A widespread array of pit-like anomalies in the south-east region conceivably represents a group of back-filled quarry pits (4: red). This zone of variation is also clearly visible on the Google Earth image dated May 2020 and a concentration of stone rubble was noted on the surface during the survey. More isolated potential pits were recorded in this general locality; it is speculated that a relatively strong 'positive' response that abuts the western edge of one example might signify a focus of industrial activity, potentially the remains of a kiln (5).

The survey recorded widespread magnetically weak discrete anomalies in the southwest region, with more dispersed examples encountered across the site (e.g. green dots). Whilst an anthropogenic origin as pits cannot be entirely discounted, given the high potential for archaeological remains elsewhere within the site, it is not always possible to confidently differentiate between natural variations and archaeological pits solely by non-intrusive investigation. Nevertheless, it seems likely that most are of natural origin, such as tree throws and soil-filled solution holes. Larger zones of probable natural variations were also recorded (e.g. areas broadly described by green dotted lines).

Widespread traces of (predominantly) ridge and furrow cultivation were recorded (orange lines). Remains are particularly apparent in the south-west region of Area 2 and southern part of Area 1 - reflective of enhanced magnetic contrast with that of the underlying limestone geology. Examples in the northern half of the area exhibit only limited magnetic contrast where mudstone and some alluvium is recorded. The latter appear to largely terminate to the immediate south of a recently removed c.E-W boundary, with possible examples in the north-east corner situated to the east of a c.N-S former boundary (yellow lines; Sutherland, 2021). For the most part, stronger responses recorded along and adjacent to the removed boundaries are considered to signify modern ferrous-rich objects and materials (pink & blue). With that in mind, a small group of predominantly 'positive' responses to the north of the former boundary exhibit some potential as an area subject to high temperature (6).

Land drains were recorded in the northern part of the site (purple lines).

A magnetically strong buried service extends north from the southern boundary to the mid-southern region, thereafter abruptly turning to the west and continuing to the western boundary (blue line). The shared alignment of the western component of the service and linear anomalies to its east possibly imply contemporaneity (dashed yellow lines); the latter might therefore reflect sections of a recent land division, albeit not depicted on historic maps (*ibid*).

Strong variation was induced by electricity poles in the northern part of Area 2, with one example at the north-western edge of Area 1 (EP).

Other than those discussed above, magnetically stronger discrete anomalies within these areas (and Areas 3 – 5) probably signify near surface ferrous-rich debris contained within the ploughsoil (pink and blue).

The two presumed Bronze Age ring ditches to the immediate south of the proposed development site responded particularly well to the geophysical survey (7 & 8: red lines). The results also indicate possible internal features (red). The ditches appear to be sufficiently deep to have survived relatively undisturbed by subsequent cultivation, most notably ridge and furrow (orange lines).

6.2 Areas 3 & 5 (Figs 2, 3, 7 - 9)

The survey recorded a substantial number of ditches, some of which correspond to cropmarks (*ibid*) (Figs. 3 & 9: red lines). Surface artefactual evidence suggests that these date from at least the Roman-British period, and thus associated with intensive occupation, including settlement.

The central elements of these collectively describe a relatively large triangular enclosure that tapers at its northern end (9). This encompasses a number of NW-SE aligned parallel ditches that, albeit only partially resolved, appear to define internal rectilinear sub divisions. Further potential ditches extend from its eastern and north-eastern sides edge, some appearing to bound variously-sized enclosures though these are generally less well defined, particularly to the north and east. Remnants of a possible ditch-flanked track extend eastward from this complex (10).

However, an archaeological interpretation for linear trends at the northern edge of this complex is tentative and a natural origin for at least some components is also feasible (e.g. palaeochannels). Suggestions of parallel linear features along its eastern side follow the course of a former path/track depicted on historic maps, though this might be incidental given the relatively broad nature of this zone of variation (11).

Putative ditch 1 continues eastward into this area, towards the western edge and seemingly beyond (albeit slightly offset to form the western edge of the triangular enclosure (12). It also appears to abut the eastern edge of a c. NNW-SSE magnetically distinct ditch that has also been identified as a cropmark (13). As apparent on aerial images, the survey confirmed that a gap separates the northern extent of 13 and a similarly aligned ditch to its north that extends towards the north-west corner of the field (14). There is no geophysical evidence of the latter's potential continuation to the northern edge of the site in either Area 1 or Area 3; any such continuation would seemingly follow the course of the existing boundary between these fields (though this would possibly be coincidental).

A small group of ditches and potential pits were recorded in close proximity to the mid-eastern eastern edge of putative ditch 14. Though slightly remote from ditches to the east, it seems likely that they also date from at least the Romano-British period.

Two parallel linear anomalies in the northern part of Area 3 have been tentatively interpreted as buried ditches though, alternatively, these might merely be of agricultural origin (15 & 16). These are limited suggestions of a continuation of 15 into the southern part of Area 4.

A number of discrete anomalies in Area 3 have been interpreted as possible pits (red dots). One example close the southern boundary possibly signifies some form of burning (17), with a more isolated example in the mid-northern part of the field (18).

Clear traces of NS aligned relict ridge and furrow was recorded at the western side of Area 2, with less magnetically distinct examples in Area 4 (orange lines).

Land drains were recorded in Areas 4 & 5 (purple lines).

A short linear feature lies at the mid-northern edge of Area 5 (red line). However, notwithstanding its ditch-like characteristics, this might merely be a gully that drained into The River Ray and hence of only limited archaeological value.

A buried service extends along the eastern boundaries of Areas 3 & 4 (blue line).

Magnetically strong discrete responses in Area 4 include those induced by electricity poles (EP).

The survey has not recorded any geophysical evidence of the postulated Roman Road in Areas 3 & 4, the potential existence of which was speculative.

Highlighted anomalies were recorded against a generally minimal backdrop of natural variation (greenscale), with distinctive zones broadly highlighted as hashed green.

7.0 Conclusions

The survey identified potential Romano-British settlement remains in the southern part of the site, some of which correspond to cropmark ditches. An adjacent linear cropmark was also recorded. These are situated on slightly higher and hence potentially better drained ground over limestone.

The results suggest that remains of former pits lie to the east of the putative settlement, with a possible kiln site in proximity to the south. Of uncertain date, feasibly these might similarly date from at least the Romano-British period.

Ridge and furrow cultivation was identified across most of the site, most apparent in areas with underlying limestone.

Modern features include in situ remains of recent field boundaries, buried services and land drains.

The survey gathered clearly-defined geophysical evidence of two putative Bronze Age ring ditches that lie to the immediate south of the proposed development site.

8.0 Acknowledgements

Pre-Construct Geophysics wish to thank Pegasus Planning Group Ltd and Green Nation for this commission.

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