

# **A21 KIPPINGS CROSS TO LAMBERHURST DUALLING**

## **Report on Archaeological Geophysical Survey 2010**

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## **A21 KIPPINGS CROSS TO LAMBERHURST DUALLING**

### **Report on Archaeological Geophysical Survey 2009-10**

#### **Summary**

This report describes a magnetometer survey which forms part of a continuing archaeological evaluation of the route of the proposed A21 dualling scheme to the south of Tonbridge, Kent. Fieldwork for the survey was done in December 2009 – January 2010. The purpose of the survey is to provide information relevant to the preparation of an Environmental Impact Assessment for the scheme, and which may inform further stages of the archaeological evaluation.

The present phase of the evaluation covers land which may be affected by the future road works along an approximately 5km length of route south of the Kippings Cross junction. The survey produced findings which are consistent with previously available archaeological evidence, which suggests that the evaluation area is of only limited archaeological potential, but some positive findings were obtained. The most significant of these were a ditch and possible associated magnetic anomalies at the northern end of the route (identified as site A in the summary list appended to this report), and an apparent ditched enclosure (J in summary list). Neither of these features is of unambiguous archaeological significance, but they could be tested during future investigations, as could a number of other findings reported on below.

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## **A21 KIPPINGS CROSS TO LAMBERHURST DUALLING**

### **Report on Archaeological Geophysical Survey 2009-10**

#### **Introduction**

This geophysical survey forms part of an archaeological evaluation which is being undertaken in advance of a proposed widening scheme on the route of the A21 between Tonbridge and Lamberhurst in Kent. The survey was commissioned by Atkins Heritage, on behalf of the Highways Agency, and is required in support of the Environmental Impact Assessment for the project.

The survey covers specified fields alongside an approximately 5km length of the existing A21. Fieldwork for the survey was started in December 2009, but had to be suspended after 4 days because of snow. A further attempt was made from 5 January 2010, but conditions again became impossible after further snow on 7-8 January. The remainder of the work was therefore completed following a thaw from 19 January.

The survey follows a similar previous investigation of a 3km section of the route between Tonbridge and Pembury, some 5km to the north of the present evaluation area. This earlier work was commissioned by Oxford Archaeology on behalf of Atkins Heritage, and reported on in August 2009 [1].

#### *Survey coverage*

The survey covered all surveyable ground in fields as specified by Atkins Heritage between the B2160 Kippings Cross roundabout (at NGR TQ 644399), and the B2162 Lamberhurst Road at TQ 682373. The total area to be surveyed was initially estimated as 54ha in the project brief, but this was subsequently increased to c. 60ha. Coverage of this area was substantially achieved, with the exception of an overgrown field and pipeline construction site at the northern end of the route.

#### **The Route**

Background information on the topography and geology of the route, and on previously identified archaeological findings, was supplied to us in the project brief issued by Atkins Heritage [2]. This material is summarised in the following sections.

### *Location and topography*

The present A21 follows a sinuous route through a landscape of ridges and valleys within the High Weald. The elevation varies, but falls overall from c 144m OD at the northern end to 82m OD at the south. The route mainly follows a ridge, and so is not intersected by any substantial watercourses which could be associated with alluviated valleys. This part of the Weald is a mixture of pasture and woodland, with limited arable areas.

### *Geology*

The underlying geology of much of the route is the Tunbridge Wells Sand. This alternates with areas of Wadhurst Clay, which predominates in the southern part of the route [3]. Both are members of the Lower Cretaceous Hastings Beds, which extend across the greater part of the Weald.

The geology of the present section of the route is similar to that encountered in the previous survey in 2009. It was noted in the earlier report that soils on clay and sandstone bedrock are often not strongly magnetic. This was confirmed by the topsoil magnetic susceptibility readings which were recorded during both surveys to test for variations in soil magnetic properties along the route (as presented here in figure 20). Readings in the 2009 survey were mainly less than  $10 \times 10^{-5}$  SI, which is towards the lower end of the commonly encountered range of values. Some areas of slightly higher readings (to c. 15 SI) were seen in the present survey. These readings are not abnormally low, and do not exclude the possibility of detecting archaeological features by magnetometer surveying, particularly at former settlement or industrial sites where there is likely to be localised soil magnetic enhancement. The strength of the magnetic response to isolated earthwork or other features lacking such enhancement might, however, be less reliable than would often be the case.

### *Archaeological background*

The brief lists only eight previously identified archaeological sites in the immediate vicinity of the survey area (with the exception of standing listed buildings). These include the sites of two windmills (sites AH1 and AH8 as listed). These will not necessarily be associated with any magnetically detectable debris or ground disturbance, particularly if they were of timber construction. There are two possible brickworks (AH3 and AH4, although AH4 is outside the survey area), as well as a further possible post-medieval industrial area (AH6, which is also some distance outside the survey area), and the sites of three buildings (AH 2, 5, 7). Of these, the recorded location of AH5 is within the survey, but 2 and 7 appear to be within existing property boundaries adjacent to the A21. There do not appear to be any immediately relevant earthwork or cropmark sites, although some were noted in the vicinity of the 2009 survey.

The shortness of this list is consistent with the limited potential for early settlement activity in the wooded Wealden landscape, but leaves open the possibility that additional findings could emerge from the survey data.

## Survey Procedure

The survey followed procedures as specified in the project brief by Atkins Heritage, and as described in the Written Scheme of Investigation for the project [4].

### *Magnetometer survey*

Readings were collected using Bartington 1m fluxgate magnetometers, and are plotted at 25cm intervals along transects 1m apart. The results of the survey are shown as grey scale plots at 1:2000 scale in figures 2-8, and as a graphical (x-y trace) plots at 1:1250 scale in figures 9-19.

The survey plots show the magnetometer readings after standard treatments which include adjustment for irregularities in line spacing caused by variations in the instrument zero setting, and slight linear smoothing. Additional 2D low pass filtering has been applied to the grey scale plot to reduce background noise levels.

The magnetometer responds to cut features such as ditches and pits when they are silted with topsoil, which usually has a higher magnetic susceptibility than the underlying natural subsoil. It also detects the thermoremanent magnetism of fired materials, notably baked clay structures such as kilns or hearths, and so responds preferentially to the presence of ancient settlement or industrial remains. It is also strongly affected by ferrous and other debris of recent origin.

### *Presentation*

An interpretation of the findings is shown superimposed on the graphical plots (9-19), and is reproduced separately to provide a summary of the findings in figures 21-25. Features as marked on these plans include magnetic anomalies thought to be of at least potential archaeological significance (in red), as well as other magnetic activity, much of which is likely to be of recent or natural origin. A number of larger-scale disturbances are outlined in brown, and other (probably mainly natural) background activity is shown in a lighter brown/orange.

The division between these categories is not always clearly defined, and there are numerous borderline magnetic anomalies. In this case there is particular difficulty in distinguishing between natural and (potential) archaeological features. This is because the survey has detected a number of individual magnetic anomalies which display the rounded profiles to be expected from silted pits, and which are often a characteristic of ancient settlement sites, but which in this survey are usually unsupported by any additional evidence in terms of their distribution, or association with other features, which would suggest they are archaeologically significant. It is usually the case that magnetic anomalies representing clearly identifiable settlement sites will occur in groups or clusters, or will be associated with other features suggesting ditches or enclosures. Similarly uncertain features were seen in the 2009 survey, to which the same questions applied. Some of these findings are indicated in red in the interpretation (as possible

candidates for further investigation), but it is probable that many are natural. They are perhaps likely to represent pockets or hollows of deeper topsoil, which contrasts with the relatively non-magnetic sandy subsoil. They appear to be more frequent on the sand at the northern end of the route than on the clay to the south.

Distinctions between natural and recent magnetic disturbances (as indicated in light and dark brown) may also be uncertain, given that magnetic anomalies caused by naturally magnetic stones (which appear in some places to be present) and recent debris may be similar. The strong recent magnetic disturbances commonly encountered near boundaries and buildings will include ferrous debris, together with brick rubble and other such material. Some of the more distinct individual ferrous anomalies have been outlined in blue, but their distribution and location were not found to be of any particular significance.

Some of the fields in the survey contain clear patterns of linear magnetic disturbances indicating land drains. These are presumably not of archaeological interest, and are marked on the plans in grey. Iron pipes, and some possible weak cultivation effects are also marked.

#### *Survey location*

The survey in each field was located by reference to a grid of temporary markers. The survey grid was set out and tied to national grid co-ordinates by means of a differential GPS system. OS co-ordinates of map locations can be read from the AutoCAD version of the plans which can be supplied with this report, and used to re-locate features in the field.

#### *Magnetic susceptibility survey*

The magnetometer survey was supplemented by a minimal background magnetic susceptibility survey with readings taken at 30m intervals using a Bartington MS2 meter and field sensor loop. The results are presented as a plot of shaded squares of density proportional to the readings in figure 20.

A susceptibility survey may sometimes provide a broad indication of previously occupied or disturbed areas in which burning associated with past human occupation has enhanced the magnetic susceptibility of the topsoil, although this cannot be relied upon, and the readings are often affected by non-archaeological factors, including geology and land use. The main purpose of a supplementary survey of the kind done here is to indicate the strength of response which is likely to be obtained as an aid to the interpretation of magnetometer survey .

## **Results**

The fields along the route have been numbered in an arbitrary sequence from NW to SE for the purpose of identification in this report. (Numbers 1-52 are marked in red on the

data plots and interpretative plans.) Findings are described here by fields or groups of fields in numerical order. [A further summary list of the potentially more significant findings is included as an appendix at the end of the report.]

### *Field 1*

The findings here (and in field 23) are potentially among the more significant of those seen in the survey. There is a single distinct linear ditch-like feature (which is labelled A on the 1:2500 interpretative plan, figure 21). A number of other individual magnetic anomalies are also outlined in red nearby. It is possible that these could represent silted pits, which could be of added interest given their association with a ditch, but they are otherwise similar to features seen elsewhere, and to which the reservations as noted above may therefore apply. Magnetic susceptibility values are low in this field, which further suggests that some of the magnetic anomalies may be natural, and are unlikely to represent an early settlement site. The results in this field may be of interest, but do not combine on the basis of the geophysical evidence to create a fully convincing archaeological site.

### *Field 2*

This field lies within the proposed survey area, but is overgrown and obstructed by trees and an area of hard standing. It could not therefore be surveyed.

### *Fields 3-6*

Fields 4 and 6 are intersected by a construction easement and contractor's depot for a water pipeline which is at present under construction. There is otherwise considerable magnetic activity in these fields, but none appears to be archaeologically significant.

There are strong magnetic disturbances along a trackway in field 3 (which must be reinforced with hardcore). A more dispersed scatter of similar disturbances extends across the northern half of field 4, and is seen also in the NW corner of field 6. An additional trackway was detected across field 5. A system of land drains (grey) was detected in the southern part of field 4 and field 5, and an iron water pipe leading to the adjacent reservoir is also visible (blue). There are strong magnetic anomalies caused by steel borehole casings and a water trough to the east of field 4.

Some further magnetic anomalies are outlined in red, for reasons as noted in field 1. These include apparent irregular or broken linear features at B and C (in fields 5 and 6), and a few individual pit-like features. These findings do not appear to form any focus or concentration which would suggest an archaeological site.

### *Fields 7-10*

These fields show a relatively high level of background magnetic activity, and gave high susceptibility readings, but there is no clear evidence for archaeological features. Pipes intersect field 10, and there are disturbances corresponding to visible rubble and debris to the north of field 9. The recorded site of a windmill (site AH1; SMR MKE8233) appears

to be at the southern end of field 8, where there are no clearly significant magnetic anomalies.

Apparent linear disturbances at D and E in fields 7 and 10 could be interpreted as fragmented ditch-like features, but (as with B and C above) nothing in the wider context suggests they are archeologically significant.

#### *Fields 11-14*

There are few findings (other than pipes) in fields 11-13. In field 14 there are clusters of small individual magnetic anomalies, the strongest of which are at F. Such disturbances are commonly seen on gravel soils when there are concentrations of small naturally magnetic stones in the gravel, but the precise explanation here may be more difficult to establish. It is unlikely that such disturbances are archaeologically significant.

#### *Field 15*

The northern part of this field is arable, which accounts for the raised magnetic susceptibility readings (which are higher on exposed topsoil rather than grass. Snow cover does not appear to have affected the readings.) The recorded site of a brickworks (AH3, SMR MKE15753) is located towards the eastern edge of the survey within this field (at TQ 6541 3871), but there is no magnetic activity in this part of the site.

A concentration of magnetic activity in the NE corner of the field (labelled G) could be consistent with the presence of burnt debris (but is no more conspicuous than the disturbances associated with trackways and rubble scatters, as seen in fields 3, 9 and elsewhere). There are no large individual magnetic anomalies of a kind which could indicate the remains of a kiln, although the feature as marked in red could be a pit with magnetic debris in the fill.

#### *Fields 16-19*

These fields show minimal magnetic activity, with only a few scattered and apparently recent magnetic disturbances.

#### *Fields 20-25*

There are various weak and apparently natural individual magnetic anomalies in field 20, which is otherwise undisturbed. The line of strong magnetic disturbances at H in field 21 may indicate debris on the line of a former boundary, if this continued to the west on the alignment seen in field 22.

In field 23 there are various linear features, visible particularly in the grey scale plot, of which the most clearly defined is at J. There could also be some relatively small and distinct pit-like features nearby. It is not impossible that the linear features represent land drains, but they are distinct and different from those seen elsewhere (as in fields 35 and 37, where alignments of small strong magnetic anomalies represent sections of clay drains). The possibility therefore remains that the findings in field 23 could represent

one or more enclosures, perhaps in association with other features of archaeological interest.

The strong disturbances near the tennis court in fields 24 and 25 may represent landscaping or infilled ground.

#### *Fields 26-34*

Little was found in these fields, other than minor recent or natural disturbances (and pipes).

A few of the more distinct magnetic anomalies in field 26 are marked in red (to indicate possible silted pits), but they are sparsely distributed and it remains likely (as in fields 4, 5 and elsewhere) that they could be natural. The recorded site of a post-medieval building (AH5, SMR MKE15755) lies on the western edge of the survey in field 27, but the survey response at that location appears undisturbed.

#### *Fields 35-40*

Fields 35-37 and 40 contain distinctive patterns of linear markings representing land drains (as shown in grey in the interpretation). The lines seen in each field are made up (as previously mentioned) of small magnetic anomalies representing sections of ceramic drain. (There is presumably an increased need for drainage on the clay soils which extend from around field 37 to the end of the route.)

Findings otherwise are limited to unusually extensive (and presumably recent) disturbances alongside field boundaries (and especially adjacent to the A21). Field 40 is particularly disturbed by drains, boundaries and a trackway, but none of the activity appears to be archaeologically significant.

#### *Fields 41-45*

Faint linear markings are visible in the grey scale plots in some of these fields, and particularly in field 45. These may indicate past cultivation. Markings caused by modern ploughing, as well as surviving traces of ridge and furrow, are commonly detected in magnetometer surveys, but the evidence here remains weak.

There are strong disturbances around a concrete trig point (and a parked trailer) in field 41, but there does not appear (as was also the case at site AH1 in field 3) to be any magnetic activity at the site of a windmill in the NW corner of the field (site AH8; SMR MKE15758 at TQ 6713 3790).

#### *Fields 46-51*

The coverage of fields 46-47 is interrupted and divided by overgrown mounds of rubble. A cluster of magnetic anomalies at K in field 47 could perhaps be natural (as was suggested at F in field 14), but it includes some stronger magnetic anomalies which could (in part ?) be recent.

There are strong disturbances near to boundaries and buildings (and around a pond) in fields 48-50. There is a slight (probably natural) increase in background noise in field 51, but no identifiable findings.

## **Conclusions**

The survey has detected considerable magnetic activity, but only a few findings show any of the characteristics to be expected from archaeological features. These may include the ditch-like magnetic anomaly in field 1, but it remains uncertain whether other nearby features may be archaeologically significant. They could represent silted pits, but other similar features are seen elsewhere in contexts which suggest they could be a natural effect representing variations in the depth of soil cover on a sandy subsoil. Other less distinct (and possibly natural) ditch-like features were seen in fields 5, 6 7 and 10.

A grouping of linear and other features of potential interest was seen in field 23. Linear markings here could be drains (but are distinct from drains identified in field 37 and elsewhere), but the possible presence here of ditched enclosures and associated features is difficult to dismiss without further investigation.

Other survey findings include clusters of magnetic anomalies of possibly natural origin (F in field 14 and K in field 47), recent disturbances from boundaries, trackways and pipes, and possible weak indications of former cultivation towards the eastern end of the route.

No clear evidence of archaeological findings was obtained at locations identified in the project brief and SMR. The two windmills (AH1 and AH8) would not necessarily give rise to detectable magnetic disturbances, but the post-medieval building (AH5 in field 27) must lie outside the survey area. The only magnetic activity in field 15 is in the NE corner of the field at some distance from the recorded location of the brickworks (site AH3).

The survey results suggest there is only limited potential for further archaeological findings within the evaluation area, but have identified a number of locations which could provide targets for further investigation.

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Fieldwork for this survey was done by P. Cottrell, C. Oatley, F. Prince, D. Shiel, N. Paveley and A. Bartlett.

**References**

- [1] A21 Tonbridge to Pembury Dualling. Report on Archaeological Geophysical Survey, 2009. Report on survey by Bartlett Clark Consultancy for Oxford Archaeology on behalf of Atkins Heritage. 3 August 2009.
- [2] A21 Kippings Cross to Lamberhurst Dualling. Brief for an Archaeological Geophysical Survey. Job number 5084887; document ref. 006tw\_A21 KX-L. Atkins Heritage; September 2009.
- [3] BGS 1 inch sheet 303; Tunbridge Wells, 1971.
- [4] A21 Kippings Cross to Lamberhurst. Written Scheme of Investigation for an Archaeological Geophysical Survey. Bartlett Clark Consultancy for Atkins Heritage; 3 December 2009.

## A21 Kippings Cross to Lamberhurst

### Appendix : Inventory of Selected Findings

This list notes the more significant findings from the magnetometer survey of this route. The grading (1-4) given alongside each entry refers to the reliability of the geophysical evidence rather than the archaeological significance of the findings.

- Grade 1:        Distinct magnetic anomalies of probable archaeological origin.
- Grade 2:        Magnetic anomalies possibly including natural or recent disturbances, but which could in part be archaeologically significant.
- Grade 3:        Weak or isolated features; not necessarily archaeologically significant.
- Grade 4:        Magnetic anomalies of probably non-archaeological origin.

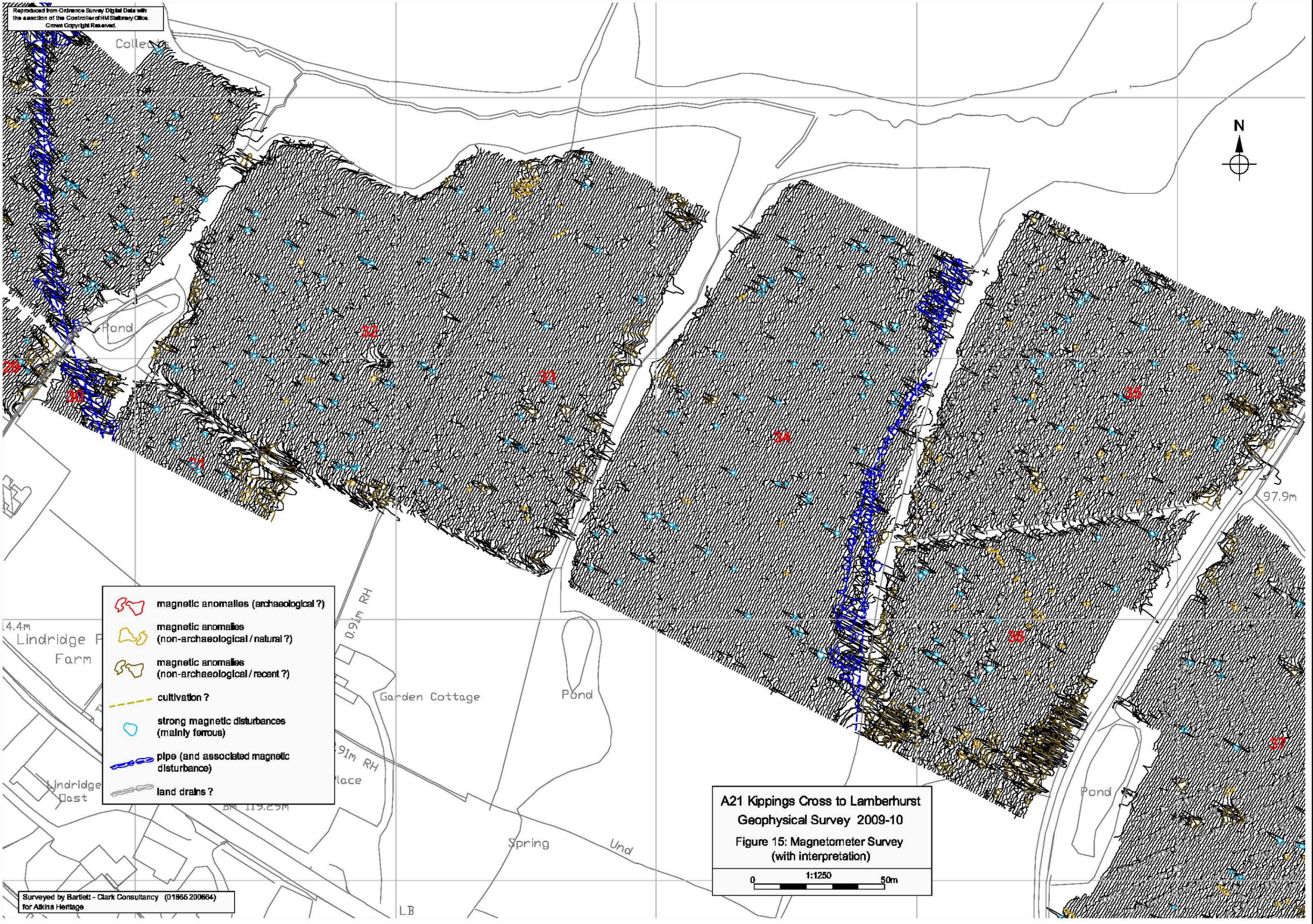
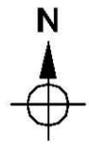
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This summary list includes only selected magnetic findings, particularly those which may be of potential archaeological interest, or which may require further investigation for their significance to be established. Magnetic disturbances which may be mentioned in the text or indicated on plans are not necessarily included if they appear to be of natural or non-archaeological origin.

<u>Feature (field)</u>	<u>Grade</u>
A (1)        Distinct linear ditch-like feature. + Other smaller magnetic anomalies (possible pits, but perhaps natural).	1  2-3
B (5)        Irregular linear ditch-like feature.	2-3
C (6)        Possible fragmented linear feature (+ other dispersed Pit-like magnetic anomalies in fields 4,6) – perhaps natural.	3
D (7)        Short weak linear magnetic anomaly.	13
E (10)       Similar to D, but fragmented.	3
F (14)       Scatter of small magnetic anomalies: probably natural.	3
G (15)       Strong magnetic disturbances in field said to contain brickworks.	2

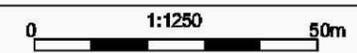
H (21)	Former field boundary ?	2
J (23)	Ditch like linear magnetic anomalies perhaps indicating enclosures with associated features (but could perhaps be drains).	1-2
K (47)	Localised cluster of magnetic anomalies (rather stronger than F above). Perhaps recent or partly natural.	2-3

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-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (non-archaeological / natural ?)
-  magnetic anomalies (non-archaeological / recent ?)
-  cultivation ?
-  strong magnetic disturbances (mainly ferrous)
-  pipe (and associated magnetic disturbance)
-  land drains ?

A21 Kippings Cross to Lamberhurst  
Geophysical Survey 2009-10  
Figure 15: Magnetometer Survey  
(with interpretation)



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A21 Kippings Cross to Lamberhurst  
Geophysical Survey 2009-10  
Figure 20: Magnetic Susceptibility  
Survey  
0 1:10000 500m

