

# PRE-CONSTRUCT ARCHAEOLOGY

L I N C O L N

ARCHAEOLOGICAL DESK BASED ASSESSMENT  
(INCORPORATING GRADIOMETER SURVEY REPORT):  
LAND ON THE EAST SIDE OF THE VILLAGE GREEN,  
WILLOUGHBY, LINCOLNSHIRE

NGR: TF 4716 7198  
Planning Ref. S/208/01545/01

*Willoughby*



Conservation  
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*Willoughby with Stothby*

Report prepared for Mr R Brearley, on behalf of Mawthorpe Farms Ltd.  
by Rachel Gardner

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### Summary

- *An archaeological assessment has been prepared for Mr. R. Brearley on behalf of Mawthorpe Farms Ltd., in respect of a proposed residential development on the east side of the Village Green, Willoughby, Lincolnshire.*
- *The site contains extant earthworks that are believed to be of medieval date, and this report incorporates a basic earthwork survey of the remains, backed up by the results of a fluxgate gradiometer survey by Pre-Construct Geophysics.*
- *The report concludes that the archaeological potential of this site is high, although the actual potential has not been fully quantified: indeed, such a level of quantification can only be established by follow-up investigations, involving a programme of archaeological trial excavation*

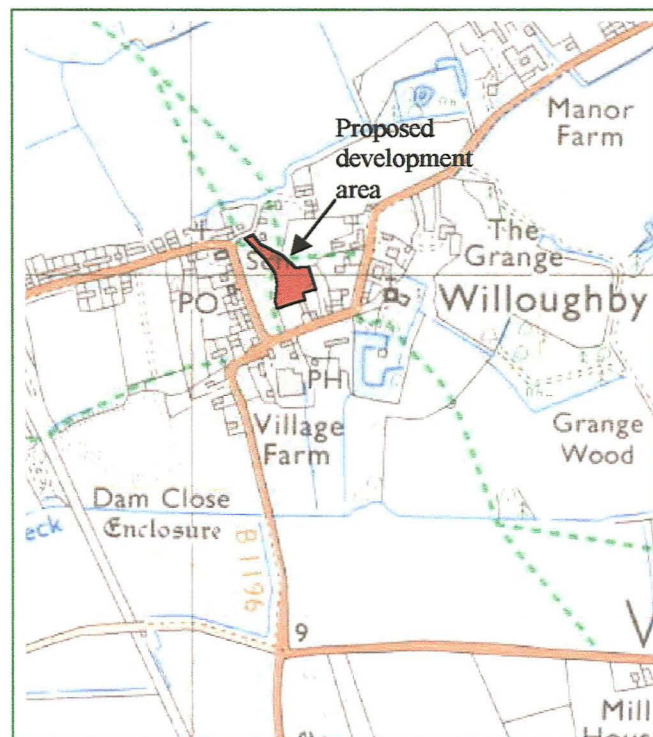


Fig. 1: Location of proposed development.  
(Scale 1:12500; OS copyright ref AL 515 021 A0001)

## 1.0 Introduction

This combined desk-based study and non-intrusive field evaluation was commissioned by Mr. R Brearley on behalf of Mawthorpe Farms Ltd. Its purpose is to assess the archaeological potential of a proposed residential development site (without the use of intrusive methods) on the east side of Willoughby Village Green (fig. 1), and to assess the likely impact of developing the area. The results of this investigation will assist East Lindsey District Council with its planning decision regarding archaeological matters, and will also inform the client of any archaeological constraints of relevance to the application.

## 2.0 Location and description

The village of Willoughby is in the administrative district of East Lindsey, approximately 12km north-west of Skegness and 4km south-east of Alford.

The area of proposed development is close to the centre of the village, on the east side of the village green, off Station Road (fig. 2). Its central National Grid reference is TF 4716 7198.

The land comprises a roughly trapezoid area of approximately 3800m<sup>2</sup>. Its west side is bounded by the village green, from which it is divided by a wire fence and a recently planted hedge, and its south side by the Village Hall and the bowling green. There is a sharp drop in ground level on its eastern boundary, which is formed by a shallow ditch: the lower land is occupied by a modern development of bungalows and small houses. The shallow ditch continues around the angle to the north side of the site, which is also bounded by a grown-out hawthorn hedge, now consisting of full-sized trees: at the north-west end of this hedge is open access to a rough pasture. Access to the site is by a narrow strip of land extending north-west to the road. This is bounded on the south-west side by the village green and on the north-east by the grounds of Elder House: the house is of late 18<sup>th</sup>/early 19<sup>th</sup> century date, and was built as the alehouse (with attached brewhouse) for farm labourers (Mr. K. Colley, Elder House, *pers. comm.*). Two public footpaths crossing the green conjoin to cross this access strip, at present by means of a kissing-gate. The site has been in use as seasonal sheep pasture up to this year: ground cover is well-established grazed turf with large patches of nettles.

The housing surrounding the site and village is of mixed appearance, with some buildings of 18<sup>th</sup>-19<sup>th</sup> century date, chiefly recent conversions of agricultural buildings and cottages, interspersed among early to mid-20<sup>th</sup> century houses and some very recent development. The school on the other side of Station Road is Victorian. The oldest building in the immediate area is 'Pyewipes', a house on the north side of Station Road, which dates from the 1770s and was formerly a village shop (Mr. A. Smith, 'Pyewipes', *pers. comm.*).

### **3.0 Geology and topography**

Willoughby lies on the interface between glacial till – a chalk-rich sandy gravelly clay – and glaciofluvial deposits of sand and gravel, both overlying sandstone (carstone) bedrock (British Geological Survey Sheet 116). The results of an auger survey indicate that natural deposits within the proposed development area comprise glacial till (see auger survey data).

Willoughby is at the foot of the Lincolnshire Wolds, between the Wolds rising to the north and west, and the flat Lincolnshire Marsh extending to the coast. The site lies between the 10m and 5m OD contour lines. The area is artificially drained by a system of dykes and canalised streams, including Burlands Beck to the south and Willoughby High Drain to the east (1:25 000 Ordnance Survey sheet TF 47/57). Willoughby lies on a spring-line, and several springs were known in the village, although most no longer run: a spring near the Village Hall runs occasionally in wet winters (Mr. A. Smith, *pers. comm.*).

### **4.0 Planning background**

Full planning consent is sought from East Lindsey District Council for a residential development, comprising four detached houses (Ref. S/208/01545/01). Prior to determination of this application, the local planning authority, acting on the advice of Lincolnshire County Council Conservation Services, has requested that an archaeological assessment and non-intrusive evaluation should be undertaken, to determine the archaeological potential of the site without use of intrusive techniques. This approach is consistent with the recommendations of *Archaeology and Planning: Planning Policy Guidance Note 16*, 1990.

### **5.0 Objectives and methods**

The purpose of this report is to identify the presence and assess the significance of archaeological remains which may be vulnerable to construction works associated with the proposed development, and, if necessary, to suggest further methods by which the site may be evaluated in advance of such works.

The report is based on information derived from a variety of sources: -

The County Sites and Monuments Record for Lincolnshire (SMR)

Records held by the Lincolnshire Archives Office

Aerial photographs held by the SMR

Aerial photographs held by the NMR / English Heritage

Records held by North Lincolnshire Museum, Scunthorpe

A geophysical survey by Pre-Construct Geophysics

A site visit, including an auger survey, carried out on 15/02/02 to assess the site locality and ground conditions, and reinforce the findings of the geophysical survey

Information from local residents

## 6.0 General archaeological and historical background

Willoughby is situated between two prehistoric barrow groups – the Butterbump round barrows to the east, and the Deadmen's Graves long barrows to the west. (These monuments are too far from the site to be germane to this report.) A single circular ditched feature, possibly a ploughed-out round barrow, was seen on aerial photographs north-east of the village, to the north-east of Manor Farm on the Bonthorpe Road, and field-walking in this area produced a flint scraper of probable Bronze Age date, found 450m west of the Willoughby High Drain, and a total of seven other flint flakes (Ellis *et al.*, 2001). The blade end of a Bronze Age bronze axehead was found within the village itself, approximately 100m east of the proposed site, although this findspot must be considered unreliable, as it was found during extensive landscaping of the village with waste soil from potato processing, and was probably imported from elsewhere (Mr. J. Kirkby, finder, *pers. comm.*).

The Sites and Monuments Record for Lincolnshire records an area of Romano-British activity to the north-west of Willoughby, along the course of the (now dismantled) railway line. Railway construction works in 1885 turned up Roman roof and flue tiles, pottery (including Samian ware), a coin of Hadrian and a square-headed pin at the railway junction, approximately 0.5 km north-west of the village, while six Romano-British potsherds and part of a Romano-British glass bottle were found at a later date along the eastern branch of the railway line, approximately 200m further north. The presence of flue tile (for hypocaust heating), Samian ware and vessel glass indicates a relatively wealthy settlement in the area. Further Roman material, including a brooch and several coins (not yet identified), has been found by metal-detecting in the field directly north of the village, and in the area north of the railway junction (Mr. J. Kirkby, finder, *pers. comm.*).

Few indications of Anglo-Saxon or other Migration Period activity are known of in the vicinity of Willoughby: this period is represented only by three Anglo-Saxon strap-ends from the 9<sup>th</sup> century, found by metal-detecting in the area east of the church (Mr. J. Kirkby, finder, *pers. comm.*). However, the place-name itself is pre-Norman: it appears in Domesday Book as '*Wilgebi*', which is thought to be a Scandinavian variant of the Old English place-name '*Wiligtun*', 'the farmstead/village where the willows grow', with the Norse *-by* ending replacing the Saxon *-tun* (Cameron, 1998).

There are four entries concerning Willoughby in Domesday Book, when it was part of the lands of Gilbert of Ghent. In the manor itself, '*Tonni had 2 carucates of land taxable. Land for 4 ploughs. Roger, Gilbert's man, has 2 ploughs. 4 freemen on ½ carucate of land have 2 ploughs and meadow, 40 acres; woodland pasture, 120 acres; underwood, 60 acres. Value before 1066 £4; now £8.*' Willoughby church was in a '*berewica*' – an outlying area attached to the manor: '*3 bovates of land with full jurisdiction, taxable. Land for 5 oxen. 1 church which has ½ carucate. Value before*



1066, 20s; now 10s'. The manor also had '1 carucate of land taxable (and) land for one plough' within its jurisdiction at Welton le Marsh and Boothby. The fourth entry is a legal claim which was outstanding at the time of the Domesday audit: 'In Willoughby hundred the Bishop of Durham claims the land of Alnoth the priest against Gilbert of Ghent, and the men of the Riding state that they never saw the Bishop's predecessor put in possession of it, either by writ or officer, and they testify (it is) for Gilbert's use.'

In total, Willoughby had a relatively small amount of land, and there is no mention of a mill, or of any other industrial buildings or processes, implying that 'Wilgebi' was a small and rather impoverished agricultural settlement, dependant largely on pasturage of animals, without enough arable land to support its own mill.

Willoughby with Sloothby parish church also served Bonthorpe, Ashingdon, Habertoft and Slackholme, although Sloothby acquired a parochial chapel in the 12<sup>th</sup> century. The church path by which corpses were carried from Bonthorpe to Willoughby for burial was well defined up to the late 13<sup>th</sup> century (Owen, 1971). Nothing of the church mentioned in Domesday Book is now extant: the present church is early Perpendicular (14<sup>th</sup>-15<sup>th</sup> century), with much Victorian restoration (Pevsner and Harris, 1995).

Directly south-west of the village is the earthwork known as Dam Close, a quadrilateral banked enclosure with entrances on its north and south sides. The interior of the earthwork has been ploughed, and no traces of structures are visible. On its west side is a much smaller earthwork: the interior of this is below current ground level and water-filled in wet weather. Both earthworks are believed to be medieval, although no definite date is known: the smaller work may be a constructed pond, possibly for the use of stock penned in the larger enclosure. Whatever its purpose, it was forgotten by the beginning of the 19<sup>th</sup> century: the 1906 Ordnance Survey map marks Dam Close as a 'Roman Camp'.

Earthwork remains are visible on the development site and the village green, and less distinctly in the pasture to the north of the site: they appear on aerial photographs, but have no SMR reference at present (see fig. 2). The site was recently visited by S. Grundy of the Built Environment team, who interpreted the earthworks as the remains of medieval crofts and tofts (See 8.0: Site visit.), which indicates that the site was not always common land. Willoughby appears to be a 'shrunken medieval village', in which an area once occupied reverts to common or farmland due to a sharp fall in population (often associated with the ravages of the Black Death, or with a change in local land use from arable farming to sheep pasture, requiring far fewer agricultural workers).

There are traces of medieval ridge-and-furrow ploughing directly south of the village and on the south-west side of Dam Close: this also indicates a change in land use or population size, as ridge-and-furrow only remains visible if the ploughing ceased in medieval times and never recommenced. A pottery spout in the shape of a dog's head, from a medieval aquamanile, was found in a field on the south-west side of Grange Wood, approximately 300m south-east of the village.

Crop-marks seen on aerial photographs to the north of Willoughby are believed to represent post-medieval field boundaries (Ellis *et al*, 2001). The fishpond associated with the Manor House is also post-medieval; the Manor House itself is largely 19<sup>th</sup> century, with one 18<sup>th</sup> century wing remaining. The moat on the south and west sides of the rectory (originally enclosing it) is thought to be an ornamental feature with drainage use, of the same 18<sup>th</sup> century date as the rectory.

## 7.0 Archaeological potential

Information relating more specifically to the area of proposed development was researched and collated from several sources, and is summarised below.

### 7.1 Aerial photographic and cartographic information

An aerial photographic cover search (obliques and verticals) was undertaken by the National Monuments Record, and the following aerial photographs were found (see table below). Copies of those taken before 1960 were requested, in the hope of seeing the earthworks prior to landscaping. Only one available photograph, taken in September 1946, showed the proposed development area (fig. 3). The light was not ideal for photography of earthworks, which show up best in very low sunlight, but some features are visible on the village green, and it can be seen by comparison with the Dam Close earthworks that they were then considerably more pronounced than they are now.

NMR Library No.	Sortie No.	NGR Start	NGR Finish	Scale	Date Taken
387	3G/TUD/UK/195	TF 463731	TF 480731	10080	10/05/1946
466	106G/UK/1730	TF 466718	TF 481721	9800	12/09/1946
851	CPE/UK/2604	TF 481716	TF 465716	10000	19/04/1948
10378	OS/73030	TF 462723	TF 481722	7500	23/03/1973
10378	OS/73030	TF 473709	TF 466709	7500	23/03/1973
21542	MAL/57256	TF 465717	TF 471722	6000	01/01/1957
21542	MAL/57256	TF 465716	TF 465716	6000	01/01/1957

The following cartographic sources at the Lincolnshire Archives Office were consulted:

Enclosure map of the Willoughby estate: 8 chains to 1 inch. 1838.

Tithe map of Willoughby with Sloothby: 3 chains to 1 inch. 1840.

2<sup>nd</sup> edition Ordnance Survey Map of Great Britain: 1:2500. 1906.

The 1838 enclosure map (fig. 4) is uninformative, as it shows only land boundaries and watercourses, with a few roads, not all of which still exist (Mawthorpe Hill Road appears to have been reduced to a farm track), and only one building: the Willoughby

Arms Inn, which is still present. All of the land surrounding Willoughby is shown as belonging to Lord Willoughby de Eresby, or being acquired by him at the time of the enclosures: no boundaries of any kind are shown within Willoughby village itself. The boundaries marked in red in fig. 4 represent enclosures which were old at the time of mapping; new enclosures are outlined in green. The green-bordered area in the printed extract is named as 'Freshney's Car', and was acquired by Lord Willoughby from John Freshney in exchange for land 'in the Great Field' – the middle strip of the three outlined in black in the E corner of the extract, of which the largest belonged to the Rector.

From the much more detailed 1840 tithe map (fig. 5) it can be seen that this area of Willoughby was sparsely populated – considerable infilling has taken place on the east, west and south sides of the green, which incorporated the present development site. Only three buildings – one occupying the present position of the school – are marked opposite the green on what is now Station Road, currently built up along the full length of its west side, and the land to the east of the proposed development site is largely open. In the south, the edge of the green extends to Church Lane along its full width: there were no buildings on the site of the present bowling green. Elder House can be identified on the north side of the green: the pattern of occupation on this side is roughly similar to the present. The Dam Close earthworks are not shown on this map. As well as the rectory moat, here shown as a complete circuit, there are several other ponds and watercourses within the village: a drain (no longer visible) forms the north border of the village green, but none are marked on the green itself. A small square feature on the south-west corner of the green is not identified, but is not a building: the drawing convention seems to indicate an embankment or raised mound (not observed on site visit). This feature, and two others drawn with the same convention, are shown in green in fig. 5.

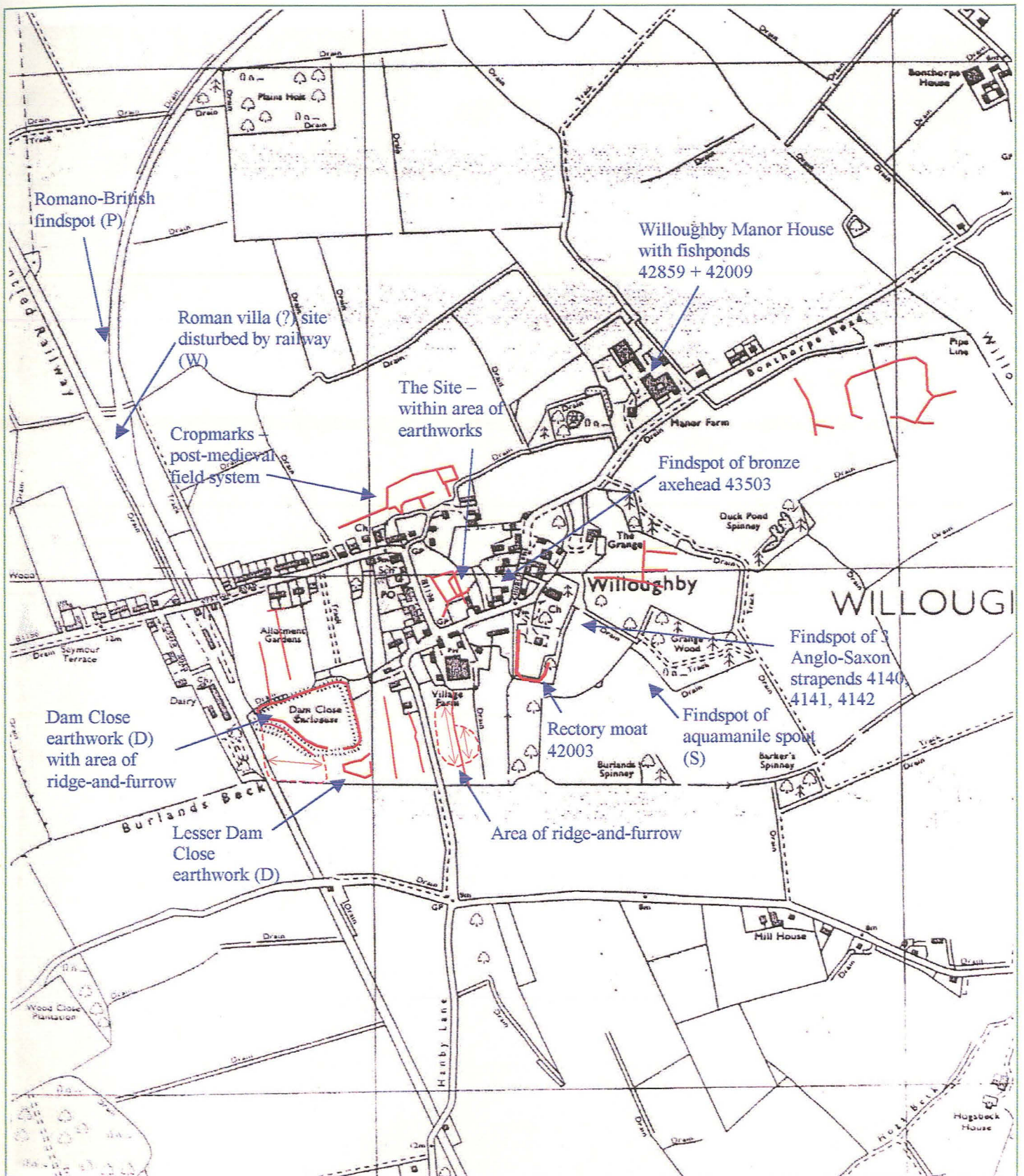
The 1906 Ordnance Survey map cannot be reproduced here, due to disruption caused by building work at the Lincolnshire Archive Office. The areas of open land to the east, south and west of the village green are much the same as those seen on the 1840 tithe map, except that the school is marked at the north end of Station Road, and a smithy is located on the south side of Church Lane. A spring is marked in the north-east corner of the open land on the west side of Church Lane, east of the village green and the site (currently occupied by a modern housing development), but the pond referred to by Mr. Kirkby does not appear. The green itself (incorporating the development site) appears to have the same size and form as on the 1840 map, and, excepting the loss to its southern edge caused by the construction of the Village Hall, the bowling green, and one house plot, to have remained in this form to the present day. The earthworks on the green are not shown on either map, but nor does either map make any reference to the presence of buildings or ruins there, implying that, like the purpose of the Dam Close earthwork, the presence as well as the nature of any structures on the green had already been forgotten.

## **7.2 The County Sites and Monuments Record**

The records held by the SMR which have a potential bearing on the proposed development scheme are as follows. (The SMR is still in the process of updating these records, so not all have a standard SMR reference number.)

SMR Ref.	NGR	Description
42003	TF47307184	Moat-like earthwork partially enclosing rectory, probably 18 <sup>th</sup> century.
42009	TF47557235	Willoughby Manor House.
42859	TF47407230	Post-medieval earthwork (fishpond) associated with the Manor House.
43503	TF47257200	Findspot: part of a Bronze Age axe.
D	TF469717	Dam Close earthwork – believed to be medieval.
P	TF46507245	Findspot: six Romano-British potsherds and part of a Romano-British glass bottle.
S	TF47527180	Findspot: medieval pottery spout from an aquamanile, in the shape of a dog's head.
W	TF465722	Roman site disturbed by railway works – roof and flue tiles, pottery, a Hadrianic coin and a square-headed pin.
Y	TF47357196	Willoughby with Sloothby Parish Church (St. Helen): early Perpendicular with Victorian restoration.

The three Anglo-Saxon strap-ends referred to in section 6.0, along with other material found by metal-detecting in the wider parish area, were recorded under the Portable Antiquities Scheme by North Lincolnshire Museum, Scunthorpe: reference numbers NLM 4140, NLM 4141 and NLM 4142.



**Fig. 2:** 1:10,000 Ordnance Survey map extract, incorporating relevant SMR entries. Earthworks and cropmarks known from aerial photographs are shown in red (not all have received SMR numbers), areas of ridge-and-furrow with dashed red lines. (Reproduced under OS Licence No. AL 515 21 A0001)

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108.6/UK/1730.12SEP46.F/20/541SQDN. →



**Fig. 3:** Aerial photograph of Willoughby village, looking north. The railway line runs along the left-hand side of the image; the Dam Close earthwork can be seen between the railway and the village. The raised earthworks on the Village Green can be seen as lighter lines where they are catching the sun from the east.

(Source: NMR – TF 466718-TF 481721, 12 Sept 1946, NMR 466)



Figure 4: Extract from 1838 Enclosure Map. (Scale 8 chains = 1 inch)



Figure 5: Extract from 1840 tithe map of the Parish of Willoughby (Scale 3 chains = 1 inch). Ponds and watercourses are shown in blue, possible banks in green.



### 7.3 General considerations

In the light of the information already obtained, it is possible to construct a generalised picture of the archaeological and historical background of the area of proposed development.

The wider area of Willoughby appears to have been of considerable consequence in the period ranging from the Neolithic through the Bronze Age to the early Iron Age, as shown by the two barrow groups. However, there is very little evidence for prehistoric activity within a 1km radius of the development site, where only single finds have occurred, largely of flint flakes.

A known area of Roman activity is located closer to the development site, and the quality of the finds recorded indicates a site of some status, as do more recent metal-detector finds. However, the Humber Wetlands Project's programme of field-walking located no further Roman or Romano-British artefacts in the immediate vicinity of Willoughby, so it seems likely that the site is relatively localised, and that the possibility of extensive Roman remains in the area is low.

There is very little evidence for activity in or around Willoughby between the end of Roman occupation and the Norman Conquest, although a settlement of this name must have been present in pre-Norman times. Medieval activity, however, is extensive and well-preserved. Standing earthworks survive in two areas within the village: at Dam Close on its south-west edge, and on the village green itself, extending to the proposed development site. The archaeological potential of this specific area is clearly high, but almost certainly restricted to the medieval period.

### 8.0 Site visit

A site visit incorporating an auger survey was made on 15/02/02 (see Appendix 3 for auger survey results). A sketch plan was made of visible earthworks on the proposed development area, backed up by EDM surveying (Fig. 6). The site was photographed, but due to poor light few photographs were taken (see Appendix 2). Ground conditions were wet, with some surface water in areas between standing earthworks: extensive growth of nettles indicates the presence of disturbed ground or demolition.

The earthworks are now much less prominent than they used to be, as the area was landscaped in the 1960s, using waste soil from potato processing to fill in hollows between upstanding earthworks: a deep linear feature running NE – SW across the green, which might have represented a road, is no longer visible (Mr. J. Kirkby and Mr. A. Smith, *pers. comm.*), but can tentatively be identified on the aerial photograph (Figs. 2 and 3). A pond in the eastern corner of the site was more recently filled in (Mr. J. Kirkby, *pers. comm.*): an auger survey hole in this area had to be abandoned, as the auger could not penetrate the rubble backfill.

Earthworks in the south corner of the site are roughly square or rectangular in shape, and probably represent house platforms (plate 1). None of these can be traced across the boundary between the site and the village green, though further examples may be seen outside it. A geophysical anomaly in this area may represent a well: the auger

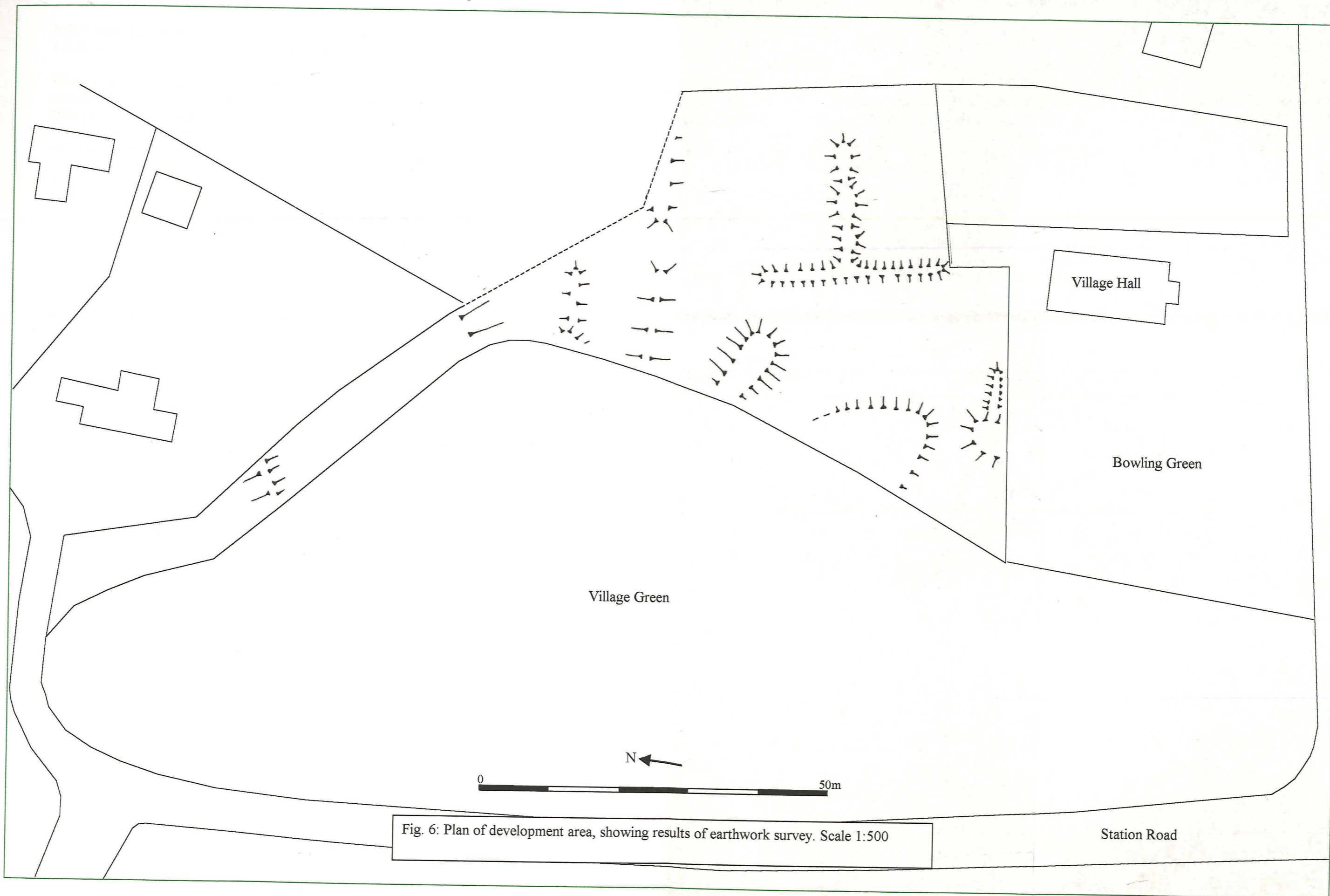


Fig. 6: Plan of development area, showing results of earthwork survey. Scale 1:500

Station Road

Village Green

Bowling Green

Village Hall

N

0 50m

hole investigating it had to be abandoned due to excessive groundwater at a depth of 1.12m without encountering natural (typically encountered at 0.40-0.60m).

Directly north-east of the putative house platforms is a very narrow raised earthwork, running NW-SE in a straight line, parallel to the present north-east field boundary (plate 2). Another linear earthwork may run NE from it to the field boundary, but this was indistinct and may have been caused by dumping of material during back-filling of the pond area, which it borders.

Two raised linear earthworks, indistinct and heavily overgrown with nettles, run NE-SW across the north-east corner of the site at its junction with the access strip, and can be seen continuing a short distance on the village green. It is possible that these are associated with the linear feature previously visible on the green, although the exact location of this is no longer known. A narrower but more distinct linear earthwork, also running NE-SW, crosses the access strip about half-way along its length, beginning directly under a mature sycamore tree on the boundary between the development site and the garden of Elder House. It can clearly be seen extending on to the green, where it continues to SW for a short distance before turning NW.

Further earthworks can be seen in the rough pasture on the north side of the development site, but they appear only as irregularities in the ground: no definite diagnostic shapes could be determined. The ditch dividing these two areas is shallow, and contains only a few millimetres of slowly moving water, but is probably a partially silted boundary ditch, as this boundary dates to at least 1840 (see tithe map, fig. 5).

As the development area is entirely under turf, fieldwalking was not possible. Two sherds of medieval pottery – rim sherds of a light grey shell-tempered fabric, unglazed, partially oxidised on inner and outer surfaces – which had been found in the garden of Elder House were seen: they were found close to the site boundary at a depth of no more than 150mm (Mr. K. Colley, *pers. comm.*).

## 9.0 Impact on archaeological resources

No activity in the area under discussion is likely to have impacted significantly on the archaeological resources. Documentary sources show the area to have been open common land since at least 1840: it has not been built on subsequent to the collapse or demolition of such structures as are now visible as earthworks, and has never been ploughed. Recent landscaping work is unlikely to have caused any harm to the archaeological remains, and may even have helped to preserve them.

The impact of the proposed development may be high, as the archaeological remains are close enough to the ground surface to be visible under the topsoil, in spite of landscaping in recent times.

## 10.0 Conclusions

The archaeological potential of the proposed development site is considered to be high, as archaeological remains are visibly present and widespread, and can safely be considered to be in a good state of preservation. The date of the remains is probably confined to the medieval period, representing part of a shrunken medieval village: it is unlikely that pre-Norman remains are present.

## 11.0 Mitigation

Non-intrusive surveys such as those conducted during the preparation of this report can only go so far towards evaluating the archaeological potential of a site. The report concludes that the remains are probably of medieval date and are likely to be in a good state of preservation. However, actual quantification of the resource (ie in terms of extent, density, date, significance etc) would require the undertaking of a limited programme of archaeological trial excavation. The results of such an investigation could then be used to formulate an archaeological mitigation strategy in due course.

## 12.0 Acknowledgements

Pre-Construct Archaeology would like to thank Mr. R. Brearley for this commission. The authors would like to thank the staff of the Lincolnshire County SMR, the staff of the Lincolnshire Archives Office, the staff of the English Heritage NMR, and Mrs Marina Elwes at North Lincolnshire Museum for her assistance during the research, and Messrs. J. Kirkby, A. Smith and K. Colley for volunteering information during the site visit.

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## Appendix I

**FLUXGATE GRADIOMETER SURVEY:  
LAND AT WILLOUGHBY,  
LINCOLNSHIRE**

NGR

TF 4716 7198

Report prepared for R Brearley  
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March 2002



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## Illustrations

**Fig.1** Location of survey. Scale 1:1000.

**Fig.2** Trace plot of raw data. Scale 1:500.

**Fig.3** Greyscale image of clipped data. Scale 1:500.

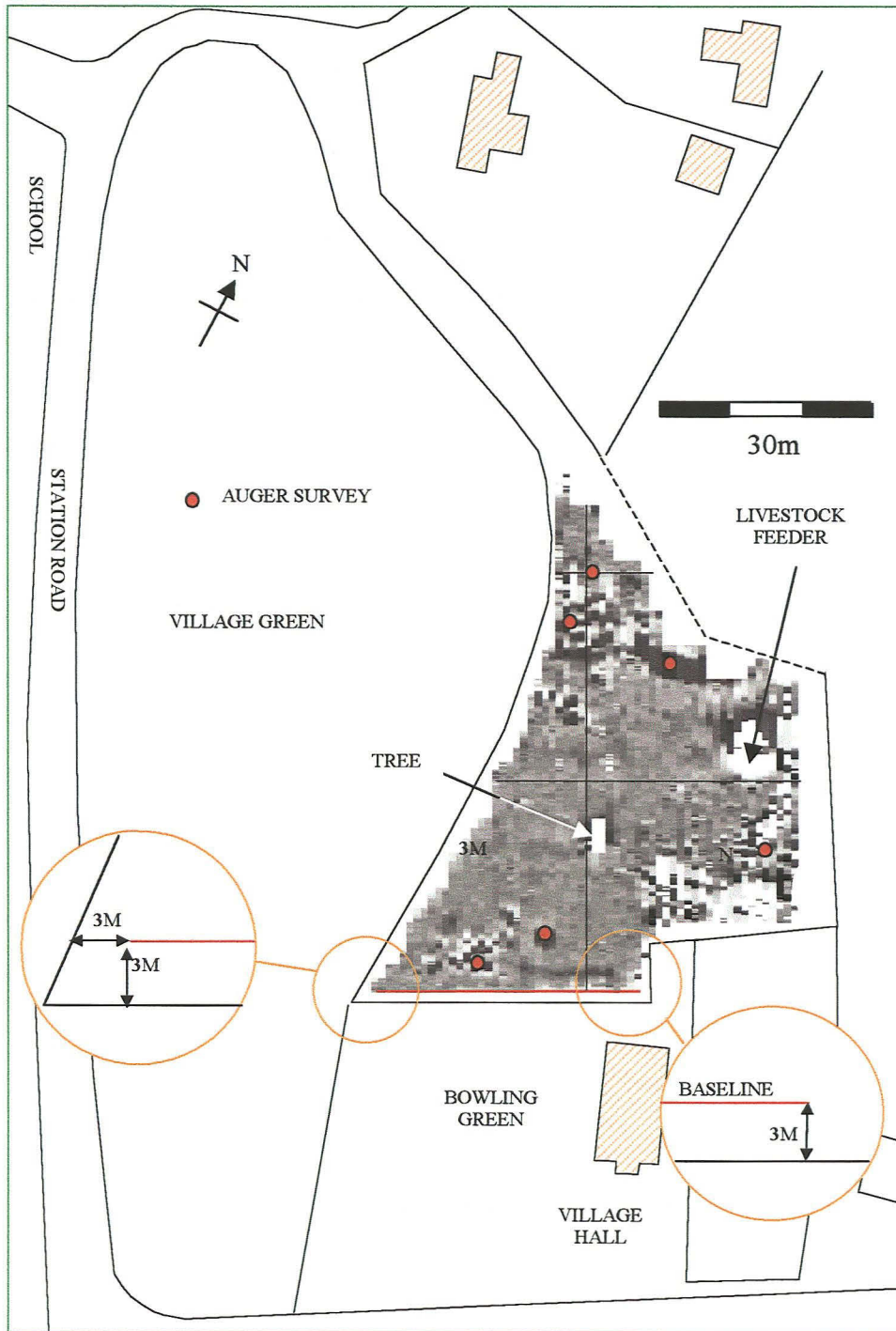
**Fig.4** Interpretive plan. Scale. 1:500.

**Table 1** Summary of survey parameters.

### *Summary*

- *As part of an integrated desk top assessment, a fluxgate gradiometer survey was undertaken on approximately 0.25 hectare of land at Willoughby, Lincolnshire*
- *This survey identified a range of magnetic anomalies across the site, which contains earthworks. Whilst some of the anomalies can be directly associated with modern activities, others appear to reflect the presence of buried features of potential archaeological significance*
- *Some anomalies possibly represent land divisions and a hollow way*
- *One area of relatively strong magnetic strength possibly reflects the rubble fill of a former pond. Weaker, magnetic variation may be evidence of archaeologically significant features, such as buildings and a possible well*





**Fig.1: Location of survey 1:1000**

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## 1.0 Introduction

R. Brearley, on behalf of Mawthorpe Farms Ltd., commissioned Pre-Construct Archaeology (Lincoln) to undertake a combined archaeological desk top assessment and geophysical survey. This work was carried out to fulfil part of a recommendation by East Lindsey District Council for an archaeological evaluation of a site. Full planning permission is sought for the construction of four dwellings (Ref. S/208/01545/01).

The gradiometer survey methodology was based upon guidelines set out in the English Heritage document '*Geophysical Survey in Archaeological Field Evaluation*' (David, 1995).

The archaeological background and site description is discussed in the main report (Gardener, 2002).

## 2.0 Geology

Willoughby lies on the interface between glacial till – a chalk-rich sandy gravelly clay – and glaciofluvial deposits of sand and gravel, both overlying sandstone (carstone) bedrock (B.G.S., 1996).

## 3.0 Methodology

Detailed area survey using a fluxgate gradiometer is a non-intrusive method of evaluating the archaeological potential of a site. The gradiometer detects magnetic anomalies created by areas of high or low magnetic susceptibility. These variations are caused by changes in the composition of the subsoil or the underlying geology. Archaeological features result from man-made alterations to the soil and they may also incorporate intrusive materials such as brick and stone. These features can create detectable magnetic anomalies. In addition, activities that involve heating and burning can generate magnetic anomalies, as will the presence of ferrous metal objects.

The anomalies detected by a fluxgate gradiometer survey can often be resolved into entities sharing morphological similarities with features of known archaeological provenance. This enables the formulation of an informed, but subjective, interpretation.

Magnetic variation between archaeological or naturally occurring features and natural geological strata can result from:

- their relative depth or density of fill
- the magnetic properties of materials introduced as a result of human activity (e.g. rubble, stone, brick/tile, ferrous metal etc.) in contrast to those within surrounding natural deposits
- magnetic enhancement associated with areas of burning

- the magnetic properties of localised, naturally deposited minerals, such as those occurring in the fills of palaeo-channels.

An area of c. 0.25 ha was surveyed.

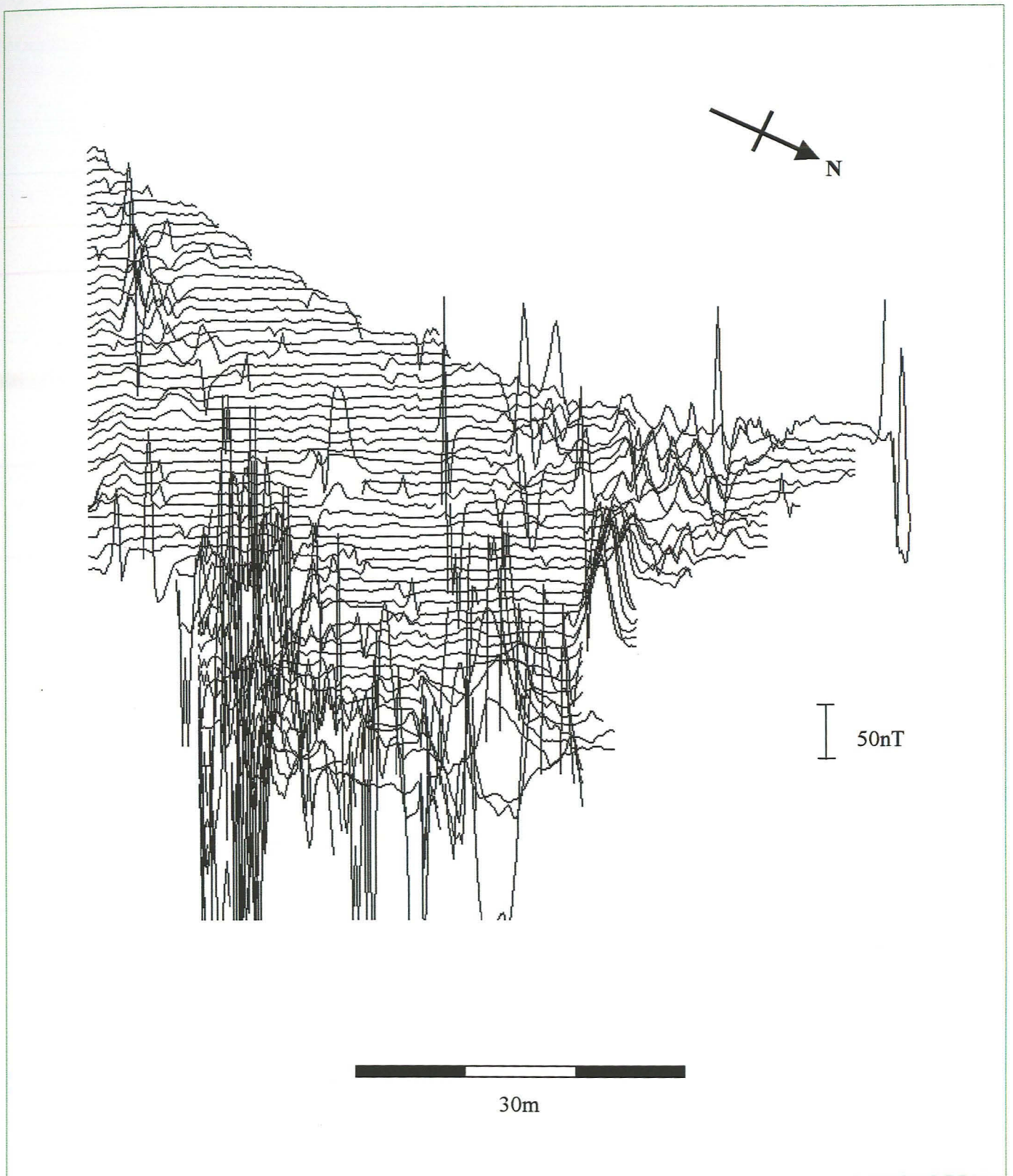
The area survey was conducted using a *Geoscan Research* fluxgate gradiometer (model FM36) with an electronic sample trigger set to take four readings per metre (a sample interval of 0.25m). The zigzag traverse method of survey was used, with 1m wide traverses across 30m x 30m grids. The sensitivity of the machine was set to detect magnetic variation in the order of 0.1 nanoTesla. A base line was established along the southern edge of the site.

Data from the survey was processed using *Geoplot* (v. 3.0). It was desloped (a means of compensating for sensor drift during the survey) and clipped to reduce the distorting effect of extremely high or low readings caused by discrete pieces of ferrous metal. The results are presented as a greyscale image (Fig: 3), trace plot (Fig: 4), and interpretive plan (Fig: 5).

The site was surveyed by David Bunn on 7 February 2002.

Instrument	Geoscan Research fluxgate gradiometer FM36 Sample trigger ST1
Grid size	30m x 30m
Sample interval	0.25m
Traverse interval	1.0m
Traverse method	Zigzag
Sensitivity	0.1nT
Processing software	Geoplot (v. 3.0)
Weather conditions	Cold, occasional showers
Area surveyed	c.0.25ha

**Table 1: Summary of survey parameters**



**Fig.2: Trace plot of the unclipped data 1:500**

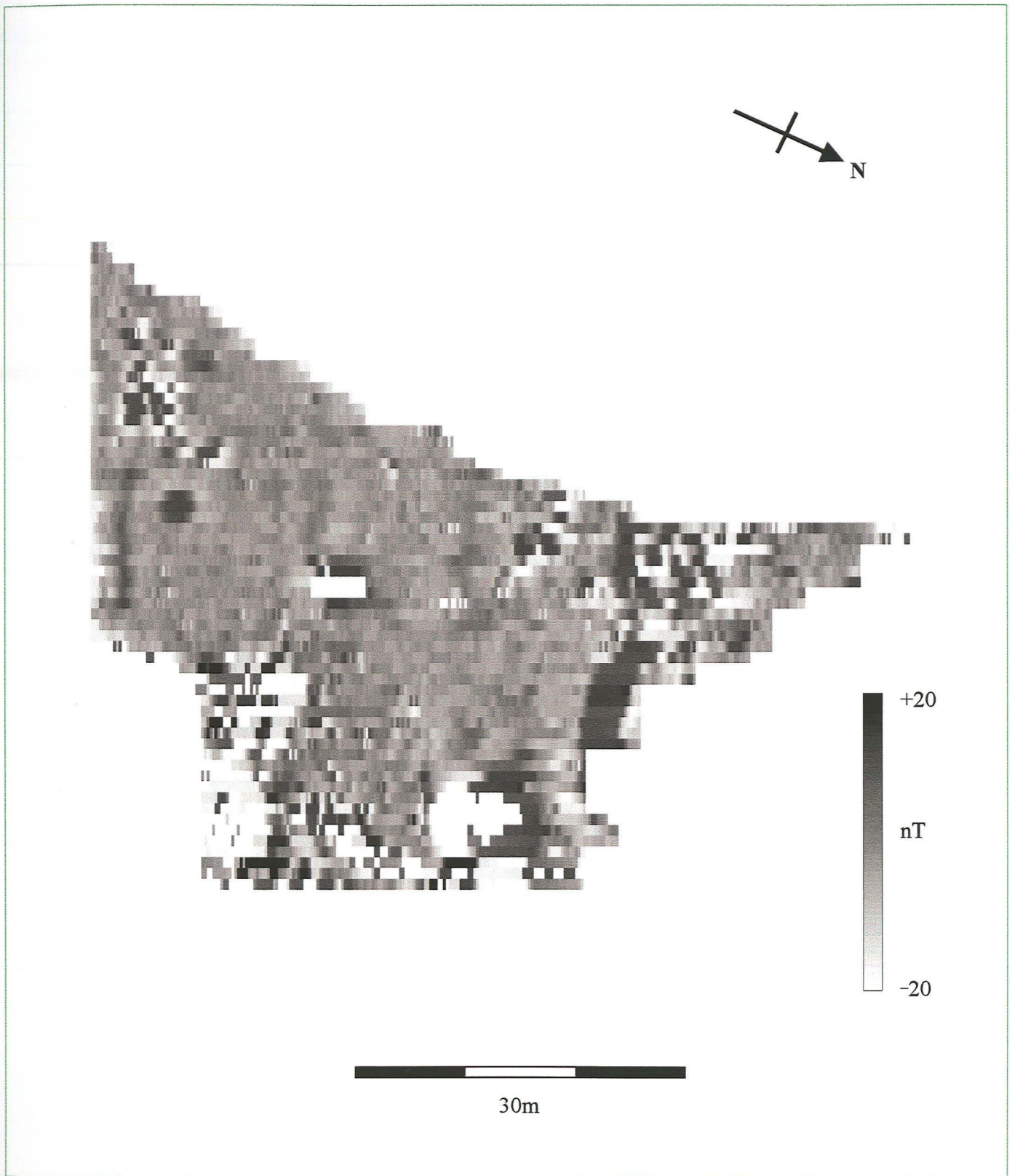


Fig.3: Greyscale image of the clipped data

1:500

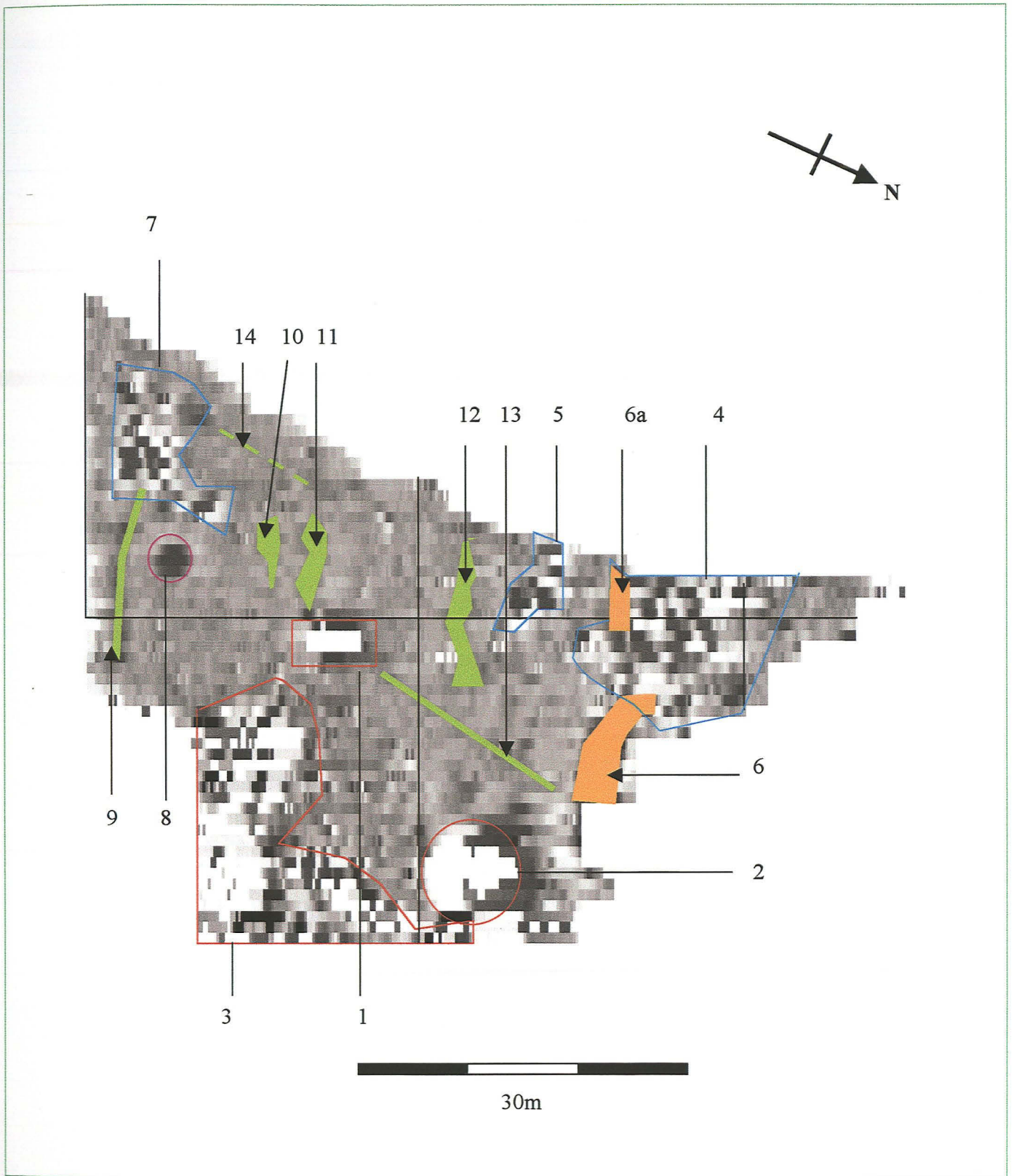


Fig.4: Interpretive plan 1:500

#### 4.0 Results

The raw data is presented as a trace plot (Fig. 2), a greyscale image (Fig. 3), and an interpretive plan (Fig. 4).

Earthworks suggest that archaeological remains lie within the site; the survey detected magnetic anomalies that appear to support this, although not all of the anomalies correspond with obvious surface features. Other anomalies reflect modern objects, such as a wire fence surrounding a tree, figure 3: 1, and a livestock creep feeder (2).

A relatively large area of strong magnetic disturbance (3) was detected in the south-east and lowest part of the site. Miscellaneous ceramic debris, including that contained within the backfill of a suspected pond (Part 1, section 8) may account for this variation. Uneven and disturbed ground substantiates this interpretation. Traces of ceramics, flint, sandstone and bone fragments were recovered by auger.

A weaker, area of magnetic variation was detected in the northern part of the survey (4). Soil samples containing fragments of ceramic and modern glass suggest that 4 reflects rubble debris. A smaller area of similar variation (5) was detected to the south of 4.

A broad, east to west aligned, positive linear anomaly (6) was detected to the south-east and, possibly, to the south (6a) of 4. Relatively high levels of clay (within auger samples) probably account for this variation. It is possible that 6 represents the fill of a broad ditch or hollow way (Part 1, section 8). Anomaly 6 appears to correspond with a slight ridge/earthwork.

Magnetically similar to 4 and 5, anomaly group 7 was detected in the south-west corner of the site, where pronounced earthworks were visible.

An apparently circular anomaly (8), detected to the east of 7, was augered to a depth of 1.12m. The sample, which comprised sandy clay with traces of chalk gravel and flint fragments, was waterlogged beyond 0.7m. It is possible that 8 reflects the fill of a former well, although this interpretation is offered only tentatively.

A slight curvilinear anomaly (9) was detected along the mid-southern edge of the site; a possible continuation to the west may be masked or obliterated by anomaly group 7. 9 may represent the traces of a former ditch or hedge.

Other ill-defined anomalies were detected. Of these, anomalies 10, 11 and 12 share a similar alignment with 9 and, as such, may be related. 12 also appears to correspond to a low ridge.

Diffuse linear anomaly 13 extends north from the mid point of the site to within c. 5m of anomaly 6. A similarly aligned, though magnetically weaker, linear (14) may extend along the south-west edge of the site. Although potentially significant, no obvious earthwork corresponds to these features. The importation of soil and extensive levelling during the 1960's has removed or reduced the impact of upstanding features

## 5.0 Conclusions

The survey detected a range of magnetic anomalies, some appearing to complement earthworks that were recorded during site inspection.

An area of strong magnetic variation (3) in the south-east corner of the site may be the result of ceramic debris contained within the fill of a former pond.

Areas of discrete magnetic variation in the northern and southern parts (4, 5, 7) of the site may reflect small traces of ceramic materials, the origin of which has not been resolved by the survey or by auger samples. Anomaly 8, possibly the remains of a well, lies close to and may be related to anomaly group 7.

A series of linear anomalies (9- 14) possibly reflect former boundaries. Others (6/6a) may represent a hollow way, although this interpretation is tentative.

## 6.0 Acknowledgements

Pre-Construct Geophysics would like to thank R Brearley for this commission.

## 7.0 References

- B.G.S. 1996 *Skegness, England and Wales, Sheet 116*. Solid and Drift Edition. 1:50,000 Series. Keyworth, British Geological Survey.
- Clark, A. J. 1990 *Seeing Beneath the Soil*. London, Batsford.
- David, A. 1995 *Geophysical Survey in Archaeological Field Evaluation*. London, English Heritage: Research & Professional Guidelines No.1.
- Gaffney, C., Gater, J. & Ovendon, S. 1991 *The Use of Geophysical Techniques in Archaeological Field Evaluation*. London, English Heritage: Technical Paper No. 9.



APPENDIX 2: Colour Plates



**Pl.1** Shot of the development site, looking SW from the SE corner, showing possible house platforms.



**Pl. 2** Shot of the development site, looking SE from the village green, showing narrow linear earthwork.

### Appendix 3: Results of the auger survey

An auger survey was carried out on 15<sup>th</sup> February 2002, using information from the geophysical survey. Seven holes (A-G) were sunk in the area of marked geophysical anomalies (see location plan, Appendix 1). The results of the survey were as follows:-

**A:** site grid ref. 113.50/103.00

Topsoil: dark greyish-brown sandy clay.

At 0.19m: mid greyish-brown sandy clay with moderate chalk gravel and occasional flint fragments, containing some larger stones which necessitated 3 repositionings of the auger.

At 0.50m: mid-brown silty clay with some sand, believed natural.

**B:** site grid ref. 125.00/101.80

Topsoil: dark greyish-brown silty clay.

At 0.19m: mid greyish-brown sandy clay with moderate chalk gravel, occasional flint fragments, and one sandstone fragment (70mm), containing 1 fragment of bone (discarded) and one charcoal fleck, becoming more stony in the lowest 0.10m.

At 0.49m: mid-brown silty clay with some sand, believed natural.

**C:** site grid ref. 124.00/107.00

Topsoil: dark greyish-brown sandy clay.

At 0.22m: mid greyish-brown sandy clay with moderate chalk gravel, moderate flint fragments, and one large chalk fragment (90mm), becoming waterlogged at a depth of 0.70m. Auger hole abandoned at a depth of 1.22m due to standing water, with no visible change in the deposit.

The geophysical anomaly at this grid reference appears as a discrete feature, and may be the site of a well.

**D:** site grid ref. 153.00/116.50

Topsoil: dark greyish-brown sandy clay with frequent pebbles and flint fragments, and occasional small flecks of CBM.

At 0.17m: dark greyish-brown silty clay with c. 50% chalk gravel.

At 0.20m: mid greyish-brown fine-sandy clay with moderate chalk gravel and occasional sandstone fragments, containing 1 bone fragment (discarded).

At 0.60m: mid yellowish-brown fine- to medium-sandy clay with c. 30% chalk gravel, believed natural.

**E:** site grid ref. 142.50/146.00

Topsoil: mid greyish-brown sandy clay.

At 0.27m: mid greyish-brown plastic clay with occasional chalk gravel.

At 0.42m: mid-brown silty clay with some sand, believed natural.

**F:** site grid ref. 131.00/152.50

Topsoil: mid greyish-brown sandy clay.

At 0.12m: mid greyish-brown clay with occasional chalk pebbles and fragments of CBM.

At 0.35m: dark greyish-brown sandy clay with occasional chalk gravel, containing a fragment of modern glass (discarded). Auger hole abandoned at a depth of 0.45m, as the deposit became too stony to continue.

**G:** site grid ref. 145.00/112.00

Topsoil: dark greyish-brown sandy clay.

At 0.13m: chalk rubble and cobbles. This layer could not be penetrated with the auger, and after 4 attempts to reposition it, the hole was abandoned.

According to local information, a pond in this area was recently backfilled.