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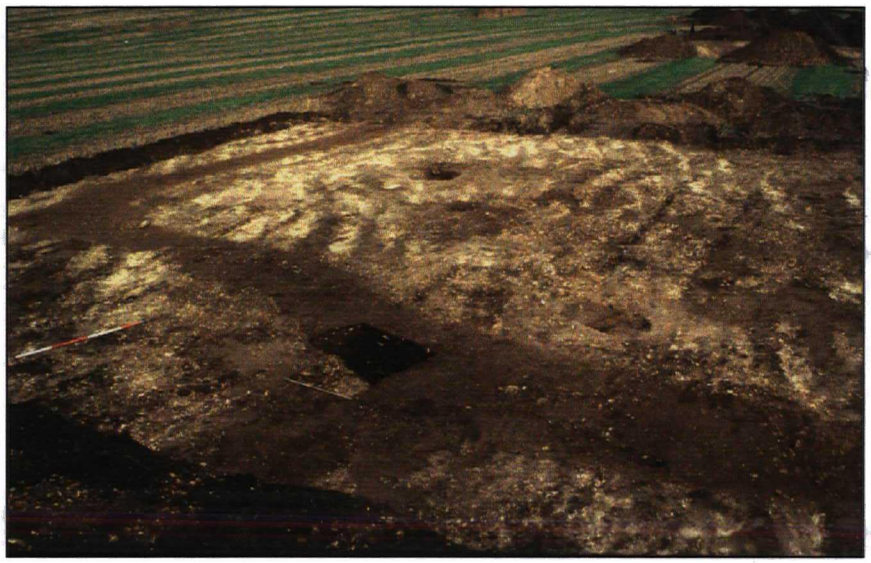
ARCHAEOLOGICAL
SERVICES
WYAS

Land at Barnsdale Bar East
Kirk Smeaton
North Yorkshire

Archaeological Evaluation and Mitigation Strategy



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CLIENT

S.I.T.A. Products and Services Ltd

Land at Barnsdale Bar East

Kirk Smeaton

North Yorkshire

Archaeological Evaluation and Mitigation Strategy

Contents

Summary

An archaeological evaluation and a gradiometer survey were carried out at Barnsdale Bar East in advance of a planning application to extract limestone. The evaluation confirmed the presence of truncated archaeological remains of probable late prehistoric/Roman date. Field ditches formed two phases of boundary delineation and a trackway. Large ditches defined two enclosures, one of which contained several discrete pits and evidence for internal subdivision. A gradiometer survey covering three hectares of land to the east of the evaluation, identified anomalies mostly attributable to recent agricultural practices, infilled field boundaries or geological/pedological features. However, several linear anomalies of a possible archaeological origin were also identified. A mitigation strategy outlines proposals for the rapid recording and excavation of elements of the archaeological landscape identified by the evaluation work, to be carried out prior to, or during, the initial stripping process.

Archaeological Services (WYAS)

1. Archaeological Evaluation

1.1 Introduction

1.1.1 Archaeological Services (WYAS) were commissioned by Mr B. Le Clerc of S.I.T.A. Products and Services Ltd to excavate a total of seven evaluation trenches at Barnsdale Bar East, Kirk Smeaton (Fig. 1). This work was undertaken in advance of a planning application to extend an existing limestone quarry at Barnsdale Bar. The evaluation was concentrated in one of five fields forming an application area of approximately sixteen hectares. The development is centred at NGR SE 515 145.

1.1.2 The site is situated on an undulating arable landscape that rises to the south. The soils are classified as Brown Calcareous loam, with the underlying geology comprising Magnesian Limestone.

1.1.3 This report describes the stratigraphic and artefactual records from this evaluation. The significance of these results is considered within a local context, and the impact of the proposed development upon any archaeological remains is discussed.

1.2 Archaeological Background

1.2.1 The site lies within an extensive landscape of archaeological cropmarks. In the 9km^2 around the proposed quarry extension, 30 archaeological sites have been identified primarily from cropmark evidence (Fig. 2; Boucher 1996). To the immediate north-east of the development area geophysical survey and trial trenching at Long Lane Quarry, by Archaeological Services (WYAS), has identified enclosure and field ditches of probable late prehistoric/Roman date (Webb 1997; O'Neill 1997).

1.2.2 The sample gradiometer survey of the proposed extension area identified linear anomalies representing at least two discrete sub–rectangular enclosures, an irregularly shaped enclosure and an extensive field system of probable late prehistoric/Roman date (Fig. 3; Cottrell 1996). Concentrations of discrete features (pits or hearths) were also identified within the enclosures. A scheme of investigation was drawn up by Archaeological Services (WYAS) and agreed by the North Yorkshire Sites and Monuments Record (SMR).

1.3 Aims and Objectives

1.3.1 The aim of the investigation was to rapidly ascertain the nature, character and consequently, the importance of the site, in support of a planning application for mineral extraction. Specifically the work aimed to investigate the correlation of excavated features with geophysical results, the date, evolution and function of the site, the depth and sensitivity of the surviving deposits and the potential for environmental reconstruction.

1.4 Method

1.4.1 The seven evaluation trenches (Trenches A-G) were located using a robotic 600 series Geodimeter system with reference to control points utilised during the gradiometer survey (Fig. 3). A 360° tracked mechanical excavator, fitted with a smooth-bladed ditching bucket, removed the topsoil and subsoil deposits under direct archaeological supervision. Mechanical excavation was halted at the top of the first archaeological horizon or undisturbed natural, and the area then cleaned by hand.

1.4.2 A sample of the archaeological features in each trench were excavated by hand. A written, drawn and photographic record was made of all material revealed during the course of the excavation. The on-site recording was undertaken in compliance with the standard Archaeological Services (WYAS) method (Boucher 1995). All trenches were planned by hand at a scale of 1:50. Plans of excavated segments were drawn at 1:20 and sections at 1:10. All sections and plans included spot-heights to Ordnance Datum in meters. An inventory of this primary archive data is presented in Appendix I.

1.4.3 All non–modern artefacts were collected as small finds and located three-dimensionally. The artefacts were cleaned and labelled and at the time of writing are held by Archaeological Services (WYAS).

1.4.4 In all trenches, except Trench C, the underlying geology was of a variable yellowish white limestone, and was revealed beneath topsoil approximately 0.25-0.4m in depth. Numerous palaeo-channels and solution hollows formed by the action of water on the limestone bedrock were observed, particularly in Trenches D-F. In Trench C the underlying geology changed from limestone to reddish clay, which was revealed beneath topsoil and subsoil approximately 0.8m in depth.

1.5 Stratigraphic Record

1.5.1 Introduction

A total of 83 contexts were recorded from the seven evaluation trenches and these are listed in Appendix II. All trenches contained archaeological remains and these are described below.

1.5.2 Trench A (Fig. 4)

Trench A measured 10m by 10m and was located to investigate a possible ditch intersection towards the north-western extent of the site. Two ditches 100 and 102, a substantial recut ditch 105, and a drystone wall 104 were identified.

The earliest feature identified in the trench was a north-south aligned ditch 100, which turned through 90° in the centre of the trench and continued east. Ditch 100 measured 0.4m in width and 0.5m in depth.

The second phase was probably represented by the recutting 105 of ditch 100, and by the addition of an east-west aligned ditch 102. The recut 105

and ditch 102 appeared to have almost identical profiles and dimensions. The two ditches measured 1.2m in width and 0.8m in depth. A substantial spread of limestone rubble was observed on the surface of ditch 102, extending for approximately 4m to the western edge of the trench.

No direct stratigraphic relationship between ditches 102 and 105 was observed due to the presence of a drystone wall 104 (Pl. 1), aligned north-south, across the eastern extent of ditch 102 at its intersection with ditch 105. Wall 104 was constructed of roughly hewn limestone blocks, of varying dimensions, with a maximum of 9 courses extending to a depth of 0.75m. The construction of the wall appeared to follow the profile of ditch 102, effecting a revetment. Although no construction cut was observed, a possible western face to the wall was partially exposed, indicating that the wall might measure up to 0.7m in width.

1.5.3 *Trench B (Fig. 5)*

Trench B measured 10m by 10m and was located to investigate a possible ditch intersection towards the northern extent of the site. Two ditches 201 and 202, and a substantial recut ditch 200 were identified.

Ditch 201 was aligned east-west and ended in a rounded terminal in the centre of the trench. The ditch measured 0.7m in width and 0.5m in depth. A substantial recut 200 along the northern edge of ditch 201 traversed the centre of the trench from east to west. The recut 200 of the ditch measured 1.7m in width and 0.9m in depth.

A north-south aligned ditch 202 ended in a rounded terminal approximately 0.6m to the south of ditch 201. The ditch measured 0.4m in width and 0.3m in depth, and also appeared to have a shallow U-shaped profile. The fills of the two ditches 201 and 202 appeared to be contemporary.

1.5.4 *Trench C*

Trench C measured 20m by 20m and was located to investigate possible ditched features towards the north-eastern extent of the site. A single ditch 300 traversed the trench from east to west. The ditch measured 1m in width and 0.47m in depth.

1.5.5 *Trench D (Fig. 6)*

Trench D measured 20m by 20m and was located to investigate possible ditched features towards the north of the site. Four linear ditch features 400/412, 409, 413 and 404, and two discrete pit features 406 and 411, were identified.

Two parallel east-west aligned ditches 400 and 409, 6.5m apart (across the centre), appeared to form a trackway that traversed the centre of the trench. The northern ditch 409 measured up to 1m in width and 0.48m in depth, and was aligned east-west, turning gradually through 45° towards the north-eastern corner of the trench. The ditch intersected with a north-south aligned ditch 413, of wider and deeper dimensions, in the north-eastern

corner of the trench. The fills of the two features appeared to be contemporary.

The southern ditch 400 was much shallower and measured up to 1m in width and 0.15m in depth. Ditch 400 appeared to end to the east in a linear segment 412. The segment 412 measured 2.8m in length and 0.7m in width, and was separated from the ditch by a gap of approximately 1.5m. Both ditch and segment had rounded terminals. The section excavated through the intersecting ditches 409 and 413 appeared to record the confluence of two ditches and may explain the difference in depth between ditches 400 and 409.

A north-south aligned ditch 404, measuring 7.6m in length and 0.96m in width, formed a transverse barrier to the east of the ditch segment 412 of the trackway. Ditch 404 had rounded terminals to the north and south, and formed a gap of 3m with the northern ditch 409 of the trackway.

One of two discrete pit features which lay on the western side of ditch 404 was investigated. Pit 406 was sub–rectangular in plan and measured 1.02m in length, 0.64m in width and 0.33m in depth. A further discrete pit feature 411 was located immediately south of pit 406.

1.5.6 *Trench E (Fig. 7)*

Trench E measured 20m by 20m and was located centrally within the site to investigate the south–west corner of a possible enclosure (Pl. 2). A large curvilinear enclosure ditch 502, three internal discrete pit features 500, 516 and 517, and a linear ditch feature 518 to the west of the enclosure, were identified.

Enclosure ditch 502 (Pl. 3) ran roughly north-south along the western side of the trench before turning through 90° and continuing east. The ditch measured 2.13m in width and 1.1m in depth. The pattern of deposition observed within the ditch appeared to indicate a ploughed out bank external to the enclosure. A shallow V-shaped re-cut 509, 1.24m in width and 0.6m in depth, was observed in section along the western side of the ditch. In addition, an isolated but substantial spread of limestone rubble approximately 4m in length and 1.8m in width was observed on the surface of the south-western corner of the enclosure ditch.

Only one of the three pit features which lay within the area defined by the enclosure ditch was investigated. Pit 500 was sub-circular in plan and was located in the south-western corner of the enclosure. The pit measured 2m in length, 1.45m in width and 0.55m in depth. Two other discrete pit features 512 and 514, were located in the north-eastern corner of the trench. Towards the western extent of the trench, an east-west aligned linear ditched feature 516 ended in a sub-rounded terminal within 1m of the western section of the enclosure ditch 502. This may also be indicative of a ploughed out bank external to the enclosure.

1.5.7 *Trench F (Fig. 8)*

Trench F measured 20m by 20m and was located towards the south of the site to investigate the south-west corner of a possible enclosure (Pl. 4). A large curvilinear enclosure ditch 607, three linear ditch features 609, 617 and 618, and several internal discrete pit features 600, 602, and 612-616, were identified.

Enclosure ditch 607 was slightly irregular in plan, and ran roughly north-south along the western side of the trench, before turning through 90° and continuing east. The ditch measured up to 2m in width and 0.85m in depth.

Shallow ditch 609 intersected with the southern section of the enclosure ditch 607 on its southern side. The two features appeared to be contemporary. Ditch 609 measured 0.89m in width and 0.33m in depth.

Two of the several discrete features that lay within the area defined by the enclosure ditch 607 were investigated. Pit 600 was sub-oval in plan and was located towards the south-eastern extent of the trench. The pit measured 1.35m in length, 0.95m in width and 0.22m in depth. Pit 602 was sub-rectangular in plan and located towards the western extent of the trench. The pit measured 2.28m in length, 1.35m in width and 0.4m in depth. An environmental sample was taken from the upper fill 602 of this pit.

A concentration of four discrete pit features 611-614, were located towards the north-eastern corner of the trench, and a further two discrete pit features 615 and 616 located close to the excavated pits 600 and 602. Two other linear ditch features were identified but not investigated. Ditch 618 was aligned east-west and ended in a sub-rectangular terminal within 0.2m of the south-western corner of the enclosure ditch 607. An internal ditch 617, aligned north-south along the eastern side of the trench, intersected with the southern section of the enclosure ditch 607, on its northern side.

1.5.8 *Trench G (Fig. 9)*

Trench G measured 10m by 10m and was located towards the southern extent of the site to investigate a possible ditch intersection. Two ditches 709 and 706/712, and two discrete pit features 704 and 714, were identified.

Ditch 709 was aligned north-south and terminated in a sub–rounded terminal within 0.2m of ditch 706/712. The ditch measured 1m in width and 0.4m in depth.

Ditch 706/712 traversed the centre of the trench from east to west immediately south of ditch 709. The ditch measured 0.98m in width and 0.4m in depth. The almost identical profiles and dimensions of ditches 706/712 and ditch 709 suggested that these features were contemporary.

Pit 704 appeared to be sub–circular in plan and cut the infilling of ditch 706/712 towards the western extent of the trench. The pit measured approximately 1.12m in length, 0.78m in width and 0.52m in depth. The full extent of the feature was not exposed.

One other discrete pit feature 713 was identified towards the north–western corner of the trench but was not investigated.

1.5.9 Discussion

At least two phases of boundary delineation were identified in the field system to the north of the site. The earliest phase ditches in Trenches A and B, and the substantial recuts and ditch observed in Trenches A, B and C, were extremely similar in terms of their dimensions and profiles, and the form (colour/texture/inclusions) of deposits filling them.

The development of the field system in Trench A was difficult to determine due to the presence of the wall 104 in the ditch intersection. One possibility is that ditches 105 and 102 were cut at the same time, but at some stage during their usage, ditch 102 became redundant. The spread and depth of limestone rubble in the filling of ditch 102 suggests that the feature had been deliberately backfilled, perhaps to create a causeway across this ditch. The wall 104 may have been built to retain this causeway.

In Trench D the ditches of the trackway 409, 400, 412, and the field system 413 appeared to be contemporary, although earlier activity is attested by the presence of two pits seemingly cut by the transverse ditch 404. Conversely in Trench G, where ditches of the field system also appeared contemporary, a later phase of activity was represented by a pit cutting one of the ditches.

In Trench E, an external bank is postulated for the enclosure given the deposition observed in the ditch and the enclosures apparent isolation from the field system. This may be indicate that the enclosure was utilised for stock control as opposed to being utilised as a defensive feature. The spread of limestone rubble on the surface of the south–west corner of the enclosure ditch 502 has parallels with the possible backfilling observed in Trench A, and perhaps represents the creation of a causeway across the ditch. In Trench F, where the enclosure intersected with the field system, the features appeared contemporary. Although of similar dimensions, the enclosure in Trench E was considerably more irregular in plan than that in Trench F and contained considerably less internal features. This may relate to differences in date or function between the enclosures.

The small gaps noted between ditch terminals in Trenches B, D, F and G are unlikely to have formed entrances, especially given that more substantial entrances through field ditches were apparent from the gradiometer survey (Cottrell 1996), and that severe horizontal truncation by ploughing is likely to have occurred, particularly in the last few centuries.

1.6 Artefactual Record

1.6.1 Introduction

A total of five small finds were recovered from stratified contexts during the evaluation at Barnsdale Bar East. A further eleven unstratified small

finds (Δ1-Δ11), nine of flint and two of pottery, were recovered from the surface of the field during the course of the evaluation. The unstratified finds included a flint arrowhead and a scraper, in addition to pottery sherds of Roman and medieval date. The artefacts are listed in Appendix III.

1.6.2 Flint

A single flint flake (Δ12) was recovered from the primary fill 301 of ditch 300 in Trench C.

A single flint flake (Δ14) was recovered from the tertiary fill 604 of ditch 607 in Trench F.

1.6.3 Metal Objects

Several large fragments of slag (Δ13) with vitrified organic inclusions were recovered from the single fill 106 of ditch 105 in Trench A.

A fragment of slag (Δ16) was also recovered from the single fill 410 of ditch 409 in Trench D.

A ferrous nail (Δ15) was recovered from the single fill 705 of ditch 706 in Trench G.

1.7 Environmental Record

1.7.1 Only one environmental sample was taken during the evaluation, from the upper fill 603 of pit 602 in Trench F. A considerable quantity of charcoal was present in the sample.

1.8 Conclusions

1.8.1 The evaluation confirmed the presence of severely truncated linear ditches and discrete pits corresponding faithfully to, and supplementing, the anomalies identified by the gradiometer survey (Cottrell 1996). The evaluation also confirmed that several of the ditches observed in different trenches were likely to be continuations of the same features.

1.8.2 The field system at Barnsdale Bar East is characterised by a linear pattern of boundary delineation. Towards the north of the site the field system appeared to have evolved from shallow ephemeral ditches into more substantial boundaries. The exact form and chronology of this evolution is difficult to determine given the paucity of datable artefactual evidence and the lack of stratigraphic relationships between features. A broad contemporaneity seems likely given that many of the ditches respected each other, and that ditches of the earliest phase must have been visible, if not in use, when boundaries were subsequently redefined. That these boundaries were redefined is attested by the evidence for recutting and backfilling.

1.8.3 Understanding the chronological relationship of the enclosures to the field system was made difficult by the lack of stratigraphic relationships between features and the dearth of artefactual material present. The function of the enclosures was equally difficult to determine given that none of the discrete features identified in the areas defined by the enclosure ditches, resolved

themselves into recognisable structures. It is possible that the discrete features relate to similar features beyond the enclosures, although given the area sampled by this evaluation, this is unlikely to be the case. The size of the ditches however, and the number of internal features, indicated substantial enclosures probably utilised for domestic settlement or livestock control. That the usage of these enclosures extended over a considerable period of time is attested by the evidence of recutting of the enclosure ditches and by the creation of new causeways across them.

1.8.4 The archaeological remains investigated at Barnsdale Bar East are clearly not of national importance, however they are consistent with the landscape of late prehistoric/Roman ditched enclosure and field systems identified by previous evaluations, watching briefs and geophysical surveys in the vicinity (Boucher 1996; O'Neill 1997; Webb 1997). These have indicated that far from being uniform, field systems and enclosures of this date vary considerably in their complexity and nature. The construction of a wall in a ditch intersection, as observed in Trench A, is a particularly unusual phenomenon, parallels of which have yet to be found. Although only a small sample of the proposed extension area was evaluated, the archaeological features identified indicate that the landscape in this area was a fairly open one, dotted with isolated foci such as the two enclosures, and subdivided into large areas by field ditches.

1.8.5 The potential for the dating and interpretation of the site on the basis of cultural artefacts alone appears to be low. There is possible potential for dating by scientific methods if enough suitable material could be obtained. Further work can only elucidate on the exact chronological development of this landscape and the function of the enclosures within it.

2. Additional Gradiometer Survey

2.1 Introduction & Archaeological Background

2.1.1 The geophysical survey was centred at SE 516 146. The survey covered an area of three hectares, this being the greater part of the unsurveyed area within fields previously surveyed (Cottrell 1996).

2.1.2 About half the current survey area was under stubble with the remaining, middle field, having recently been harvested of a sugar beet crop. This field slopes upwards from north to south and has lynchets at its eastern and western boundaries. This field was also very muddy at the time of survey (November 13th to 17th 1998) with very deep ruts in places. The easternmost field sloped steeply upwards towards the north-east.

2.1.3 The 1996 geophysical survey identified at least three enclosures with associated ditched land divisions. Other earlier geophysical surveys (Boucher 1993; Webb 1996) and subsequent trial excavations in the immediate vicinity of the current survey area have revealed similar anomalies/features which are suggestive of a relict enclosed landscape of late prehistoric/Roman date.

2.1.4 The objectives of the survey were:

- to establish the presence/absence of any magnetic anomalies to the east of the 1996 survey area.
- to characterise any such magnetic anomalies in the light of previous survey and excavation results.

2.2 Results & Discussion

2.2.1 The gradiometer data, both the 1998 and the adjacent 1996 surveys, are presented as a dot density plot super-imposed on an Ordnance Survey digital map base at a scale of 1:2500 in Figure 3. The data are also presented as a dot density plot at a scale of 1:1250 (Fig. 11), with an interpretative overlay (Fig. 10). The data are presented as dot density and X - Y trace plot formats at a scale of 1:500 in Appendix VII.

2.2.2 The most common anomalies are the isolated dipolar responses or 'iron-spikes' (Appendix IV) which have been identified across the whole of the site. Responses such as these could be caused by archaeological artefacts, but the lack of a discernible distribution pattern suggests a non-archaeological origin; they are probably caused by modern ferrous debris in the topsoil which commonly occurs on rural sites as a consequence of manuring.

2.2.3 The other common anomalies are the positive linear striations that are orientated north-west to south-east in all three fields. These anomalies coincide with the orientation of the current ploughing regime. There are also similar linear anomalies, orientated from south-west to north-east, in

the middle field that probably represent an earlier ploughing regime or field drains.

2.2.4 Three linear anomalies on a parallel north-west to south-east alignment have also been identified. These reflect former and current field boundaries; the western and eastern responses reflect boundaries that are still extant in places as lynchets but which are flat and could be surveyed across in other parts. The middle anomaly is caused by a ploughed out and infilled field boundary.

2.2.5 Four areas of magnetic enhancement are present. The broad and diffuse nature of these responses suggests that they are probably natural in origin; reflecting geological or pedological changes. However, an archaeological origin for the responses cannot be ruled out. The westernmost of these four areas is the most suggestive of anthropogenic activity but the lack of associated non-agricultural anomalies indicates that the anomaly is probably natural in origin. The area of enhancement to the east is located close to the break of slope within this field and may therefore be caused by a combination of topographical and geological variations.

2.2.6 A number of positive isolated reposes are present in the northern part of the survey area. These anomalies may indicate areas of burning or pits as they are not typical ferrous responses. However, it should be noted that the limestone geology is susceptible to physical and chemical erosion and that infilled erosional features might also account for these anomalies.

2.2.7 The remaining positive linear anomalies form two distinct groupings. The first are located in the eastern part of the site and are oriented north-west to south-east. It is possible that these anomalies have an archaeological origin (para. 2.2.10) but their linearity and the fact that they are parallel with a recently installed field boundary suggests a modern origin.

2.2.8 The second group of positive linear anomalies are located in the western half of the site. These anomalies have different orientations and are not as regular as the anomalies that have been interpreted as being part of the modern agricultural/field boundary system. The breadth of some of the responses and the fact that there is no obvious pattern to, or connections between, the different anomalies suggests that they anomalies are probably natural in origin. However, it is also possible that the anomalies represent truncated or discontinuous features and an archaeological origin cannot, therefore, be ruled out. There is not enough evidence to definitively interpret these anomalies.

2.2.9 When analysing the geophysical data in relation to the earlier, adjacent geophysical surveys (Fig. 3; Cottrell 1996) it can be seen that the 1998 survey area contains fewer probable archaeological anomalies. This is not too unexpected as the fields covered by the 1998 survey are much more steeply sloping than those fields surveyed in 1996. This may have meant that these areas were less desirable as sites for enclosure/occupation and also that there will probably have been greater differential soil erosion on the slopes such that the magnetic responses of any archaeological features

present may be masked by an increased depth of soil cover or have been destroyed by ploughing where the topsoil is intermittent.

2.2.10 It is possible that the linear anomaly that was evaluated by trenches A, B and C (Fig. 3.) turns and continues into the north-eastern part of the 1998 survey area and is detected as the discontinuous positive linear anomalies that are parallel with the modern field boundary.

2.2.11 Trench D revealed the presence of a possible truncated ditch trending east to west (para. 1.5.5) that appears to continue into the 1998 survey area. There is an anomaly in the north-western part of the survey area that corresponds closely with this anomaly but there is a significant difference in the responses of the two anomalies which may indicate that the anomalies are caused by two different features.

2.2.12 None of the archaeological anomalies in the north of the 1996 survey area continue as obvious anomalies into the 1998 survey areas. There are two positive linear "archaeological" anomalies in the south-west of the 1998 survey area that may be continuations of the enclosure system identified in the previous surveys but again there is not enough evidence to definitely link them. The anomalies identified in the earlier surveys are close to the orientation of the modern ploughing regime and so it is possible that they do continues but are masked by the stronger agricultural responses in the 1998 survey area.

2.2.13 The area of magnetic enhancement in the east of the 1998 survey area can be seen to continue into the previous survey area as a negative response. A strong linear anomaly, interpreted as a possible field boundary in the 1996 survey, is also adjacent to the enhanced area possibly indicating that the response is due in part to the continuation of the field boundary.

2.2.14 Comparing the previous geophysical surveys and subsequent excavations it can be seen that the gradiometer surveys have not detected all the archaeological features that were revealed in the excavations. There are generally a number of factors that can cause this non-detectablity of some features, any of which are possible across the site. The main factors are likely to be truncation of features by ploughing such that there is little or no change in magnetic susceptibility across the feature, geological/pedological variations that "mask" the magnetic responses, difficulty in identifying archaeological features that are parallel with an agricultural regime or simply that the archaeological features are too small to detect with the current instrumentation available.

2.3 Conclusions

2.3.1 Most of the identified anomalies are attributable to recent agricultural practices, field boundaries or geological/pedological variations.

2.3.2 There are several linear anomalies that are potentially of archaeological origin but there are no anomalies that are as archaeologically significant as those in the adjacent areas to the south and west.

2.3.3 As strong archaeological anomalies were detected in the previous survey areas this indicates that the absence of significant archaeological anomalies within the 1998 survey area is probably a real absence rather than being due to a lack of magnetic contrasts between features and the surrounding soil.

The results and subsequent interpretation of geophysical surveys should not be treated as an absolute representation of the underlying archaeology. It is normally only possible to prove the archaeological nature of anomalies through intrusive means such as by trial excavation.

The absence of geophysical anomalies should not be interpreted as indicating an absence of archaeological features. Supporting evidence should always be sought by alternative methods such as by trial trenching.

3. Archaeological Mitigation Strategy

3.1 Introduction

3.1.1 This mitigation strategy has been prepared by Archaeological Services (WYAS) for Mr B. Le Clerc of S.I.T.A Products and Services Ltd. S.I.T.A. Ltd have been advised by the North Yorkshire Sites and Monuments Record (SMR), on the basis of archaeological work already carried out, that the archaeological remains to be affected by a proposal to extend the quarry at Barnsdale Bar will require further investigation.

3.1.2 The North Yorkshire SMR have advised that a strategy for the mitigation of the impact of extraction on the archaeology is required to ensure that the archaeological remains are adequately recorded and the results are brought into the public domain.

3.2 Archaeological Background

3.2.1 The site of the proposed development, centred at SE 515 415, impacts upon an area that contains a complex of field systems and enclosures of potentially late prehistoric/Roman date, visible on oblique aerial photographs as an extensive cropmarked landscape (Boucher 1996). Although little stratified dateable artefactual material was recovered during the evaluation, the features are presumed to be of late prehistoric/Roman date, based on the results of previous investigations in the vicinity of Barnsdale Bar (Boucher 1996; O'Neill 1997).

3.2.2 Ditched enclosures and field systems of this date generally appear to have been utilised for a variety of purposes, including domestic, industrial, animal husbandry, defensive, mortuary, or all or several of the above These enclosures can represent individual farmsteads or similar groups of buildings forming compounds (Hingley 1989). Enclosure ditches are often very visible features on aerial photographs and geophysical survey plots, and can be easily targeted by excavation. In contrast, the ephemeral nature of structures associated with domestic settlement restricts their survival in the archaeological record, and their visibility. This is especially true in areas that have been subject to intensive ploughing for several centuries. The chronology and use of enclosures and associated features is poorly understood, due primarily to the paucity of dateable material recovered from them. Romano-British pottery, of first to fourth century date, is often recovered from the upper fills of ditches, but this does not necessarily date their cutting or their main period of usage (Chadwick 1997).

3.2.3 At Barnsdale Bar East, areas to the east and west of the enclosures appear, from the results of the gradiometer survey, to be of limited archaeological potential. Recent excavations by Archaeological Services (WYAS) however, of enclosures defined by discrete and narrow linear features undetected by geophysical survey and aerial photography, have

demonstrated the danger of ignoring so-called 'blank' areas, (Howell 1996, 1997).

3.2.4 A number of factors must be taken into consideration in advance of and/or during development:

- the continuation of, and potential stratigraphic relationships between, features which were not observed during the evaluation.
- the presence of features which are undetectable by remote sensing techniques.
- the truncated nature of the archaeological remains.

3.3 Aims and Objectives

3.3.1 To preserve the archaeology at the site by recording, at an appropriate level of detail, all archaeological features encountered within the boundaries of the proposed development area.

3.3.2 To determine the function, period of use and importance of the enclosures, field systems and associated features. In particular to establish firm dates for pre-Roman activity and establish elements of continuity and/or modification in Iron Age/ Roman settlement and landscape regimes.

3.3.3 To establish a chronological sequence of landscape development.

3.3.4 To investigate the possibility of settlement and/or activity areas not detectable on aerial photographs or by geophysical survey.

3.3.5 To ascertain the environmental background of the site.

3.3.6 To assess the site in its wider landscape context.

3.3.7 To disseminate the results of the works to the wider public and to the academic community.

3.4 Strategy and Methodology

3.4.1 It is proposed that two areas, Areas AA and AB (Fig. 12), should be machine stripped under strict archaeological supervision and targeted for open area excavation (paras 3.3.1-3.3.3). Area AA measures 110m by 60m and would expand on two previously evaluated enclosures located centrally within the proposed development area. Area AB measures 56m by 50m and would involve the excavation of a previously unevaluated enclosure towards the southern extent of the proposed development. The two areas of excavation cover approximately 6% of the total development area.

3.4.2 It is also proposed that a watching brief is carried out during topsoil stripping in an area (Area A, Fig. 12), identified as of greatest archaeological potential (paras 3.3.1, 3.3.3 and 3.3.4). Topsoil removal in this area would be archaeologically controlled. The area of watching brief covers a further 54% of the total development area.

3.4.3 The preservation of the archaeology at the site by record (para. 3.3.1), will be achieved through the following excavation sampling strategy. A sufficient sample of archaeological features will be investigated in order to acquire an understanding of the full stratigraphic sequence, down to naturally occurring deposits.

In the excavation areas:

- A minimum excavation of 10% length of linear enclosure ditches. A contingency should be made for the rapid excavation of enclosure ditches to recover dateable artefactual or ecofactual material, should there be a dearth of such material in the initial sample.
- Excavation of intersections of linear features by means of a box section to demonstrate and record stratigraphic relationships.
- Discrete features such as post-holes, pits, kilns, hearths and gullies to be subject to a 50-100% sample by volume as appropriate.

In the areas covered by the watching brief:

- all archaeological features will be subject to rapid survey and selective sample excavation, with particular emphasis on ditch junctions.

A full written, drawn and photographic record will be made of all material revealed during the course of the excavation. Given that the spatial location of features will be crucial to an understanding of the site, all archaeological features will be surveyed in detail using the Geodimeter Total Station theodolite. Larger scale hand drawn plans and sections will be drawn of excavated features where appropriate.

3.4.4 To assist in environmental reconstruction (para. 3.3.5), a soil-sampling programme will be undertaken for the recovery of carbonised remains, vertebrate remains, molluscs and small artefactual material. Where appropriate and practicable soil samples of up to 30 litres will be taken from excavated contexts, and larger samples will be taken of any rich carbonised deposits. To assist in the dating of the enclosures and field systems (para. 3.3.2), specific attention will be given to the recovery of carbonised material from primary ditch deposits. The carbonised material could provide radiocarbon determinations where there is a paucity of dateable artefactual material.

3.4.5 To place the investigations at Barnsdale Bar in a more meaningful archaeological and landscape context (para. 3.3.6), it is proposed that a distribution map is produced of all known archaeological sites and find spots pertinent to this area. This would be included in the publication report. The principal sources of information would be the North Yorkshire SMR, West Yorkshire SMR and South Yorkshire SMR. The collation would include an aerial photographic search of a 1.5km^2 area around the site. All relevant crop marks would be rectified and plotted. Geophysical survey data for the immediate 1.5km^2 area around the site would also be plotted on the distribution map.

3.4.6 To disseminate the results of the works to the wider public and academic community (para. 3.3.7), it is proposed that the results are reported in two formats:

- published with illustrations in an appropriate academic journal or monograph.
- published with illustrations as a short stand-alone popular booklet.

3.4.7 The analysis of artefacts and environmental samples, the acquisition of absolute dates through radiocarbon dating, and the completion of an archive summary report and of publication reporting, would form part of a post-excavation programme. The archaeological works would comply with any requirements made by the North Yorkshire SMR.

Aims and Objectives	**Strategy and Methodology**
Preserve the archaeology of the site by record.	Undertake open area excavation and watching brief in areas of greatest archaeological potential. Carry out excavation and recording strategy.
Establish the function, date, and importance of enclosures.	Carry out excavation sampling strategy, diagnostic finds recovery and radiocarbon dating sampling strategy.
Establish chronological sequence of landscape development.	Target feature intersections to establish stratigraphic relationships between, and dating of, features.
Identify settlement/ activity areas not visible on aerial photographs or geophysical survey.	Undertake watching brief in area of greatest archaeological potential.
Ascertain the environmental background of site.	Carry out environmental sampling strategy.
Assess the site in its wider landscape context.	Collate and present results from other work in the area on distribution map.
Disseminate the results to the academic community and wider public.	Produce academic report and popular booklet.

Table 1: Summary of mitigation strategy

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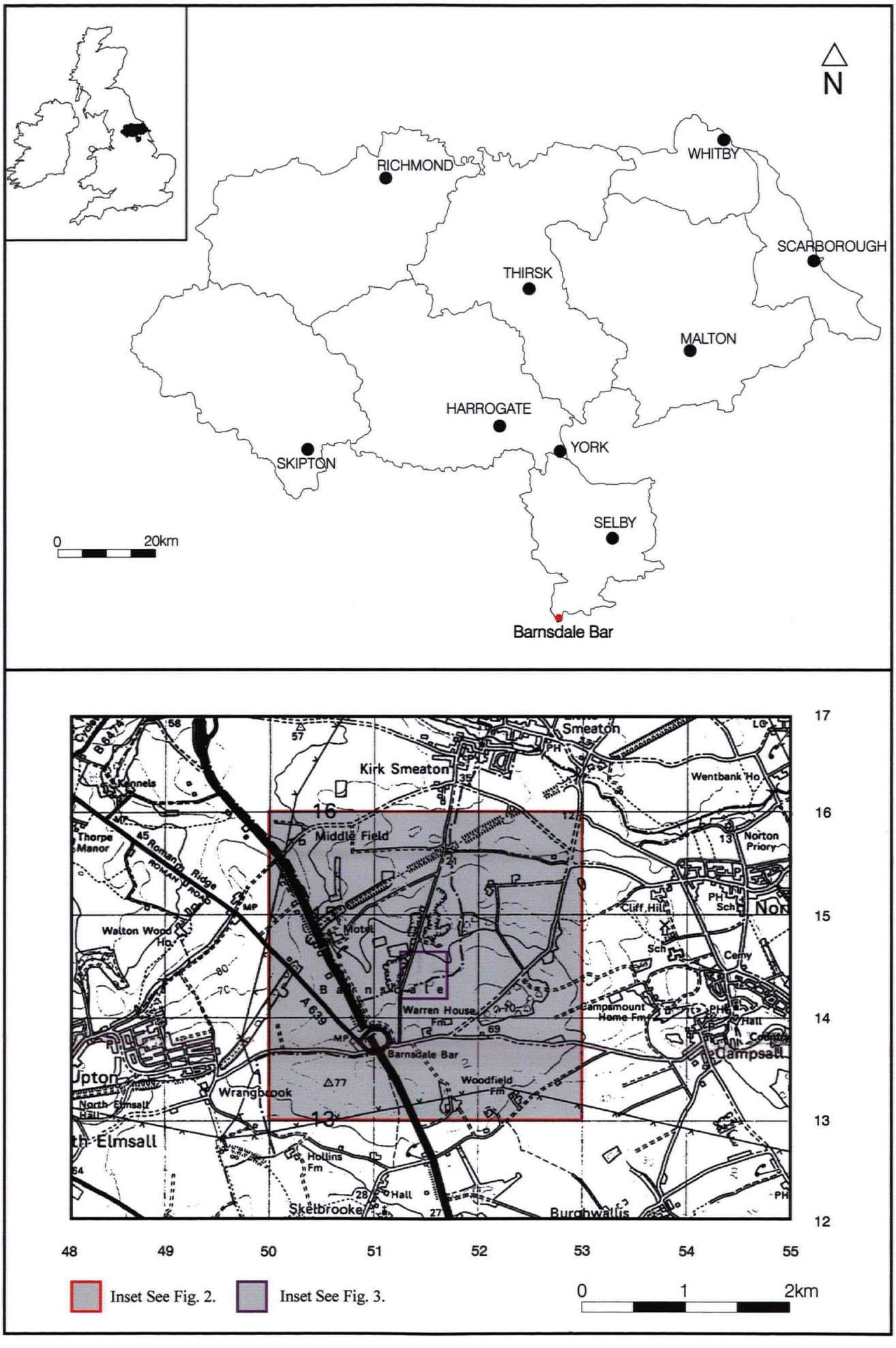

Fig. 1. Site Location

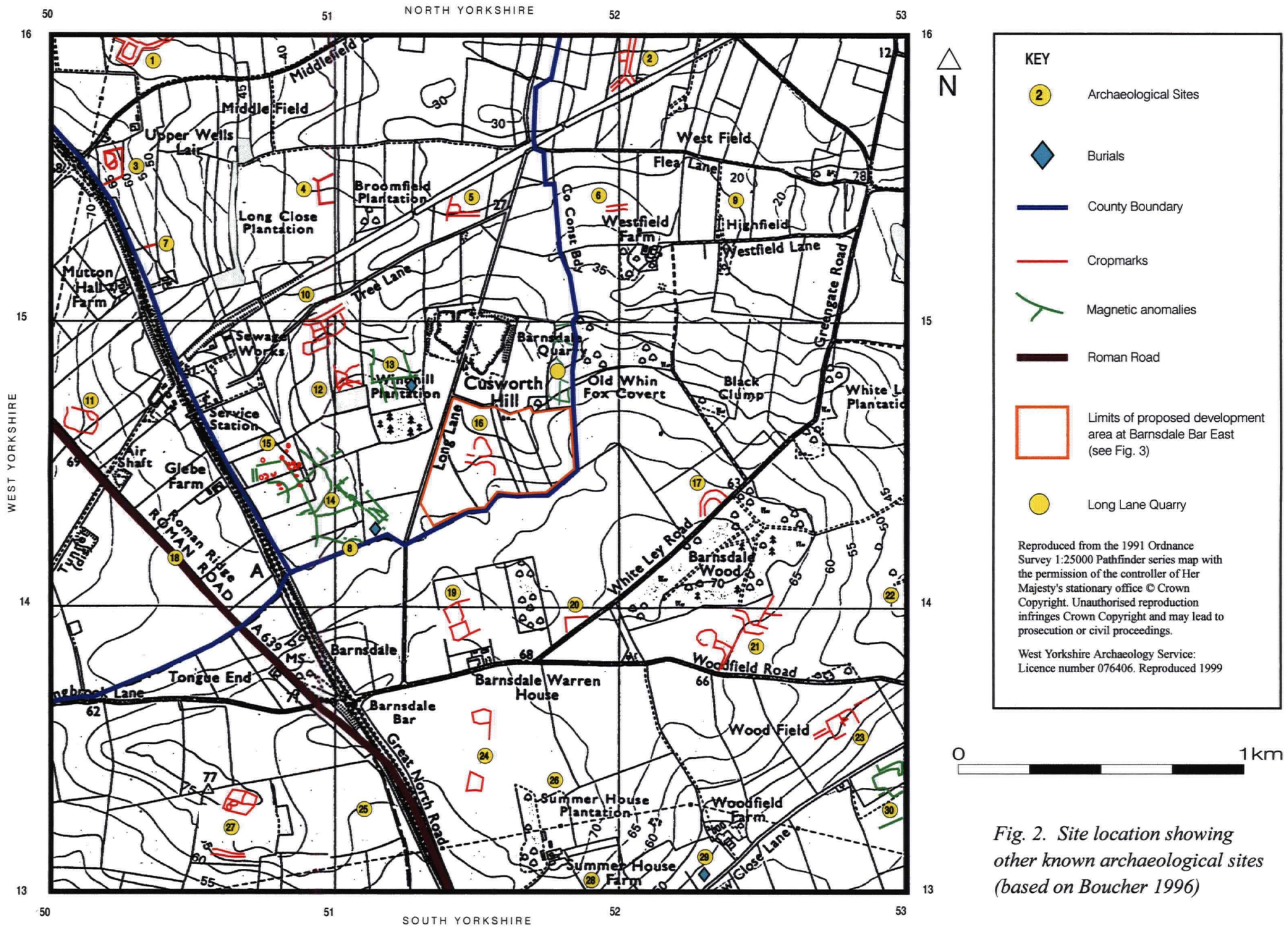

Fig. 2. Site location showing other known archaeological sites (based on Boucher 1996)