AN ARCHAEOLOGICAL ASSESSMENT OF THE PROPOSED SCORTON QUARRY EXTENSION, BROMPTON-ON-SWALE, NORTH YORKSHIRE

A programme of research carried out on behalf of

Tilcon (North) Ltd

by

GeoQuest Associates

1 INTRODUCTION

1 01 This report presents the results of an archaeological study consisting of a desk-based assessment and a geophysical survey on the site of the proposed extension to Scorton Quarry (NGR SE229998), between Brompton-on-Swale and Scorton in the distnct of Richmondshire, North Yorkshire (Figure 1)

1 02 The desk-based investigation included a search of documentary and cartographic sources to establish the archaeological and historical background of the area, and a held visit on 2nd April, 1997

1 03 The aim of the geophysical investigation was to use remote sensing techniques to test for the presence of subsoil archaeological features in order to verify and extend the findings of the desk-based assessment

1 1 Landuse, Topography And Geology

1 1 1 The study area comprises approximately 11 hectares of farm land situated on alluvial terraces immediately north of the River Swale Four adjoining areas were examined in this investigation

Area 1 (arable) adjacent to the river on a level floodplain
Area 2 (arable) west of Areas 1 3 and 4, comprising land that slopes S towards Bridge Farm
Area 3 (stubble) divided from Area 4 by a sharp wooded scarp
Area 4 (pasture) which adjoins Area 1 at a similar level but is separated from it by Howe Hill Lane

The OS geological one-inch series of maps (dnft and solid sheet 41) indicate that Areas 2 and 3 are underlain by river terrace alluvium of both Pleistocene and Recent date while Areas 1 and 4 are underlain by undifferentiated alluvium over boulder clay The solid geology comprises Carboniferous Millstone Gnt

2 DESK-BASED ASSESSMENT

2 01 The methodology and summary of the findings are descnbed below, with a comprehensive list of the sources that were used given in Appendix I

2 1 North Yorkshire Sites and Monument Record

2 1 1 The Sites and Monument Record (SMR) at North Yorkshire County Council Heritage Unit, Northallerton, was consulted to see if any archaeological features were recorded in the survey area This search provided no direct documentary record of archaeological or historical remains m the application area The search was then extended to an area withm a radius 2 km and the findings are summarised in Figure 2 and tabulated in Appendix II The results are discussed below

2 2 Scheduled Ancient Monuments

2 2 1 Although no Scheduled Ancient Monuments (SAMs) exist m the study area, nor in the parish of Scorton, a large area to the southwest encompassing the Roman fort and town of *Cataractonium* has been scheduled as an Ancient Monument (SAM NY169) This Monument comprises four land parcels either side of the river Swale *Cataractonium* North comprises two parcels north of the River Swale which extend eastwards to within 0 2 km of Area 2 and 0 3 km of Area 1 in this assessment (Appendix III) The structure of Cattenck Bndge, 0 2 km south of the study area, is recorded as a Scheduled Ancient Monument (SAM NY50) and a listed Grade II* building Additional archaeological features within 2 km of the study area include Iron Age enclosures (revealed by cropmarks) and Roman remains that are also scheduled (SAM NY907)

2 3 Aenal Photographs

2 3 1 Vanous collections of both vertical and oblique air photographs were inspected at North Yorkshire County Council Hentage Unit to try to locate any potential archaeological features m the application area (Appendix I) The vertical photographs provided good evidence for a number of past changes in landuse and field boundanes

Area 1 appears once to have been divided into two East West aligned strips with contrasting landuse
Area 3 was once divided in half by a North South aligned boundary
Area 2 appears to have once been divided into three North South aligned stnps
The photographs indicate a pattern of medieval ridge and furrow cultivation in the field adjacent to Bridge Farm, west of Area 1 and south of Area 2

2 3 2 Several smaller scale oblique photographs show the area under investigation and reveal several linear and curvilinear cropmark features in Area 2 and a pattern of irregular 'banding' in Area 3 (Appendix I) A distinct curvilinear feature was also located in Area 1 that appears to be pedological or geological in ongin Of archaeological interest are linear features oriented NE that are seen in aenal photographs of Areas 3 and 2 (Plate A) It is possible that these features compnse Romano-British linear ditches (associated with *Cataracto*nium or Dere Street) or 'Celtic' held boundanes The curvilinear feature seen in Area 1 is almost certainly geomorphological in oiigin since a photograph of the adjoining held to the east clearly shows parch marks in the form of a meandenng palaeochannel (NYCC Ref ANY9/4)

2 4 Cartographic Study

2 4 1 An examination of early Ordnance Survey (OS) maps was made in order to distinguish any changes in the positions of the River Swale or held boundanes (Appendix I) This search was also designed to locate any former monuments or archaeological sites in the study area from OS notes or place names Comparison of the present day Ordnance Survey with the First Edition map of 1857 shows that minor held boundary changes have occurred, predominantly in Areas 1 and 2 Although, in principle, landuse information older than 1857 may be denved from tithe or enclosure awards, the study

area is unfortunately close to the boundanes of three parishes, and searches of parish tithe awards have failed to locate the present area of investigation It seems possible that land parcels withm the study area were not subject to inclusion under tithe or enclosure awards owing to proximity to the river

2 5 Site Visits

A site visit to the application area was carried out on April 2nd, 1997 in dry sunny conditions The results of these observations are summansed below

2 5 1 Area 1

Area 1 comprises a level held formed of a sandy loamy soil with pebble inclusions The southern boundary of this area adjoins the River Swale and is walled in stone This structure is of architectural interest since it includes hemi-cylindrical turret-like structures attached, at regular intervals of approximately 7m, to the inside of the wall Both the wall and 'turrets' are of indeterminable age but may be associated with Cattenck Bridge

The surface of this held is raised into a series of subdued E-W aligned ridges whose scale and spacing is consistent with medieval ridge and furrow which has since been eroded N-S oriented ridge and furrow, with similar spacing, is present in the adjoining held east of Bridge Farm A slight topographic rise is present along the eastern boundary of this held that may be related to a c 1m deep and c 200m wide hollow that extends from the NW of the field curving towards the southeastern corner (Plate B) It is seems likely that this feature compnses the silted palaeochannel traversing an older floodplain of the River Swale

A marked groove is seen to cross this held in a direction parallel to the northern boundary The relatively fresh appearance of this feature suggests that it comprises the excavation for a modern land drain

2 5 2 Area 2

This held gradually rises north from Beech Grove before becoming approximately level The soils comprise a sandy loam with inclusions of lithic material and substantial quantities of pottery and tile The presence of these artifacts suggests that further archaeological information might be revealed by a programme of structured held walking Moreover, the proximity of this held to Roman Dere Street highlights the archaeological potential of this study area

Modern land drains are known to be present immediately within the boundanes of this held

2 5 3 Area 3

In the northeastern corner of this field is Hollow Banks House which stands on a prominent plateau that may be an artificial or a natural terrace The field is level and devoid of topographic features To the north of Area 3 are landfill sites at a slightly higher level, surrounded by embankments

2 5 4 Area 4

This field is at a similar elevation to Area 1 and separated from it by an old roadway known as Howe Hill Lane The field consists of an elongated rectangle with mature trees along both of the longer sides (Plate B) A steep scarp separates this field from Area 3 to the north The exposed south side of this 'scarp' carries mature vegetation and there is some evidence of stone revetment Since the scarp is parallel to the River Swale it can be concluded that this feature comprises a natural river terrace

2 6 DISCUSSION

2 6 1 Our search of the Sites and Monuments Record provided little information regarding the region immediately north of the study area since most of this ground has been quarried However over 1 km to the northeast are the remains of the NW oriented 'Scorton Cursus' (SMR No 13547) that extends for 2 1 km This monument and associated circular features have been excavated, revealing ramped external pits to hold timbers or lithics (Topping 1979, 1982) The association of a cursus and related monuments on flat river terraces is a recurring feature especially in the North of Britain, for example at Thornborough 21 kms to the SW of the study area, completing the picture of a Late Neolithic - Early Bronze Age landscape Moreover, south of the application area at Catterick Racecourse a large Neolithic cairn 35 metres in diameter was found in gravel beds below later Roman reworkings (Moloney 1996) The size and position of these Later Prehistonc monuments overlooking the River Swale may indicate a 'ritual' landscape of some importance in the vicinity of the proposed quarry extension

2 6 2 Iron Age and Romano-British features have been recorded, including circular 'round-houses', sub-rectangular stone buildings and associated enclosures (Moloney 1996) A typical example of an Iron Age complex was excavated south of the Racecourse before it was quarried (SMR no 13521-3)

2 6 3 An abundance of archaeological evidence is present in the record for the Roman period, particularly relating to the Fort and later Town of *Cataractonium* The Roman town has been the subject of several excavations, most notably an extensive project for the Ministry of Works and road-building during the late 1950s (Wacher 1960) This along with later limited excavations of the periphery of the fort and settlement revealed many Roman buildings including a *mansio* and a bath house (Wacher 1960) Other known sites north of the river include fortifications possibly for the bridge head that date from Hadrianic times (AD117-138) until the third century Furthermore,

rebuilding south of river occurred during the third and fourth centuries, with the civilian population possibly displaced north and east into the study area By the fifth century Cataratonium had become predominately a civilian town The presence of a marching Camp (SMR no 13512) and an amphitheatre are unusual for a small fort such as Cataractonium and reflect the strategic importance of the river crossing

2 6 4 The archaeological importance of the study area is highlighted by the proximity of the course of Roman Dere Street to the west This road was the main north-south highway connecting the legionary fortress at York with the forts of the Hadrianic frontier Many excavations have taken place along the line of this major Roman Road and to the South near Catterick The Racecourse excavations of the Roman amphitheatre show the continuing occupation in this area from Neolithic, through Roman, to the Anglian period since burials containing brooches typical of AD 450-550 were found in excavated deposits surrounding the amphitheatre (Moloney 1996) This information contributes to the substantial record of Anglian graves and structures in the Catterick area

2 6 5 Approximately 0 3 km east of Catterick airfield, situated in a bend in the River Swale, are motte and bailey earthworks known as Castle Hills (Taylor-Wilson 1995) A similar example survives as earthworks in Catterick Village (SMR no 13506 04) These monuments originate from the 11th century and often occupied strategic points along the river

2 7 CONCLUSIONS

2 7 1 In conclusion it can be stated that no known elements of the archaeological or historical record would be disturbed by the proposed extension However the potential for unknown sites is high because of the attraction of the favourable geographic setting, although such multiperiod settlement may not be continuous It is considered that the archaeological features and periods listed below are the most likely to be represented

Neolithic elements of a 'ritual' landscape typified by barrows cairns and cursus' that were situated and survive on gravel river terraces
Roman remains to the west of the study area (Area 2) associated with a corridor of activity along line of Roman road and more importantly the proximity of Roman Cataractonium North
Archaeological finds and structures of the Anglian period are also ubiquitous in this area

2 7 2 The results of this assessment indicate that the proposed quarry development would have a moderate impact on the setting of known archaeological features in the vicinity and any additional archaeological resource that may be revealed through further landscape studies Furthermore, the view from the elevation of Cattenck Bridge following the route of the Coast to Coast walk adjacent to Area 1 would be detrimentally affected (Plate C)

3 THE GEOPHYSICAL SURVEY

3 01 The geophysical survey was undertaken on behalf of Tilcon (North) Ltd in accordance with instructions supplied by the Archaeology Section of North Yorkshire County Council The project brief specified geomagnetic survey of Areas 1, 2, 3 and 4 at a resolution of 1 0x0 5m (total of 11 ha, Figure 3) The geophysical survey was carried out between 14th and 25th April, 1997

3 1 Choice of Technique

3 1 1 The primary aim of the geophysical survey was to record any subsoil features that might be of archaeological interest and to compare the findings with the results of the desk study

Previous research has shown that in the majority of cases a significant magnetic susceptibility contrast exists between the undisturbed subsoil and the fill of cut features such as ditches and pits, as well as between the subsoil and stone features such as foundations and tracks The main processes at work appear to be iron oxide production in the plough soil, due to repeated burning, with further enrichment after burial as a result of microbial activity fueled by organic material Geomagnetic surveying should therefore be an appropriate and rapid technique for locating buried archaeological features in this instance

3 2 Field Methods

3 2 1 The geophysical survey was carried out in gridded units of 20x20m which were located with respect to permanent landscape features using a total station Wooden marker pegs were fixed in positions at grid intersections to aid the relocation of geophysical anomalies The geomagnetic survey was earned out by two teams using Geoscan FM36 fluxgate gradiometers fitted with ST1 sample triggers and utilised a zig-zag traverse sheme (Appendix IV provides further information about the technique)

3 2 2 Data were downloaded on site into a portable graphics computer for storage, quality control and initial interpretation These data were subsequently transferred to a laboratory computer for final processing and archiving

3 3 Data Processing

3 3 1 The GeoQuest InSite® software package was used to process the geophysical data and produce a continuous tone grey-scale images of the raw data in each area, at a scale of 1 1250 These results are shown in Figure 4 on a plan digitised from a development drawing supplied by Tilcon (North) Ltd A convention is used that shows positive magnetic anomalies as dark grey and negative magnetic anomalies as light grey Figure 4 includes a key which relates the grey scale intensities to anomaly values in nano Tesla per metre

3 3 2 The following basic processing steps were applied to the data

Removal of Striping Artifacts in the images caused by alternating changes in level between zig-zag traverses

Removal of Random 'Spikes' present in the data due to small ferrous objects or hred stone on or near the ground surface This process replaces spikes with the mean of near-neighbours

DeShear corrects for apparent shear in strong geomagnetic anomalies surveyed by zig-zag traversing

Correction for Drift in magnetometer calibration with time

Adjustment of Grid Mean Values to achieve an optimum match along the lines of contact between data gnds

Interpolation of the data, using a bilinear function, to generate a regular mesh of values at 0 25 x 0 25m intervals

Printing of the processed data on a Hewlett Packard HP650C Designjet plotter with 256 grey shades and 600 dpi resolution A sigmoid function was used to map the data to pnnted grey tones since this provides a measure of contrast equalisation

Appendix V provides more information about data processing and itemises the algorithms that were applied to produce the grey-scale images in Figure 4

3 4 Discussion Of Results

3 4 1 Key to Figures

A large number of significant anomalies have been detected in the data and these are presented on a 1 1250 geophysical interpretation plan using coded colours and patterns (Figure 5) The following types of anomaly have been distinguished

Green Significant regions of anomalously high magnetic field gradient which might be associated with high susceptibility, soil-filled structures such as pits, ditches and palaeochannels

Blue Areas of anomalously low magnetic field gradient, corresponding to features of low magnetic susceptibility, such as concentrations of sedimentary rock rubble, stone walls and field drains

Red Strong dipolar magnetic anomalies (paired negative-positive) which may reflect recent bonfires or dumps of material with very high susceptibility

Smaller examples are almost certainly due to near-surface iron objects such as horseshoes and have been ignored in the subsequent archaeological interpretation

A 1 1250 archaeological interpretation plan is presented in Figure 6 which includes a coordinate key Using the notation d for ditches, geo for geological features, fb for field boundaries and f for miscellaneous features, the following features are interpreted in Figure 6

3 4 2 Area 1

The following features have been identified in this area

1 This area is characterised by an E-W aligned texture of diffuse, positive and negative lineations which almost certainly reflect a disturbance to the topsoil and subsoil by modern ploughing

2 A well-defined negative magnetic lineation has been detected forming a curvilinear path in an approximately E W direction through the central part of this field This anomaly almost certainly reflects a plastic land drain

3 A weak, positive magnetic lineation has been mapped extending from H7 5 and K6 5, in a position south of the field drain described in 2 above This anomaly closely coincides with a possible ditched field boundary identified on air photographs and early edition OS maps (fb1)

4 A cluster of intense dipolar magnetic anomalies in the SW corner of this area probably denote buried metal services associated with the adjacent waterworks

5 A linear chain of strong magnetic dipoles adjacent to the western field boundary provides good evidence for a buried steel pipe in this locality

6 A weak positive anomaly extends east from K6 5 for a distance of approximately 50m and is thought to represent silted channel (c1)

7 A set of diffuse magnetic lineations parallel to the northern field boundary almost certainly reflect the development of a headland as a result of recent ploughing

8 The geophysical survey has provided no evidence for additional features of archaeological interest in this study area

3 4 3 Area 2

The following features have been identified in this area

1 A distinct, negative magnetic lineation has been detected traversing the held between B0 5 and D6 The magnitude and geometry of this anomaly are consistent with a modern plastic land drain

2 Several diffuse, lobate anomalies, with positive and negative amplitudes have been detected in this area for example those centred on E5 and C2 The appearance of these anomalies suggests that they are geological rather than archaeological in origin, these features are interpreted as possible changes in drift deposits (eg geo1 Figure 6)

3 Of particular archaeological interest is a network of strong, positive magnetic lineations which provide good evidence for a set of silted ditches which may have formed field boundaries or enclosures (d1,4,6,7 & 8 in Figure 6)

4 Ditches d1, d3 and d4 appear to be conjoined to form a trapezoidal enclosure or field measuring approximately 80m in diameter

5 Within the conjectured enclosure descnbed in 4 the survey appears to have located several additional ditch-like features which have been labelled f1, f2 and d9 in Figure 6 f2 may represent a rectangular sub-enclosure or the post holes of a timber structure associated with the main trapezoidal enclosure

6 A distinct negative magnetic lineation has been mapped from A-B3 to B2 with a flexure at C3 The polarity and form of this anomaly strongly suggests traces of a stoney field boundary (fb2) or drain

7 The geophysical survey has detected a pronounced set of N-S aligned magnetic lineations with typical spacing of 8m that almost certainly reflect the remains of a ridge and furrow ploughing

8 A number of compact positive magnetic anomlaies have detected, particularly in an area adjacent to the eastern field boundary These anomalies may indicate the presence of silted pits that may be associated with the field boundaries and enclosures described above

3 4 3 Area 3

The following features have been identified in this area

1 A strong patiern of ENE aligned magnetic lineations provides good evidence for a regime of medieval ndge and furrow with a typical spacing of 8m

2 Irregular magnetic anomalies centred at K2 and J3 are interpreted as providing evidence for geological features (geo2 & geo3 Figure 6) A further arcuate set of anomalies that extends SE from G2 to H3 may also be geological in origin

3 Of particular archaeological interest is a strong magnetic lineation that defines a sub-rectangular ditched enclosure f3, measuring approximately 50x45m, centred on G3 This enclosure may have an entrance in the NE corner Within f3 a further rectangular ditched enclosure has been detected which appears to have an opening at the SW corner

4 Attached to the southern side of enclosure f3 at G3 5 are a number of additional (and possibly contemporaneous) linear and sub-circular ditched enclosures

5 The sets of ditches described in 4 and the main enclosure f3 are connected to a parallel pair of ditches (defined by strong positive magnetic lineations) that traverse the study area in a NNE direction (d10) It seems possible that these ditches define a droveway or ceremonial avenue Some minor ditched features appear to be present within the corridor defined by the droveway or avenue

6 A sub-circular, positive magnetic lineation with diameter 15m has been located at I-J3 and is interpreted as representing a henge or ring ditch (f4 Figure 6) A number of minor pits or ditches may be located immediately NW of this feature

7 An intriguing pattern of approximately 36 circular positive anomalies have been detected between G2 and H2 immediately west of ditches d10 These anomalies are interpreted as reflecting a pattern of pits arranged in two rows with an ESE orientation, the configuration narrowing to the east (f6) Further lines of pits are positioned in the area between the rows thus dividing the intervening space

8 The geophysical survey has detected a second set of six pits in two rows (f5) immediately east of the feature f6 It is interesting to note that both rows of pits appear to be oriented towards the entrance of circular feature f4 suggesting that they are associated It seems likely that the pit avenue would have continued WNW beyond the area that has been geophysically surveyed with a possible additional pair of similar pits SE of f4 (J K3 5)

9 The geophysical survey of this area has detected a number distinct negative magnetic lineations, for example that traversing the field from J3 5 to F3 these anomalies almost certainly mark the presence of modern plastic field drains or water pipes

10 A segment of a substantial ditched enclosure has been detected in the NW corner of this survey area (d11) Comparison with the survey results obtained in Area 2 suggests that this ditch may be connected with ditch d1 passing under the buildings which border the northern part of the assessment area

11 Within the angle formed by d11 the survey has detected a circular anomaly with a diameter of c 5-10m This anomaly (f7) may reflect the presence of a small cairn

12 A weak negative magnetic anomaly extending from I1 5 to I-J4 corresponds with the position of a recorded field boundary (fb3)

3 4 4 Area 4

The following features have been identified in this area

1 A linear chain of intense dipolar anomalies in the south eastern corner of this field almost certainly indicates the presence of a buried metal pipe

2 Five large and intense dipolar anomalies detected near the northern margin of the field reflect the geophysical signatures of bonfires encountered during the survey

3 5 CONCLUSIONS OF THE GEOPHYSICAL SURVEY

The results of this investigation can be summarised as follows

3 5 1 A geomagnetic survey has been carried out over approximately 11ha of arable land in four fields near Brompton-on-Swale, North Yorkshire, as part of an archaeological assessment prior to a proposed extension of Scorton Quarry

3 5 2 The geophysical survey has detected a considerable number of subsoil archaeological features which confirm and add to those identified from the desk study However the chronological relationships between these features and thus their full interpretation can only be established through a programme of selective archaeological evaluation

3 5 3 The survey detected little of archaeological interest in Areas 1 and 4 possibly due to erosional and depositional effects of the nearby River Swale In contrast a high concentration of archaeological features were located within Areas 2 and 3 where fluvial processes have been absent

4 SUMMARY

4 1 An archaeological desk-based assessment and geophysical survey have been carried out as part of a mitigation strategy prior to the proposed extension to Scorton Quarry by Tilcon (North) Ltd Documentary and cartographic material relating to the immediate area have been examined in detail and the study extended to include records within a 2km radius of the development area

4 2 The desk-based assessment found a high probability that archaeological remains dating from the prehistoric, Roman and later periods may survive in the study area

4 3 In order to verify and augment the findings of the desk-based assessment, a detailed geophysical survey has been carried out of the four fields which together comprise the proposed development area

4 4 The geophysical survey confirmed that significant archaeological remains (largely in the form of silted pits and ditches) are present in the proposed development area A preliminary interpretation of the survey data has concluded that these features largely comprise the remains of prehistoric, Roman and medieval field systems, together with features of ceremonial function which may date from the prehistoric period

5 ACKNOWLEDGEMENTS

GeoQuest Associates acknowlege the assistance provided by Linda Smith (SMR Officer NYCC Heritage Unit) and Neil Campling (County Archaeologist NYCC) We are also grateful to John Earle (agricultural tenant) and Chris Mabbott (Tilcon North) for their co-operation and advice

6 BIBLIOGRAPHY

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Credits

Desk based Assessment C Martinez
Survey D N Hale, A J Butler, D Robertson
Survey Report M J Noel, A J Butler
Graphics C Martinez
Date 25th April 1997

Note Whilst every effort has been taken in the preparation and submission of this report in order to provide as complete an assessment as possible within the terms of the brief, GeoQuest Associates cannot accept any responsibility for consequences arising as a result of unknown and undiscovered sites or artifacts

Plate A: An oblique air photograph looking east, with Area 2 in foreground NGR: SE225996 (NYCC ANY160/07).

Plate B: view from the 'scarp' south to the River Swale, with Area 4 in the foreground. The curvilinear hollow can be seen as a dark shadow in Area 1 (rear).

Plate C: view from Catterick Bridge looking NE to the development area. The field in the foreground is adjacent to Bridge Farm and displays ridge and furrow.

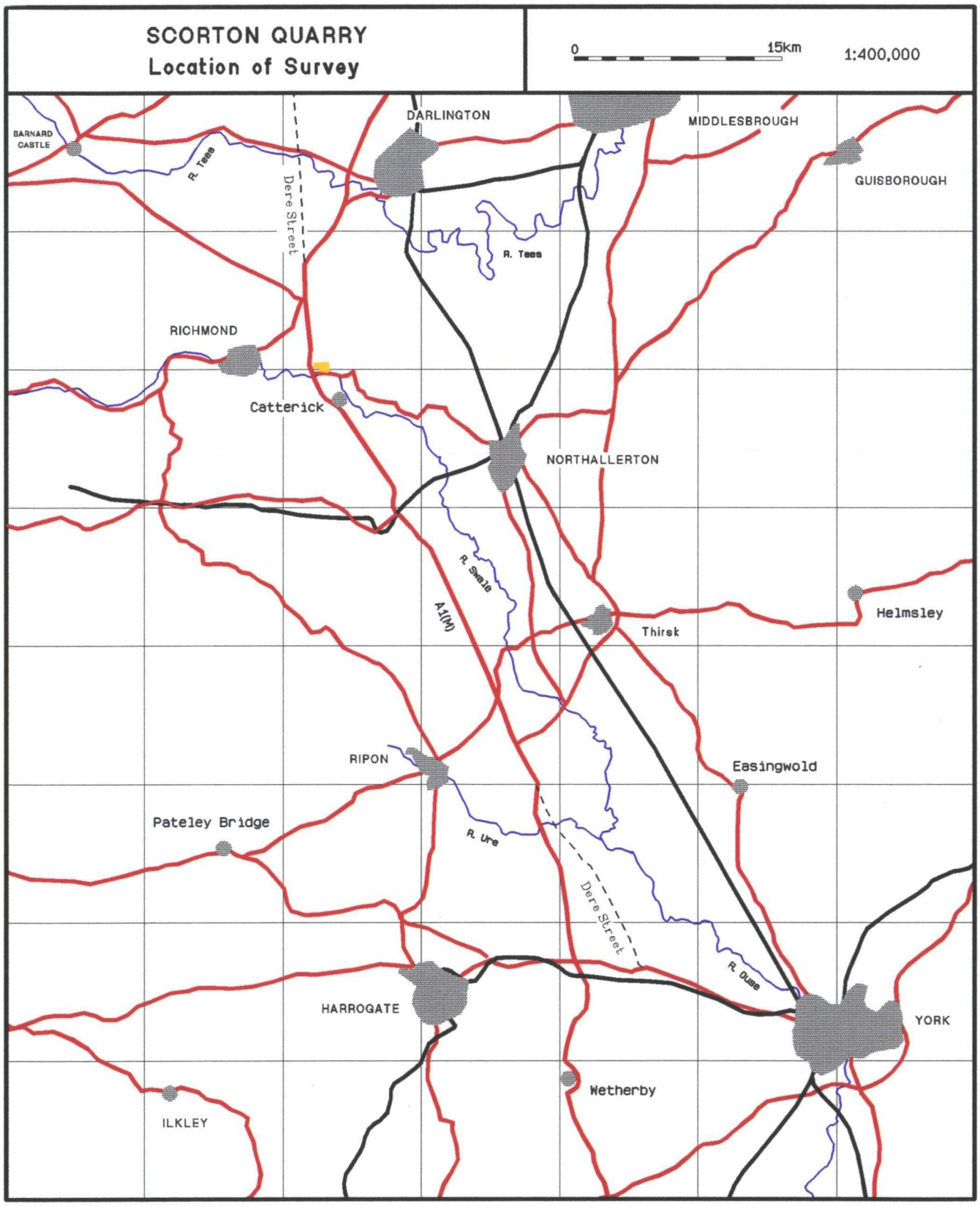

SCORTON QUARRY
Location of Survey
0
15km
1:400,000
DARLINGTON
MIDDLESBROUGH
GUISBOROUGH
BARNARD CASTLE
R. Tees
Dere Street
R. Tees
RICHMOND
Catterick
NORTHALLERTON
R. Swale
A1(M)
Thirsk
Helmsley
RIPON
Easingwold
Pateley Bridge
R. Ure
Dere Street
R. Ouse
HARROGATE
YORK
Wetherby
ILKLEY

FIGURE 1

SOORTON QUARRY EXTENSION
NORTH YORKSHIRE
SMR Information

N

1:10000

survey by GeoQuest ASSOCIATES

on behalf of TILCON (TILCON (NORTH) LTD)

13547

Dismantled Railway

Mount Pleasant

Robin Hood Farm

Nursery

Roman Road (course of)

Minto Grange

Roey Hill

Deepdale

Sand and Gravel Pit

Banks Lane

Mount Slowly

Springfield

Railway Cottages

Park Cottage

Oil Depot

Quarry (disused)

Primula Grange

White House

Citadilla

Roman Road

13528

13508

Howe Hill

Brompton Bridge

Mill Wash

Village Farm

Brompton North Bridge

Brompton South Bridge

Gatherley Road

Tancred Grange

13500

Brompton-on-Swale

Bridge Farm

Catterick Bridge

River Swale

13513

Factory

Playing Field

13511

Agricola Bridge

Roman Town

Roman Wall (remains of)

13512

Grand Stand

Solid House

13510

13526

13527

Leeming Lane

BROUGH WITH ST GILES CP

13503

Sand & Gravel Pit

Ash House

Catterick Road

13533

13522

13523

13541

13535

13507

13534

13531

13521

Ash House Plantation

Hostel

A66(T)

13541.01

13542.01

13542

Recreation Ground

13524

13525

Sand & Gravel Quarry

Pallett Hill Estate

13506

St Paulinus' Church

Wood House

Home Farm

Brough Park

13519

Swale Pasture Lane

Catterick

Sewage Works

Fish Ponds

FIGURE 2
Information from SMR

FIGURE 3

TOO LARGE TO SCAN

FIGURE 4

TOO LARGE TO SCAN

FIGURE 5

TOO LARGE TO SCAN

FIGURE 6

TOO LARGE TO SCAN

APPENDIX I - SOURCES CONSULTED

Archaeology Section North Yorkshire County Council

Sites and Monuments Record

Sheets SE29NW and NZ20SW parishes 1012/1013/1015/1039
MapInfo GIS system

Vertical Aerial Photograph Collection

Run no	Film no	Frame no	Date
29	64/72	204 5	17/7/72
29	17/72	185 6	21/3/72

Oblique Aenal Photograph Collection

Box code	Photo code	Date
SE29(N)	ANY9/1 ANY9/4 ANY9/5 ANY160/7 ANY93/5	
NZ20	CUC DQ6S	10/7/49
Slides	ANY7/22 ANY7/23 ANY7/24	

Parish Files

Parish name	Pansh no
Brompton on Swale	1012
Brough with St Giles	1013
Catterick	1015
Scorton	1039

North Yorkshire Records Office

Ordnance Survey Maps

OS Edition	Date	Scale	Sheet no
first	1857	6 to 1 mile	39 & 54
first	1893	25 to 1 mile	39(16)
second	1913	25 to 1 mile	39(15 & 16)
third	1928	25 to 1 mile	39(15 & 16)

Tithe Maps and Deposited Plans

Brough	MIC 2015 357 361
Brompton on Swale	MIC 2066 242 244
Scorton	MIC 1800/29 35
Area around Brompton on Swale and Scorton	MIC 1565

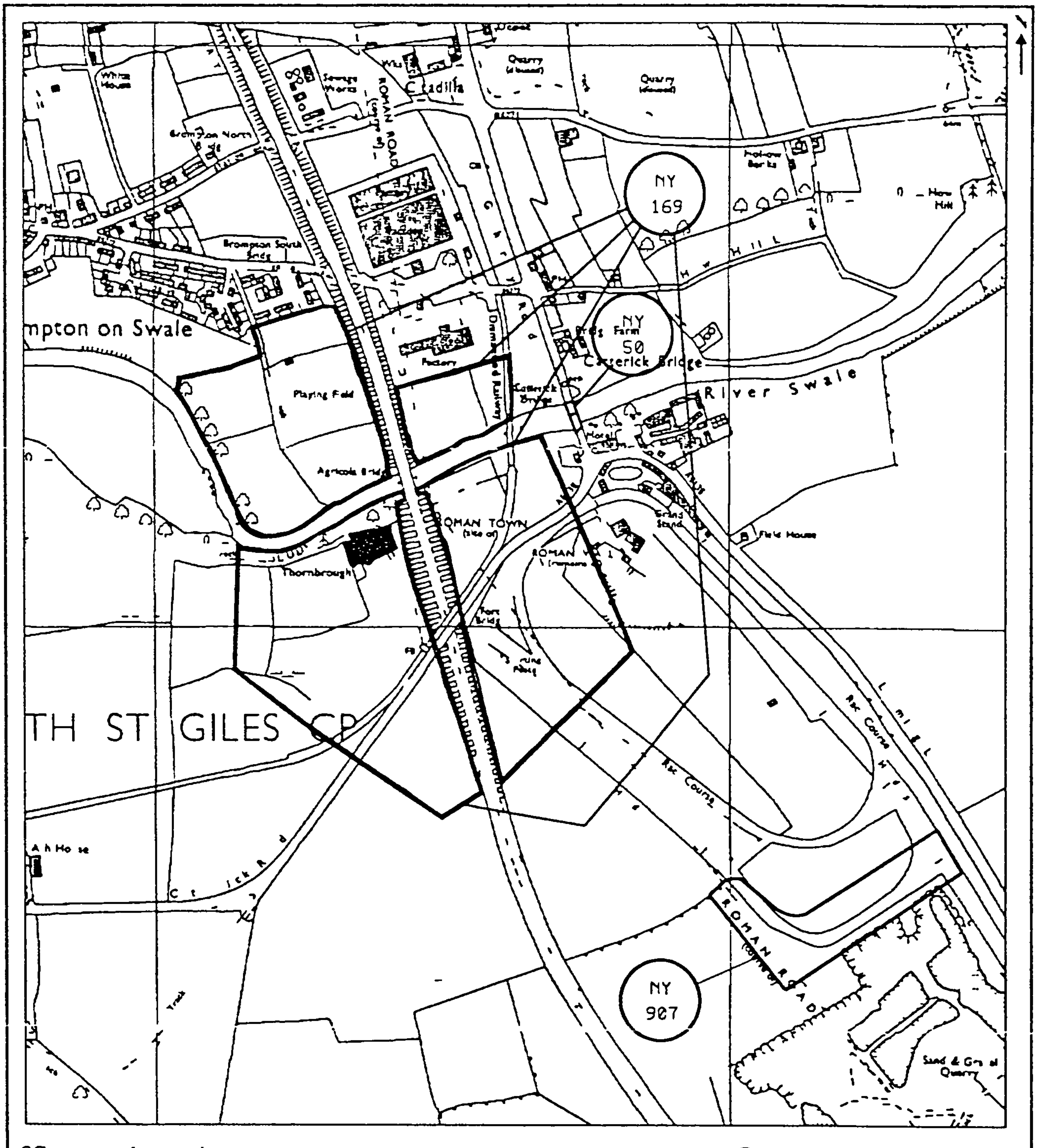
APPENDIX II - SUMMARY OF SMR DATA

SMR number	Location	Class	Date	Gnd ref	Notes
13500	St Giles Brough	hospital	medieval	SE20919967	SAM NY305
13503	Brough	ditch	unknown	SE22699875	cropmark
13506	Cattenck	village	multi	SE24090800	
13506 04	Cattenck	motte and bailey	11th century	SE23969803	earthwork
13507	Thrummy Hills Catterick	cemetery? along road	Roman	SE23009850	doc note of tumuli
13508	Howe Hill Brompton on Swale	round barrow?	Bronze Age?	SE23429975	
13510	*Cataractonium* Brough	town	Roman	SE22509912	SAM NY169
13510 00005	*Cataractonium* Brough	brooch	Saxon	SE22509920	found near a Grubenhaus
13510 01	*Cataractonium* Brough	town bath house/ mansio/ complex	Roman	SE22509912	excavated prior to A1 building
13510 02	*Cataractonium* Brough	fort	2nd century Antonine	SE22359910	excavation
13510 022	*Cataractonium* Thornborough Brough	fort and town	Roman	SE22409912	excavation
13511	*Cataractonium* North Brompton on Swale	Town bank and ditch defence	3rd century	SE22459935	spreading to E and N
13511 1/ 101 / 11	*Cataractonium* North Brompton on Swale	ditch and turf rampart	Roman	SE22459942	excavation supposed 4 ditch defences of Antoine fort Not found by trial poss boundary ditches from Dere St
13511 111	*Cataractonium* North Brompton on Swale	timber gate	2nd century	SE22459941	excavation
13511 112	*Cataractonium* North Brompton on Swale	rampart	2nd century	SE22399933	excavation
13511 1201	*Cataractonium* North Brompton on Swale	house?	4th 5th century	SE22459942	excavation fronting Dere St
13511 1202	*Cataractonium* North Brompton on Swale	house?	4th 5th century	SE22459940	excavationencr caching Dere St
13511 1203	*Cotaractonium* North Brompton on Swale	temple?	4th	SE22469940	excavation

13511 15	Dere Street Brompton on Swale	road	Roman	SE22449943	excavation cropmark
13511 3	Cattenck Bndge Brompton on Swale	houses?	3rd 4th century	SE22649942	excavation
13511 31	Catterick Bridge Brompton on Swale	ditch poss bridgehead defences	1st century	SE22639940	excavation
13511 321	Cattenck Bridge Brompton on Swale	causeway	3rd 4th	SE22639940	excavation
13511 331	West of Catterick Bridge Brompton on Swale	revetment/ nver wall	3rd 4th	SE22659941	excavation boundary of settlement
13511 34	Catterick Bridge Brompton on Swale	cemetery	3rd 4th century	SE22689942	excavation
13511 411	Cataractonium North Brompton on Swale	ditches and banks	Roman	SE22359945	at right angles to Dere St excavation and geophysical survey
13511 42	Cataractonium North Brompton on Swale	burials in ditches and banks	Roman	SE22359945	excavation
13512	Leeming Lane/Field House Brough	marching camp	1st 2nd century	SE23159910	crop and geophysical survey
13513	Catterick Bridge	Bndge and chapel /ovatory	1422 5 & later Elizabethian rebuilding	SE22759936	SAM NY50 /Listed Building Grade II
13513 01	Brough	Chapel of St Anne	medieval	SE22759932	
13518	Cattenck Tnangle	Ditch /land boundary and possible kiln	2nd 3rd century	SE23479775	excavation
13518 05	Catterick Tnangle	ndge and furrow	medieval to post medieval	SE23269785	extant and geophysical survey
13519	Palet Hill Quarry Catterick	road segment	Roman	SE23419802	shown in quarry face
13521	Catterick	enclosures and internal features	Iron Age	SE23249S44	quarned after excavation
13522	Catterick	rectangular enclosure and hut circle	Iron Age	SE23179856	cropmark partly within SAM NY907
13523	Catterick	postholes	Iron Age	SE23239851	excavation
13524	Cattenck	road segment	Roman	SE23149837	excavation

13525	Catterick	well	Medieval	SE23209816	excavation
13526	Race Course Brough	Vicus? Settlement and burials	Roman	SE22849886	geophysical survey
13527	Race Course Brough	ditch	unknown	SE23059893	excavation
13528		natural		SE22339981	excavation
13530	Catterick	sherds	multi	SE23609762	
13531	Brough & Catterick	enclosure? ditch and pit like anomalies	unkown	SE22729852	geophysical survey
13533	Brough	two circular enclosures		SE22769856	cropmarks
13534	near Dere St Brough	ditches	Roman	SE22909854	geophysical survey and cropmarks square enclosures
13535	Brough	ditch		SE22749852	geophysical survey East of poss enclosure
13537	Catterick	pits?		SE23159780	geophysical survey
13538	Catterick	sherds	Roman to post medieval	SE23509750	
13541	Brough	sherds	Roman to post medieval	SE22609845	
13541 01	Brough	Flint assemblage	Prehistoric?	SE2260459839	
13542	Brough & Cattenck	sherds	Roman to post medieval	SE22759825	
13542 01	Brough & Catterick	pits?		SE22689834	geophysical survey
13542 1	Brough & Catterick	ridge and furrow	medieval to post medieval	SE22779821	geophysical survey
13547	Scorton	Scorton Cursus	Neolithic	NZ24050042	crop and excavation

APPENDIX III - SCHEDULED MONUMENTS



For identification purposes only

English Heritage
Historic Buildings & Monuments Commission for England
Fortress House 23 Savile Row London W1X 2HE
Telephone 01 734 6010

Key	☐ Location/extent of site
	■ Excluded area --
Extract from OS sheet SE29NW	Date 20 7 89
Scale 1 10000	NGR SE22639909
Derived from 1 10000	County No NY169

APPENDIX IV - PRINCIPLES OF GEOMAGNETIC SURVEYING

Geomagnetic prospecting detects subsurface features in terms of the perturbations or 'anomalies that they induce in the Earth s magnetic field In contrast to resistivity, seismic or electromagnetic surveying no energy is injected into the subsoil and hence this is one of a class of passive geophysical techniques that includes gravity and thermal surveying Two types of magnetic anomalies can be distinguished

1 Anomalies arising from variations in magnetic susceptibility which will modulate the component of magnetisation induced in the subsurface by the Earth's magnetic field For most archaeological sites this is the dominant factor giving rise to geomagnetic anomalies In general susceptibility is relatively weak in sediments, such as sandstones and enhanced in igneous rocks and soils especially those which have been burnt or stratified with organic material

2 Anomalies due to large permanently magnetised structures Such permanent magnetisation or remanence arises when earth materials are heated to above ~600°C and cooled in the geomagnetic field Thus kilns and hearths are often detected as strong permanent magnets causing highly localised anomalies that dominate effects due to background susceptibility variations Remanence can result from other physical and chemical processes but these give rise to anomalies that are usually unimportant for geophysical prospecting

There are several approaches towards the practical measurement of geomagnetic anomalies In this study measurements were made using a Geoscan FM36 fluxgate gradiometer which records the change with height in the vertical component of the Earth's magnetic field as shown overleaf This method has the advantage of being insensitive to diurnal variations while the Geoscan instrument also benefits from an integrated data logger Note that in mid northern latitudes the magnetic anomaly will be asymmetric with the main peak displaced to the south of the archaeological feature Thus, a ditch filled with a soil of enhanced susceptibility, for example, will generate a positive anomaly to the south mirrored by a weak negative anomaly north of the feature When portrayed as an area map of grey tones this gives rise to a shadowing or pseudo relief effect which must be borne in mind when making an archaeological interpretation

Two techniques can be used to survey gridded areas using the fluxgate magnetometer In the parallel method the instrument is used to scan the area along traverses which are always in the same direction This method minimises heading errors due to operator and instrument magnetisation but is time consuming The alternative zigzag method is significantly faster and suitable for areas where anomalies are large compared to these and other sources of error

APPENDIX V - DATA PROCESSING

PROCESSING THE SURVEY DATA

The geophysical images contained in this report were prepared within Microsoft Windows® using the InSite® program published by GeoQuest Associates Geophysical images were then placed onto a map which was digitised from the Ordnance Survey, edited and then plotted using a computer aided drafting (CAD) system and colour inkjet printer

Data were downloaded from the meter to a portable computer m the held for storage, visualisation and quality control (QC) assessment These data were then transferred to a laboratory computer for hnal processing printing and archiving

A number of process steps have been applied to the geophysical data obtained during the survey and those which have been used are linked to the mam flow path by arrows Steps were applied in the order shown and are designed to reduce artifacts in the data and enhance geophysical features of archaeological interest The following sections describe each step in more detail

REMOVE STRIPING

Reduces a data artifact comprising alternating changes in level in readings logged along zig zag traverses This artifact is common in fluxgate magnetometer data InSite uses a proprietary algorithm to reduce this error

INFILL SMALL BLANK AREAS

Fills isolated blank data cells with the mean of near neighbours or a suitable approximation entered manually Small blank areas will have been logged if it was not possible to obtain a geophysical reading over for example a manhole cover m the case of a resistivity survey

REMOVE SPIKES

Replaces isolated anomalously high or low values with the mean of near neighbours or a suitable approximation entered manually Spike' readings are commonly associated with ferrous litter or poor electncal contact in the case of geomagnetic and resistivity data respectively

REDUCE WALK HARMONICS

Reduces a regular oscillation in traverse data caused by walking movements of the operator during a geomagnetic survey InSite employs a fast Fourier transform to determine the optimum amplitude and phase of the walk induced harmonic which is then subtracted from each traverse

REDUCE SHEAR ARTIFACTS

Corrects for apparent shear in geomagnetic anomalies surveyed by zig zag traversing in a geomagnetic survey The shearing effect arises from the interaction of the operator + magnetometer with the geomagnetic held and also from the lag m the

instrument response to changes in the field InSite uses a proprietary algorithm to reduce this error

CORRECT FOR METER DRIFT

Corrects for a linear drift in the meter calibration with time Such drift is a common problem with fluxgate magnetometers particularly during periods of rapid air temperature change InSite uses least squares regression on the mean of data along each traverse to estimate the change m calibration level across each grid This gradient is then removed from the data

ADJUST GRID MEAN LEVELS

Adjusts for differences in the mean level in data grids due to changes in instrument calibration (fluxgate magnetometer survey) or alteration in remote electrode spacing (resistivity survey)

INTERPOLATE AND COMBINE

Combines grids to form an array of regularly spaced data on a square mesh InSite uses bilinear interpolation to accomplish this

LOW PASS FILTER

If this process task is indicated then a 3x3 or 5x5 boxcar filter has been used to smooth the data and reduce noise or speckle seen in the original image

HIGH PASS FILTER

If this process task is indicated then a 3x3 or 5x5 filter with appropriate coefficients, has been used to pass short wavelength information into the resulting image

EDGE DETECT FILTER

Signifies that a Sobel, Laplace or other specialised filter has been applied to enhance significant lateral transitions in the geophysical image

DIRECTIONAL FILTER

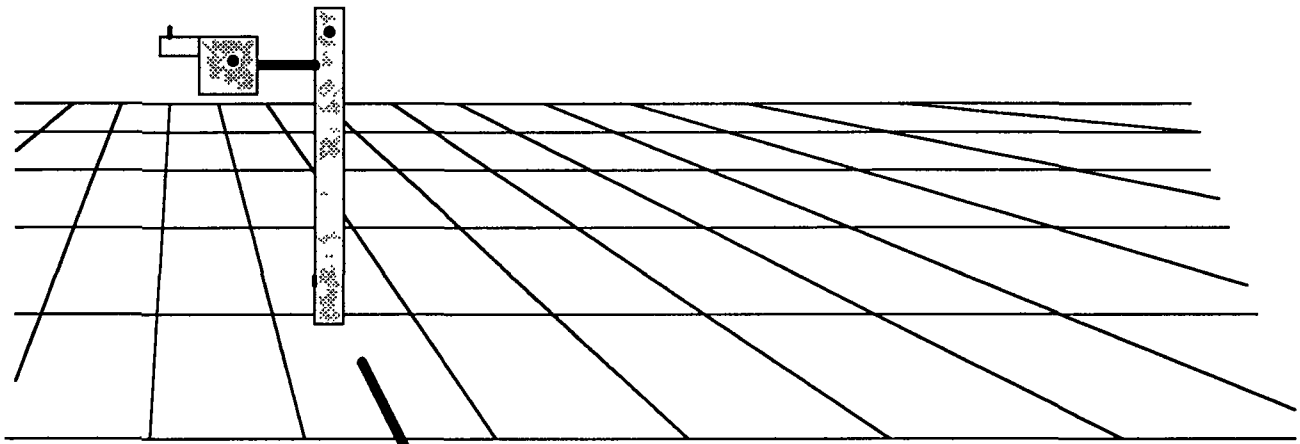
This filter is equivalent to illuminating the data from one direction to produce a pseudo relief image Directional filtering is usually employed to aid the identification of subtle anomalies in resistivity data This filter highlights features trending at right angles to the direction of illumination

NOTE

GeoQuest Associates can supply the geophysical images presented in this report in a variety of digital formats for visualisation on microcomputers running Microsoft Windows These formats include the TIFF BMP and PCX standards Please complete the request form at the rear of this report if you would like to receive such image files

APPENDIX V - DATA PROCESSING

InSite



FIELD PC

LAB PC

QC

DATA ARCHIVE

IMAGE RAW GRID DATA

REMOVE STRIPING

INFILL SMALL BLANK AREAS

REMOVE SPIKES

REDUCE WALK HARMONICS

REPORT FIGURE 4

INTERPOLATE AND COMBINE

ADJUST GRID MEAN LEVELS

CORRECT FOR METER DRIFT

REDUCE SHEAR ARTIFACTS

PROJECT Scorton Quarry Extension

SITE Areas 1 4

NOTES

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